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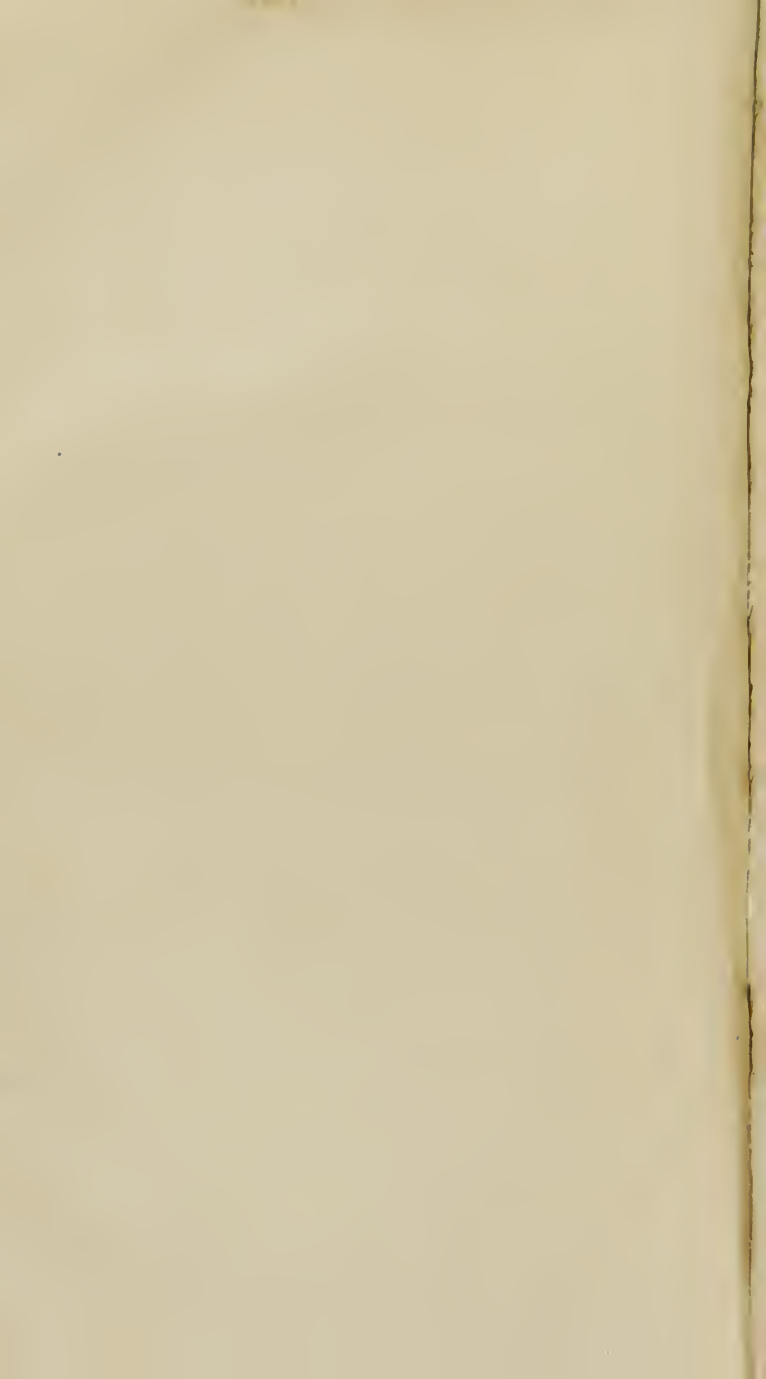
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S Y S T E M

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S U R G E R Y.

EXTRACTED FROM THE WORKS OF

BENJAMIN BELL, OF *EDINBURGH*:

BY NICHOLAS B. WATERS, M. D.

FELLOW OF THE COLLEGE OF PHYSICIANS OF PHILADELPHIA,
AND ONE OF THE PHYSICIANS AND SURGEONS
TO THE PHILADELPHIA DISPENSARY.

ILLUSTRATED WITH NOTES AND COPPER-PLATES.

SECOND EDITION.

PHILADELPHIA:

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No. 21.

District of Pennsylvania, to wit:

BE it remembered, that on the nineteenth day of August, in the sixteenth year of the Independence of the United States of America, Thomas Dobson, of the said district, hath deposited in this office the title of a Book, the right whereof he claims, as proprietor, in the words following, to wit:

“ A System of Surgery, extracted from the Works of Benjamin Bell, of Edinburgh: by Nicholas B. Waters, M. D. Fellow of the College of Physicians of Philadelphia, and one of the Physicians and Surgeons to the Philadelphia Dispensary.--Illustrated with Notes and Copper-plates.” In conformity to the act of the Congress of the United States, intituled, “ An act for the encouragement of learning by securing the copies of Maps, Charts, and Books, to the Authors and Proprietors of such copies, during the times therein mentioned.”

SAMUEL CALDWELL, Clerk
of the District of Pennsylvania.

P R E F A C E.

SURGERY teaches us the knowledge of all those diseases which require manual operations for their removal; their causes; and the methods of preventing and of curing them.

For some years past it has been a subject of regret with the medical part of the public, and particularly among students, that we have had no work on this important branch of medicine, which gives a view of the present state of the art, in a moderate compass: Mr. Bell's system, although a most valuable production, being extended to so great a length, as to be not only expensive, but exceedingly inconvenient.

To supply this defect, I have repeatedly heard a wish expressed, by some of the most eminent of the profession, that a selection of the more essential parts of Mr. Bell's treatise were made; in which, however, nothing useful, immediately relating to Surgery, should be omitted.

Although well aware that I might not execute a work of this kind in such a way as to obtain the approbation of the critical reader, yet the belief, however mistaken, that it might be done by any person tolerably acquainted with the subject, if not in the best manner with respect to language, at least in such a manner as to be highly useful; the late Dr. Jones, formerly professor of surgery in King's College, New-York, cheerfully engaging to look over the manuscript, and add occasional observations,* furnished by his own experience; Dr. William Shippen, professor of anatomy and surgery, also obligingly promising to de-

vote

* These will be readily distinguished from such as I have given myself, which consist chiefly in extracts from different authors of merit.

vote a part of his leisure to the perusal of the work; I determined to risk the undertaking. How far I have succeeded in the attempt, must be left to the decision of my medical brethren.

Those who cannot readily conceive that the essential parts of a performance of seven volumes can be comprised in a single one of the same size, will please to consider, that this one volume, from the manner in which it is printed, contains at least as much as any two of the original; and that the anatomical descriptions, descriptions of operations and practices which are, at present, seldom if ever employed, theoretical discussions, and repetitions, which, taken together, occupy no small part in the work of Mr. Bell, are entirely omitted.

As Mr. Bell expresses his opinion somewhat differently, on the same subject, in different places, I may sometimes appear to have justly incurred the censure of misrepresentation; but I beg that in such instances, a judgment may not be formed without a previous attention to every thing that is delivered on the subject in question.

Following the general plan of the original treatise, I have attempted no systematic arrangement of the diseases to be considered; because these have seldom much connection in their general symptoms, or in their respective modes of cure. When, indeed, the different subjects appeared to be connected, or illustrative of each other, they are generally treated of in immediate succession.

After noticing the appearance or symptoms of the disease, its usual and known causes are considered; its probable consequences; and the best method of treatment: And when an operation of importance is described, the parts which should be avoided, as well as those that are to be divided, are particularly pointed out.

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SYSTEM OF SURGERY.

C H A P. I.

On Inflammation and its Consequencs.

SECTION I.

Of the Symptoms, Terminations, and Causes of Inflammation.

EVERY organized part of the body is liable to inflammation; but as the treatment of this affection, when seated in the internal parts, belongs to the province of medicine; we propose in this place, merely to consider the complaint, with its consequences, as it is most frequently observed to occur externally. And as the greater part of the phenomena which in general attend it, will be understood from the consideration of Phlegmon, we shall confine our observations more particularly to that species of the disease.

Phlegmon is a circumscribed tumor, attended with heat, redness, tension, and a throbbing pain; and, if extensive, with fever.

When these symptoms are removed, and leave the part unaltered in its structure, the disease is said to terminate by *resolution*.

If however, in a short time all the symptoms are augmented, and the tumor becomes soft, somewhat prominent

in the middle, or towards the most depending part, acquires a clear, shining appearance, and becomes less painful; the different symptoms of fever then abate, and upon pressure a fluctuation is perceived; the inflammation is then said to end in *suppuration*.

But if all the symptoms, general as well as topical, except the swelling, continue to increase, there will be reason to apprehend that *gangrene* will soon take place.

Gangrene, or mortification, is first indicated by a change of colour in the part affected, from a bright red to a livid or leaden cast, while small vesicles, containing a thin acrid serum, are dispersed over its surface—the pain abates and the pulse sinks—but continues frequent—the tumor at last loses its tension—turns black and flaccid—and the part is entirely deprived of its vital properties.

These are the most common terminations of inflammation; but sometimes, though very rarely, it ends in *schirrus*.

The general exciting causes of inflammation, are whatever tend to produce irritation and pain. They are either external or internal. The external causes are, wounds of all kinds; bruises; burns, whether by the actual or potential cautery; corrosive and stimulating applications, as strong acids, cantharides, and rubefacients; ligatures, and tumors that act as ligatures; violent exercise of a particular part; and cold partially applied. The internal causes are morbid matters of various kinds; as those of syphilis, small-pox, measles, scrophula, and fevers.

Those circumstances which seem to give a predisposition to inflammation are, a full plethoric habit of body, induced by a very nourishing diet, or by want of exercise; or perhaps by a combination of both—Inflammation occurs also more frequently in young than in old people, and in men than in women.

The proximate cause of inflammation seems to consist in an increased action of the arteries of the part; and when the

the disease does not originate from the application of irritating substances, this, as well as the increased action of the heart when it occurs, seems to be supported by a spasm or constriction of the extreme vessels, either of the particular part or of the general system. See *Cullen's Pract. Physic.* vol. I.

In almost every case of external inflammation, the prognostick may be favourable. For if resolution, which is the easiest and most desirable mode of termination, is not effected, suppuration will most readily be the consequence; and the danger attending that, if the constitution is otherwise healthy, is seldom great:—When, however, the disease is extensive, and the symptoms very violent, there is much danger to be feared; for, independent of the risk from the fever itself, if the symptoms continue high for any length of time, without shewing a tendency to resolution or suppuration, gangrene will pretty certainly follow: and in what manner that may terminate is always uncertain.

S E C T. II.

Of the Treatment of Inflammation by Resolution.

IN the cure of phlegmon, the first indication in general is to promote resolution. There are, however, some cases in which this is not to be attempted. Thus inflammatory swellings, that succeed to fevers, and other internal disorders, should always be brought to suppurate as early as possible: as it is generally supposed, that nature by these points out an outlet for some superabundancy of fluids; and that it might be attended with danger to give her any interruption. And in phlegmons occurring in scrophula, we should trust entirely to the operations of nature; for if they are repelled, bad consequences might ensue; and if brought to suppuration they produce sores very troublesome to heal.

In cases of incipient phlegmon, where the general system is not affected, topical remedies merely, with a proper attention to regimen, will often accomplish a resolution. But when the effects of the disease are in any considerable degree extended to the whole system, it becomes necessary at the same time to pay attention to these.

The first circumstance to be attended to in every case, is the removal of all exciting causes that continue to operate. Of applications to the part, those of a sedative nature are chiefly to be depended on; and next to these, emollients. Of the former may be considered the preparations of lead dissolved in vinegar, and the vegetable acid. Of the latter, all the bland expressed oils, alone, or joined with wax, in form of a soft ointment.

With respect to sedative applications, it is not meant to recommend the whole class in external inflammation. Thus opium, one of the most powerful sedatives, when applied externally, always produces some degree of irritation; and although it perhaps may have been very useful in some species of inflammation; yet it will probably never become of general use in such diseases.

Warm emollient fomentations too, although more powerful, as sedatives, in removing tension and pain, than any other remedy; yet from experience, I am well convinced they always tend to produce suppuration; and when this is not occasioned, they leave such a relaxation in the parts, as renders the complete removal of the disease exceedingly tedious.

Similar objections may be made to most sedative applications. They do not, however, operate against the use of the preparations of lead; which we may affirm, from the experience of a great many practitioners, to be by far the most serviceable remedies as discutients, that have yet come into general use. They have been said to produce deleterious effects in some instances; but these have been

very

very rare; and I have known the greater part of the surface of the body to be covered with them for weeks, without any bad consequences being occasioned by them.

Saccharum saturni, or the sugar of lead, as being the preparation whose strength can be most exactly ascertained, should be preferred to any of the others. It is most conveniently applied in the form of a watery solution; for the preparation of which the following proportions in general answer very well: R. Sacch. Saturn. ℥ss solve in aceti ℥iv. & adde aq. fontis distillat. ℔ij. The addition of vinegar renders the solution more complete.

Mr. Goulard's vegeto-mineral water is preferred by some to this preparation: it is made by adding two tea spoonfuls of the *Extractum Saturni* to a quart of water, and four tea spoonfuls of brandy. The quantity of extract or brandy to be diminished or increased according to the nature of the disease, or sensibility of the part. Cataplasms made of these preparations and crumb of bread, should be constantly applied, as cold as the patient can bear them without uneasiness, and be renewed whenever they become hard. When the inflamed part is not very tender, or lies deep, the vegetable acid instead of the lead answers very well; and an alternate use of this and the lead has, in some instances, appeared to be more serviceable than a continuance of either separately. If, however, the sensibility of the part does not admit of poultices, doubled pieces of soft linen, moistened with the saturnine solution, should be substituted to them.

Emollients tend greatly to remove inflammation: but as they are less efficacious than the preparations of lead, and always blunt the action of these, they should never be employed except the tension, irritation, and pain are very considerable: when any of the mild expressed oils may be gently rubbed over the inflamed parts two or three times a-day.

Topical bleeding should always be employed when the inflammation is extensive: and the blood should be drawn from a part as near as possible to the disease. Rest should be enjoined—and the use of animal food, and of spirituous and fermented liquors, strictly forbid. And,

When a considerable degree of fever comes on, it will be proper to order *general bleeding*, gentle laxatives, and cooling diaphoretics. We should then procure ease to the patient by the exhibition of opium in *large doses*.

By these means, in the course of a few days, resolution of the tumor will gently begin to take place. The same plan should then be pursued, but with caution; because, if suppuration should at last be produced, its progress will be rendered slow and uncertain by debilitating the system, and the patient will not be capable of supporting the consequent discharge, should it be considerable.

Although we may generally determine, in the course of three or four days, whether the disease will end in resolution or not; yet it must be observed, that inflammations in tough membranous parts, often continue a considerable time without shewing any tendency to termination: In such cases, we should never be deterred from a perseverance in the use of resolvents, unless the symptoms of suppuration commence, gangrene is threatened, or an incurable obstruction is feared; when suppuration should always be encouraged as much as possible.

S E C T. III.

Of Suppuration.

SUPPURATION is that process by which the contents of tumors and ulcers are converted into a whitish, thick,

thick, opaque, and somewhat foetid matter, termed *Pus*. This, by many, has been supposed to be effected entirely by a natural exertion of the system; but experience teaches us, that art is capable, in all cases, of giving considerable assistance.

With respect to the formation of pus, various opinions have been entertained. By some, pus has been believed to consist in a dissolution of the blood-vessels, nerves, and other solids, in the fluids of inflamed parts. Others, have supposed it to be *formed* in the blood; and that it is from thence secreted into abscesses, wounds, and ulcers. But the most probable opinion is, that pus is produced by a certain degree of fermentation upon the ferous part of the blood, after its separation into the cavities of ulcers and abscesses; and this, in consequence of the natural heat of the part, or of heat artificially applied. And it is further rendered probable by experiment, that as the serum is deposited more or less free from fat, red globules, &c. it will yield a pus more or less pure or vitiated. Vide *Cullen* and *Pringle*.

When suppuration is to be promoted, all the means of producing resolution must be laid aside. But as a certain degree of inflammation is found necessary for the formation of pus, it will be improper to let the inflammatory state subside suddenly. The diet of the patient should therefore be regulated by the circumstances of phlogistic diathesis, or of debility which seem to prevail; and, such applications should be made to the inflamed parts as tend to preserve in them a proper degree of heat. This last is a circumstance of the utmost importance—And the experiments of Mr. Gaber and myself on serum out of the body, and of myself on inflammatory tumors in the body, have made it evident to me, that the greater the heat is, to a *certain extent*, the sooner suppuration will take place. From hence it probably happens, that swellings near the heart suppurate in much less time than those more distant
from

from it; and the want of a due degree of heat, perhaps, prevents the greater part of soft swellings from coming to suppuration; which then form atheromata, steatomata, and melicerides.

Warm fomentations and cataplasms are the means generally used for the application of heat to phlegmons: and when they are frequently renewed, they answer the purpose very effectually. But if they are not applied more than once or twice a-day, it is probable they do more injury than good. For as soon as the heat they at first possessed is dissipated, the moisture they support, with the consequent evaporation, must always render the part colder than if it had been merely wrapped up in flannels.

In order to receive advantage from these remedies, the parts affected should be well fomented with flannels, pressed out of some emollient decoction, and applied, as warm as the patient can bear them, continued half an hour at once, and renewed four or five times a-day. Immediately after the fomentation, a large emollient poultice should be applied warm, and renewed every two or three hours. Bread and milk, with a little butter or oil, in common, forms the most eligible poultice.

When there is a defect of inflammation in the tumor, roasted onions, garlic, &c. may be added to the poultices; but strained galbanum, or some other of the warm gums, dissolved in the yolk of an egg, or a small portion of cantharides, are much more elegant and efficacious additions. Plasters of the warm gums are useful, and become necessary substitutes to the poultices, if the patient cannot be confined within doors.

Dry cupping, i. e. cupping without scarification, upon, or as near as possible to the affected part, in cases where inflammation is defective, is also eminently serviceable.

These applications should be continued, until suppuration takes place; which seldom fails to be the case, in a longer or shorter time, according to the circumstances of the disease—The formation of matter is indicated by a remission of all the symptoms. The throbbing pain goes off, and a more dull and constant pain succeeds; the tumor becomes pointed at some particular part, generally near the middle, where, if the matter is not contained in a cyst, or very deep-seated, a whitish-yellow appearance is observed; and a fluctuation of fluid is plainly perceived upon pressure. In addition to these local symptoms, whenever a large collection of pus is formed, frequent shiverings almost constantly occur.

In the treatment of collections of matter or ABSCESSES, it is a general rule never to open them, until a thorough suppuration has taken place; for if it is done before, they never heal kindly. An exception to this rule occurs in the treatment of critical abscesses that are produced in malignant fevers, and in the plague—These should be opened as soon as it can be ascertained that there is a deposition of fluid. And collections of matter on the joints, or over the cavities of the breast or belly, especially if they run deep, ought to be discharged as soon as any fluctuation can be perceived. Because, when the resistance on every side is equal, they may as readily pour out their contents internally as externally; and the consequence of a large abscess, bursting into either of the large cavities, is commonly fatal.

Abscesses have usually been opened either by *Caustic* or *Incision*. With respect to the caustic, it is not attended with any superior advantage to a simple incision: It gives much more pain; it is more slow in its effects; and it is impossible always to confine its operation to those parts which were alone intended to be affected. On account

of these inconveniencies, incision with a lancet or scalpel, is very generally preferred to it.

When the swellings are not very large, they are commonly opened by an incision, extending two-thirds of their length, and terminating at their lower extremity: but abscesses of considerable extent should be laid open their whole length. It has been advised by some, to take away a part of the teguments, when they are very much stretched; but this can very seldom be necessary or proper—never indeed, unless the parts are completely dead.

The inconveniencies of opening abscesses with the knife, arise from the suddenness of the discharge of their contents, and the admission of air to the ulcerated surface. The first occasions faintings, and other disagreeable symptoms, and the latter often induces an astonishing change in the discharge, from a well digested pus to a thin sanies; and that sometimes within so short a space as forty-eight hours; and afterwards, if the tumor has been very large, a hectic fever, which either proves fatal in a short time, or terminates in confirmed phthisis. It seems probable that the air produces these effects by its irritation; by stimulating the vessels to a greater absorption, and by rendering the matter to be taken up more putrid.

None of these bad consequences of incision and caustic, follow the use of the *seton*. It therefore, with propriety, claims a preference to both of them. When the seton is employed in opening abscesses, there is little or no surface of the sore exposed to the air; a gradual discharge is occasioned; it is attended with very little pain and inflammation; produces a very small cicatrix; and generally completes a cure in half the time necessary to accomplish it when incision or caustic are used.

The seton is to be formed as follows:—An opening sufficiently large for the cord, being made with a lancet in the superior part of the abscess, a director, slightly curved, and having an eye at one end, threaded with

a cord of candle-wick cotton, or of soft silk, proportioned in thickness to the size of the tumor, is then to be introduced, and its point to be pushed downwards until it is felt externally, exactly opposite to the most depending part of the swelling. The director being kept firm by an assistant, an incision is to be made with a scalpel upon its lower end, somewhat *larger** than the opening first made. The director is now to be withdrawn downwards, with so much of the cord as will leave two or three inches of it hanging out of the lower orifice. In about twenty-four hours after the introduction of the cord, and daily afterwards, so much of it should be drawn downwards as will admit of all that part of it being cut off which had been lodged in the abscess. In order to make the cord pass easily, the part to be used should always be rubbed with some emollient ointment.

By this method of cure, the gradual discharge produced, admits a gradual contraction of the sides of the cavity, and the slight inflammation supported on their surfaces, by the irritation of the cord, induces a firm and speedy union of them. As the discharge diminishes, the seton should be lessened by degrees, by withdrawing a thread of the cotton once in two or three days. At length, when little more matter is produced than may be supposed to arise from the irritation of the cord, it may be altogether taken out; and a gentle pressure should then be made on the parts by a roller, until the completion of the cure†.

Every

* This will hinder an inconvenient transuding of matter above. B.

† Several objections may be offered to Mr. Bell's method of opening abscesses with the seton: In the first place, it does not appear to be an easy matter to pass a seton in the mode he directs, through a large or deep abscess, or that it should answer the purpose he proposes by it.

In the large deep abscesses frequently formed in the breasts of fat women, such small openings do not discharge the matter contained sufficiently to prevent new and troublesome sinuses; and many women are too timid

Every thing that has been said respecting the cure of abscesses from recent inflammation, applies with equal propriety, to all tumors which contain a purulent matter, or a fluid not much thicker than pus.

S E C T. IV.

Of Mortification.

A complete mortification, or the last stage of gangrene*, is known by the diseased part becoming black, by its losing all pain and sensation, and by its emitting a considerable fetor.—A softness, and entire dissolution of the different parts of the organ affected, also in common take place.

There is a species of gangrene called the *dry*, in which the parts continue hard and connected a considerable time although entirely mortified. This seems to be produced from an obstructed flow of blood to the parts, by the pressure of tumors, ligatures, &c.; and is never a consequence of inflammation. With respect to the disease termed the *white* gangrene, and in which the parts preserve nearly the natural colour, it is very doubtful whether it can with propriety be considered as a gangrene—We mean, in this place, to confine our remarks more particularly to that species which succeeds inflammation. They are, however, in general, applicable to all the varieties.

Erysipelas† is the species of inflammation most apt to terminate

to permit of one opening, instead of two which must be made by the scion—nor does fresh good air appear to be so injurious to wounds as Mr. Bell seems to think. Upon the whole, further experience seems necessary before this new mode can be generally preferred to that in common practice.

* See what has been already said on gangrene.

† See sect. on inflammatory tumors.

terminate in gangrene; and when joined with phlegmon, as it frequently is, it gives that the same tendency.

In some instances, mortification comes on almost before an inflammation is completely formed. This occurs most frequently in *carbuncles*. In these, there is seldom any evident swelling; and the parts often become gangrenous in the course of twenty-four hours. The rapid progress usually made in these cases renders them extremely dangerous, when very extensive, or seated on any of the large blood vessels or nerves. If this is not the case, the patient frequently recovers, with the loss of the affected part.

Carbuncles commonly appear without any evident external cause; and probably depend, in general, on a scorbutic or putrescent state of the fluids. They are usually a symptom in pestilential diseases; but sometimes, although very rarely, they happen as idiopathic affections.

Gangrene seems to be produced from a putrid fermentation in blood effused by the violent action of the vessels in an inflamed part; and to be propagated, by the assimilatory power of the gangrenous ferment.

The separation of the diseased part is occasioned by an inflammation, and succeeding suppuration, of some irritable part to which the mortification is extended; and the general symptoms are readily accounted for from the debility induced by the putrescent state of the fluids. See *Cullen*, Pr. Ph. vol. I.

We should never make a positive prognostic in the beginning of gangrene: for patients are sometimes carried off suddenly, without previously appearing in any imminent danger. When, however, the disease originates from external inflammation, is not deep or extensive, and has become stationary, the prognosis may generally be much more favourable than when it is produced from an internal cause, is considerable in extent, and continues to increase. For,
in

in this case, there is always the greatest danger to be feared; and, even in any considerable mortification from an external cause, the patient cannot be pronounced free from danger until the entire separation of the gangrened parts.

As there have been many instances in which death has suddenly ensued after the cessation of the progress of the disease, and before any general putrescency has appeared, we conclude that the fatal termination is then produced, not from absorption of the putrid matter, as may be with probability supposed in long continued cases, but from the deleterious effects of the gangrened part on the nervous system.

In the treatment of gangrene, whenever the general symptoms of inflammation continue to a considerable degree, it will be proper to order blood letting, laxatives, and acidulated cooling drinks. But evacuations, and particularly blood letting, should be used with the greatest caution; and never to a greater degree than seems absolutely necessary for *moderating* the violence of the symptoms.

When, however, as is most frequently the case if the disease has made any considerable progress, the patient is much debilitated, the indication is, to give the system sufficient vigour to free itself from the mortified parts.* This is accomplished by a generous diet, and a liberal use of tonic cordials, and particularly of good wine. When very great debility and languor occur, volatile alkali, *confectio cardiaca*, &c. may be given with advantage. But of all the tonic remedies of mortification, the † *common*
Peruvian

* Mr. Pott describes a species of mortification incident to the toes and feet, in which opium is a very effectual remedy, and nothing else is of any material benefit. B.

† Besides the advantages derived from the internal use of the bark, we may, from the experience of many practitioners in this city, with confidence recommend it as one of the most powerful external applications in this formidable disease.

Peruvian bark* is the most efficacious. It should be given as soon as the symptoms of inflammation are abated, and in as large quantities as the stomach will bear—As a great irritability of this organ is very commonly a consequence of gangrene, it will be best to exhibit the bark, very finely powdered, in combination with some of the spirituous waters. The vitriolic acid may also be given with advantage: and may be mixed with the patient's common drink.

THESE are the internal remedies that can be with most certainty depended on.

There has been a great variety of external applications recommended; particularly all the warm gums and balsams, ardent spirits, and even alcohol; and to admit of a nearer application of them to the sound parts, deep scarifications through the diseased, and into the healthy parts, have constantly been advised. But it is probable that these stimulating substances, by exciting too strong irritation, do more harm than good. And the incisions also may do material injury, not only by wounding blood vessels, nerves, tendons, &c. but also, by admitting a free entrance of the putrescent fluids into the sound parts. For these reasons, and because I have never known them productive of good effects, I have long been of opinion that they might be entirely laid aside.—Mr Pott concurs with me in sentiment.—It will, however, be proper to remove a portion of the mortified parts, when the disease is extensive; in order to lessen the fœtor, and contribute to render the healthy parts capable of throwing off the remainder: but the scarifications should never extend to the parts unaffected by the complaint.

Theriaca

* The red bark, from many experiments, appears evidently much inferior to the common bark. B.

Theriaca has long been, and is now with some, a very common application; but I never saw any evident good effects from its use.

All the advantages to be derived from the common applications in gangrene, are generally obtained with more ease and certainty, from gently stimulating embrocations. A weak solution of crude sal ammoniac in vinegar and water answers exceedingly well—a drachm of the salt to two ounces of vinegar and six of water, form a mixture of a proper strength in common cases; but the degree of stimulus may be easily increased or diminished according to circumstances, by using a larger or smaller proportion of the salt.

When a slight inflammation commences on the verge of the living parts, we may generally with certainty expect a separation of those mortified: but after suppuration is perceived, this, without doubt, will very soon follow. When the separation is accomplished, the wound is to be treated as a simple purulent ulcer; while at the same time, proper attention is to be paid to the general state of the system.

It sometimes happens, that mortifications destroy so much of the soft parts in the extremities, that amputation becomes absolutely necessary. In these cases, the operation should never be performed until we are satisfied that the progress of the disease has entirely ceased. When this is determined, the limb should be removed as soon as possible. See chap. on *Amputation*.

C H A P. II.

On the Theory and Treatment of Ulcers.

S E C T. I.

Observations on Ulcers in general.

AN ulcer, is commonly defined a solution of continuity in any of the softer parts of the body, discharging either pus, sanies, or any other vitiated matter. But it must be evident, that every caries attended with loss of substance might with propriety be termed an ulcer: however, to avoid making distinctions which are not absolutely necessary, we shall consider caries as an accidental symptom of ulcer, and treat of it under the general denomination of carious ulcer.

Ulcers have received various appellations, derived from their appearances, causes, and other circumstances; but we shall make such distinctions only as appear to be of real use in directing the proper treatment.

Ulcers may be divided into two general classes. In the first may be comprehended all those that are entirely local, and do not depend upon any disorder of the system at large. In the second class all are included that are the consequence of, or that are connected with, any disease of the constitution. The utility of such a classification must be evident from the difference of treatment necessary in accomplishing the cure of the species arranged under each division. Those of the first class requiring none but topical remedies; while in the latter, medicines that affect the whole system are also absolutely necessary.

The *topical* ulcers are, 1. The simple purulent ulcer. 2. The simple vitiated ulcer. 3. The fungous ulcer. 4. The sinuous ulcer. 5. The callous ulcer. 6. The carious ulcer. 7. The cancerous, and 8. The cutaneous ulcer.

The ulcers connected with an affection of the whole system, are, 1. The venereal ulcer. 2. The scorbutic, and 3. The scrophulous ulcer.

The general causes of ulcers, are, 1. Occasional or exciting. 2. Predisposing; or, 3. A combination of both these.

Under the first head may be ranked wounds in general—bruises ending in suppuration—burns—and inflammation which terminates in gangrene or suppuration.

The second division includes all systematical affections attended with topical determinations; such as fevers that terminate in abscesses—lues, scrophula—and scurvy. And,

In the third, are comprehended the sores produced by a concurrence of the causes above enumerated. Thus a slight wound, in a habit contaminated by the abovementioned diseases, will occasion a troublesome sore, which, in a healthy constitution would have healed without difficulty.

The prognosis in ulcers must depend, 1. Upon their causes. 2. Their situation; and, 3. On the time of life and habit of body of the patient.

The occasional cause must evidently have a very considerable influence on the nature of the complaint. *e.g.* An ulcer produced by a wound inflicted with a sharp instrument, will, every other circumstance being alike, heal much more easily, than one consequent to a bruise, or a wound from a ragged instrument. Punctured wounds are likewise more difficult of cure than such as have large openings; this seems to originate, 1. From the want of a free exit to the matter; which, in consequence, causes it to form sinuses between the integuments and muscles, &c. and

and, 2. To the pain and inflammation which so particularly occur in wounds of this kind.

2dly. The situation, whether with regard to the nature and organization of the parts affected, or their being seated on the trunk or extremities. Thus it has been long known that ulcers in the fleshy parts give less pain, afford a better-conditioned discharge, and heal much more readily than those situated on tendons, glands, the periosteum or bones. And experience has taught us, that sores on the head and trunk heal much more easily than those on the extremities, and particularly when the lower extremities are affected.

This difference seems to arise principally from the depending situation of the latter; for the fluids in the veins and lymphatics having here to proceed in a direction contrary to their own gravity, and the former receiving but little aid from the action of the heart; whenever any of the parts lose their tone, or are deranged by accident, swellings, and especially of the serous kind, must be produced. And when these swellings arise in the vicinity of ulcers, by occasioning too great an afflux of matter to the sore, they at length vitiate the discharge, and thus protract the cure.

The situation of ulcers with respect to the neighbourhood of large blood vessels and nerves, or any of the larger joints or cavities, from the risk of the matter penetrating to them, must also considerably influence the prognosis.

And, lastly, The age and constitution of the patient must be taken into consideration. Thus, in young healthy people, ulcers will heal much more kindly than in the old and infirm.

With respect to the *treatment* of ulcers, the first circumstance to be determined is the propriety of attempting a cure or not. In recent sores there is no room for doubt; but when ulcers have been of long continuance, or appear to have had any effect, either in carrying off or preventing diseases

diseases to which the system has formerly been subject, it has always been considered as dangerous to heal them; and instances have often happened of the fatal effects of the sudden stoppage of long continued and large discharges. From experience, however, we may now affirm, that the cure of any ulcer may be attempted, provided a discharge of matter, equal in quantity to that produced by the ulcer, be kept up by any other means. This discharge is most conveniently furnished by an *issue*.

An issue being introduced, and made to discharge nearly as much as the ulcer, the cure of the latter may then safely be carried on; and if the sore has not been of very long standing, the size of the issue may be gradually lessened, till it contains only a single pea; and it will then give but little trouble. But when the ulcer has been of long duration, and particularly if it has apparently prevented any dangerous disease, the issue should be continued of the same size for life. Its *situation* may be determined by the conveniency of the patient.

This circumstance obviates one objection that has been made to the practice, viz. that an issue is as troublesome and disagreeable in its management as an ulcer; for the situation of ulcers, independent of the nature of the discharge they occasion, and of the bad effects of absorption of the matter on the system at large, often renders them exceedingly inconvenient, and sometimes dangerous.

It has been also objected to the substitution of a discharge by issue to that by ulcers, that the matter produced is not similar; that issues constantly afford a bland pus, while the discharge from ulcers is often very acrid, and thus may free the system from a matter highly pernicious to it. But that the effects of all these drains on the body at large, arise more from the *quantity* than the *quality* of the discharge, is clearly evidenced by the following, as well as a variety of other circumstances, viz. that the same
bad

bad effects are produced from the stoppage of a discharge from issues, as from the healing of the worst species of ulcers.

And it is very clear from many facts, that the variety of matter afforded by ulcers originates, except in some cases in which a great degree of putrescency prevails, and the blood runs off in form of a thin ichor, from the *degree of inflammation or peculiar conformation* of the vessels in an ulcerated part; from the heat supported; and from the remora of the fluids for a longer or shorter time in the cavity of the sore. Thus it cannot be proved, by any analysis of the blood, that the acrid matter which is sometimes discharged, previously existed in it; and by varying the degree of external heat, the applications to the sore, and the interval of the dressings, we can vary the nature and appearance of the discharge.

SECT. II.

On the simple Purulent Ulcer.

THE simple purulent ulcer, is entirely a topical affection, is attended by an inconsiderable degree of pain and inflammation, and affords a discharge of mild pus. The granulations which arise in it are of a firm, red, healthy appearance, and if no accident occurs, in general, the cure goes on regularly until a cicatrix is produced.

This ulcer is first treated of, because it is the most simple that is produced, both in its symptoms and method of cure. And, as it is to the state of such a sore that every other species must be reduced, before a cure can be obtained, we shall be particularly minute in our observations with respect to it; and, when treating of the other varieties
of

of ulcers, we shall occasionally refer to what is here advanced, in order to avoid repetition.

The causes of purulent ulcers, are, all wounds that do not unite without the formation of matter—burns, whether produced by fire, aquafortis, scalding liquids, &c.; bruises; and every external accident that terminates in suppuration, with an opening as a consequence of it.

The prognosis may generally be favourable; and more or less so as there is a less or greater loss of substance—favourable or unfavourable situation of the fore, and good or bad habit of body of the patient.

Before proceeding to a particular investigation of the means to be employed in the cure of the simple ulcer, it will be proper to make a few observations on the manner in which nature, as well as art, operates to accomplish the healing of sores in general.

In the progress of ulcers to a cure, there is generally a growth of new parts, termed from its appearance *granulations*, that tends to diminish any vacancy produced. This substance is formed in larger or smaller quantity, as the patient is young or old, healthy or otherwise; and to so considerable a degree in young plethoric people, as often to rise above the level of the neighbouring integuments.

When the loss of parts is thus as far as possible supplied, the cure is then perfected by the formation of a *cicatrix*, either by a natural exsiccation, forming a kind of cuticle or scarfskin, or by the application of astringents. *Granulations* seem to consist, in every case, merely in an extension of the small blood vessels that have been divided, with a considerable proportion of inorganic cellular substance, probably secreted from these vessels, and which serves to connect and support them; for it does not appear that organical parts are ever reproduced.

But although granulations contribute very much to lessen vacancies occasioned by loss of substance in ulcers, and particularly

particularly in young people; yet this effect, in all cases, is evidently chiefly produced by a *diminution* of the parts that remain. And cures, even of large ulcers are often obtained, especially in old people, without any evident growth of parts whatever.

This part of nature's process, is to be remarked even in the smallest sores; but is much more evident in the larger, and more particularly in those induced by amputation of the thigh. In ulcers produced by amputation, there is never any considerable formation of new parts; and the cure advances only in proportion to the contraction of the skin caused by the decrease of the parts which it surrounds—This wasting takes place in every part but the bones; and is fully evidenced by dissection: for this teaches us, that even the largest as well as the smaller vessels, are entirely obliterated to a certain extent, and appear only as cords: the fibres of the muscles are greatly diminished, and there is often hardly any trace of cellular substance.

From what has just been said, it must be plain, that *compression*, by the laced stocking and bandages, produce beneficial effects in ulcers; not only by preventing œdematous and other swellings in their vicinity but by contributing to the diminution of the adjoining parts.

I have constantly found more benefit to arise from compression, than from any other remedy; and as the laced stocking is not always well made, and is difficultly applied, I prefer the roller to produce it. The rollers should be made of thin flannel, and ought to be about two and a half inches wide.—If the member is œdematous, they should be applied from its extremity to a little above the diseased part; but if there is no œdematous swelling, they should extend only from two or three inches below to as much above the sore.

In the application of the bandages, they should always be so managed as to support the skin, and bring the edges
of

of the fore as near together as possible: for, as new skin is never re-produced, or even an elongation of the old, all those parts which remain uncovered by it, will have nothing for their future protection, but a thin scarf skin.

It is to be observed, however, that compression is never to be employed while any considerable degree of inflammation remains in wounds; as soon, however, as this has a good deal subsided, it will contribute exceedingly to expedite a cure by approximating the sides of the fore, and at length producing their coalescence.

The production of granulations in sores, is an operation of the system itself: and all the assistance art can afford, consists in removing the obstructions which nature meets with in her progress. These obstructions may be reduced to two general heads, those of an *internal* nature, and those which operate as *external* or local causes.

Of the former kind are, every *general disorder* to which the constitution is liable; as we find, from experience, that a healthy state of the body only is capable of producing proper granulations. Thus the cure of ulcers that occur in syphilis, scrophula and scurvy, can never be properly effected, unless the general affection be first corrected.

A low emaciated state of body, also, either from a very poor diet, or from immoderate evacuations, is very prejudicial to the growth of new parts. In general, the patient should be suffered to live so as that he may be kept in a situation at least not much more reduced than that of his common health. But as a variety of treatment in this respect must be necessary in different cases, the proper diet must be directed by the judgment of the surgeon.

The *local* obstruction to the granulation of ulcers, may be reduced to those that act mechanically, and those of a corrosive nature. As inflammation and pain contribute much to prevent the healing of sores, every thing, which
by

by irritating, tends to excite them should be avoided— All stimulant extraneous bodies should be taken away, and the dressings should be mild and simple, and changed but seldom.

The corrosive substances that impede the cure of ulcers are chiefly the vitiated discharges from them. These are sometimes so acrid, as not only to prevent the rising of granulations, but even to corrode the neighbouring parts. They should be corrected, and if possible, by the means hereafter to be pointed out, converted into pus.

When the vacancies in fores are properly filled up, the remaining part of the cure consists in the formation of a cicatrix. This is frequently, in a great measure, a work of nature; but it may often be considerably expedited by the application of mild styptic powders and washes. These, by corrugating the ends of the vessels, and excising the cellular substance in which they are enveloped, tend very much to form that delicate covering termed cicatrix; which though at first very thin, by subsequent depositions of inorganic substance, commonly acquires at length no inconsiderable degree of strength and firmness.

The *indications* of cure in the *simple purulent ulcer*, are, 1. To diminish, as much as possible, any vacancy the ulcer may have occasioned: and, 2. To promote the formation of a cicatrix. For the accomplishment of the first, it is necessary, as before explained, not only to have new granulations formed, but also to produce a decrease of the parts contiguous to the fore.

In order to effect a production of new parts, we must avoid the application of every thing that may occasion pain or irritation, as the warm gums, balsams, and spirituous tinctures, which have been so indiscriminately used in all fores, remove all corrosive matters, and make use of mild, bland unguents as dressings. The following is one of the most useful of this class—

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ʒiii.

℥iii. oil ℥j. *Goulard's* cerate is also a very good mild application. It is thus made: Take 4 oz. of refined wax, and ℥j. of oil; keep them over a slow fire, until the wax is melted, stirring them gently. Having previously mixed ℥iv. of extract of lead with ℥vj. of water, add it gradually to the wax and oil, now cooled. Let them be well incorporated together with a wooden spatula; always taking care to let the quantity of water first put in, be entirely absorbed before any more is added. This ointment, as well as every other, should be made in small quantity at a time, as it is of consequence to have them free from rancidity.

The frequency of dressing ulcers must principally depend on the quantity of matter discharged; but in general they should be dressed once in twenty-four hours. The ointment should be spread on pledgits of lint, and should be applied *immediately* after the removal of the preceding dressings, in order to prevent the bad effects which often follow exposure of the sore for any time to the air. Some surgeons have advised the renewal of the applications to sores but once in five or six days. By this method, however, and particularly in hospitals, the air must necessarily be rendered impure.

Ointments have been supposed by some to render the granulations lax and flabby: but this I have never been able to perceive. Such effects are, indeed, produced by a long continued use of emollient fomentations and poultices—Lint applied immediately to sores, except the discharge is very great, gives too much irritation, and indeed always acts more or less as an escharotic.

The next circumstance requiring attention in this part of the cure, is to preserve the matter discharged in a proper purulent state. This, in the simple purulent ulcer, is chiefly produced by the preservation of a proper degree of heat—Whilst any inflammation remains, this is best effected

fectcd by warm emollient poultices, renewed every three hours ; but as soon as the inflammatory symptoms have abated, they should be laid aside. The same purpose may then be better answered by applying over the dressings thick quilted coverings of wool, cotton, or any such substances as retain heat most effectually.

The other most material part of the first indication in the cure of ulcers is to be answered by *compression*. This is to be employed in the circumstances, and in the manner mentioned when we treated of ulcers in general.

When the loss of substance in ulcers is fully supplied, the *second indication* is to be attended to, viz. the formation of a cicatrix.

This is frequently effected by nature alone ; but, in many instances, it is a matter of considerable difficulty. The emollient ointments must be now laid aside, and the sore should be dressed with some styptic drying ointment, as the unguent album prepared with cerufs, and washed once or twice a-day with lime-water or ardent spirits. These will often succeed.

On some occasions, cicatrization is prevented by the granulations rising above the surface of the neighbouring parts. It is then necessary to have recourse to astringent, or even escharotic applications. One of the best of the mild escharotics is blue vitriol ; if this is not sufficiently strong, nothing weaker than the common caustic stone will be effectual ; and in slight cases of this kind, lint, and a pretty tight bandage will frequently produce a cicatrix.

When every previous part of the cure has gone on very well, it often happens, that the granulations continue raw, and show no tendency to heal for some time ; in these cases, when the means we have recommended do not accomplish the cure, compresses wet with ardent spirits, being applied under the roller, will often answer ;

or

or these may be alternated with tincture of myrrh, or a solution of blue vitriol in water.

Besides local applications, there are some general circumstances very necessary to be attended to in the treatment of ulcers.

Rest of body, and particularly of the part affected, is very requisite: and, in all cases on the lower extremities, notwithstanding what has lately been said to the contrary, I am fully convinced by long experience, that a more permanent and speedy cure will be effected, if the patient can keep the limb in a horizontal posture generally, than if he is permitted to take much exercise.

The diet should be so regulated, that the patient may be kept in his usual habit of body. All excesses in eating, as well as in drinking, should be carefully avoided.

Internal medicines appear to be entirely unnecessary for the cure of the simple purulent ulcer, except when the discharge is uncommonly large and thin; in which case the peruvian bark is often a very useful remedy.

S E C T. III.

Of the Simple vitiated Ulcer.

THE vitiated ulcer differs only from the simple purulent sore in the nature of the discharge.

The matter afforded is either, 1. A thin, limpid, sometimes greenish discharge, termed *fanies*. 2. A somewhat red-coloured, thin, and generally very acrid matter, termed *ichor*; or, 3. A more viscid, glutinous kind of fluid, called *fordes*. This last is also frequently of a brownish red appearance, somewhat resembling the grounds of coffee, or grumous blood mixed with water. They are all more foetid than pus, and none of them free
from

from acrimony—What has been termed ichor, is often so corrosive as to destroy large quantities of the neighbouring parts. In consequence of the nature of the discharge, the granulations waste away, and have a dark brown or black appearance. The pain is often considerable, and is proportioned to the acrimony of the matter.

The causes of this ulcer are the same as those producing the purulent ulcer; and that species easily degenerates into this from neglect or improper treatment; and particularly when the tendinous parts are the seat of the disease.

The prognosis in the vitiated ulcer, may be favourable when the complaint is not extensive or is local, has not been of long duration, and occurs in young, healthy subjects; but, in opposite circumstances, it should always be very doubtful.

The quality of the discharge in ulcers has been above shewn to depend chiefly on the different degrees of inflammation in the part; and this is further confirmed by the nature of the remedies that are most effectual in relieving these disorders, which are principally of that kind which remove pain and irritation. Thus warm emollient cataplasms and fomentations often give great ease, and meliorate the discharge within twenty-four hours: these should be used as formerly recommended to promote suppuration, and the dressings applied immediately to the sore should be mild, like those advised in the simple purulent ulcer, while too great a degree of inflammation continues. When the pain is very considerable, opiates should be given, and repeated according to circumstances.

The diet must be regulated by the habit of body; if weak, it should be nutritious; if full, the regimen should be low. In the former case, the peruvian bark is a very
 effica-

efficacious remedy, and should be given in doses of ʒj. six or eight times a-day.

When the abovementioned circumstances are attended to, and the part affected is kept at rest in a proper posture, the sore is commonly sooner or later reduced to the state of the simple purulent ulcer; and then requires the same method of treatment.

I have never seen any evident good effects produced by the exhibition of nitre; although I have frequently given it in large doses for a considerable length of time.*

S E C T. IV.

Of the Fungous Ulcer.

BY fungus, or as it is sometimes termed hyperfarcosis, is meant such preternatural risings in sores as are commonly more soft and spongy than healthy granulations. These, in some instances, arrive at a very considerable size; and now and then acquire very great degrees of hardness. The pain attending them is seldom considerable; and the discharge afforded varies according to the species of sore they happen to be connected with while they are recent; but after some continuance, this, as well as other circumstances become so changed, as to form very different sores from those which originally existed.

These excrescences are often owing to the neglect of repressing the granulations when they shew a disposition to advance beyond the surface of the sound parts. They are also produced in various sores that are not healed at bottom, before granulations are suffered to proceed any length.

* It has, however, in a few instances, been attended with very happy effects in the cure of old habitual ulcers of the leg.

length. These instead of cicatrizing when they are on a level with the sound parts, continue to advance until the cause is removed.

With respect to the *cure* of fungi, when it is found that they are produced merely by an over-growth of parts, if they are not of any considerable breadth, and especially if they are not very high, we should have recourse to escharotics.—By many, we are directed to use the actual cautery, and by others the scalpel; but few patients will submit to either of these, and particularly as the disorder may just as effectually, though not quite so expeditiously, be removed by means more gentle.

Of all the caustic preparations, the lunar caustic is the best for this purpose. It acts more quickly, and does not give more pain than the milder sorts; it never fails to produce the proper effect as many others do; and it is not so apt to run, and to spread over the neighbouring parts, as some of the other caustics.

The caustics should be liquefied, and then applied by a small brush or pencil, daily or every other day—A strong solution of verdigrease, sal ammoniac, blue or white vitriol, will also commonly prove effectual. But solutions of silver or mercury in nitrous acid form the most powerful applications of this kind. In making the last we must observe, that one ounce of strong spirits of nitre will dissolve no more than about six drachms of quicksilver. These caustics should never be applied to an extensive surface at once. After their use the part should be covered with lint, as ointments lessen their activity.

When the base of the excrescence is narrow and its height considerable, it should be removed by a ligature applied at its root, and tightened daily. If, however, together with great height, the tumor has a broad base, this method will not succeed; and the following must be put in practice.

A strong straight needle fixed in a handle, with an eye near the point, being pushed through the tumor at its base, and two strong waxed threads being introduced at its eye, it is to be again drawn back, leaving the threads with their ends hanging out at each side of the swelling. A firm ligature is then to be formed round each half of the swelling by the threads, and tightened from time to time.

The fungus being by either of these methods removed, the sore is then to be treated as a simple purulent ulcer.

The other species of fungous excrescence which proceeds from the granulations not being raised on a good foundation, is generally easily distinguished from the preceding species: It rises with greater rapidity, and is not so firm as healthy granulations.

As soon as the cause is discovered, any confined matter beneath should have vent given to it by a proper opening; after which, by taking care that the sore fills up from the bottom, the cure will go on easily in the common way. There is seldom then occasion for escharotics, as the fungus commonly wastes away of itself.

S E C T. V.

On the Sinuous Ulcer.

By sinuous ulcer is meant a species of sore communicating with one or more openings or cavities, which are commonly seated in the cellular membrane, between the interstices of muscles, or between the muscles and integuments. By long continuance, or by the use of astringent applications, a sinus often becomes hard and callous in its internal surface; and in such a state, from its supposed resemblance to a pipe, it is termed a fistula.

The most frequent cause of sinuses, is the want of a free discharge of matter formed in ulcers and abscesses; which, falling to the most depending situation of the part, if it does not there find a ready passage by an opening made to it, readily insinuates itself into the cellular membrane, and proceeds gradually onward till it finds a vent. Very tight bandages applied immediately over a fore, and not made to act on the parts above and below for some distance, are also a frequent cause.

In healthy constitutions, when there is easy access to the sinus, a favourable prognosis may generally be made; but when the disease has been of very long continuance, and particularly if the sinuses open into any of the joints, or are beyond the reach of an operation, a cure is difficult, and doubtful.

The intention of *cure*, in every case of sinus, is to produce a coalescence of its sides, so as to destroy any vacuity that may have been occasioned.

To effect this, it is necessary first to make a depending orifice for a free exit to the matter; and then, by a gentle irritation, to induce on the internal surface of the fore, a slight degree of inflammation, and consequent adhesion of the sides of the sinus. Both these intentions are answered by the introduction of the seton, from the orifice in the ulcer along the course of the sinus to its other extremity, where an opening should be made in the manner we formerly directed in abscesses. The treatment is then to be similar to that of abscesses in which a seton is used. Vide chap. I. sect. iii. A cord should be introduced into every sinus.

This method is entirely free from danger, and is admissible in almost every case that can occur. It is particularly proper in sinuses in the perinæum: for the cicatrix formed there after the opening a large sinus by the knife,

is often more inconvenient and painful than the original disease.

The sinuses being by this means filled up, the ulcers with which they have been connected, are then to be treated by the method adapted to the species to which they belong.

By many writers, ancient as well as modern, we are directed, in recent sinuses, to use healing injections; and when their sides have become callous, escharotic injections and powders have been recommended. None of these, however, produce any permanent good effects; and often convert simple sinuses into the callous. Others advise to lay open the different sinuses, and cut out the whole of the callosities. This will often effect a cure; but the pain, and often the danger attending it, must induce a preference of the mode above recommended.

When, however, incision is preferred, unless *all* the parts are evidently callous; in which case extirpation may be necessary, mere division of the parts forming the sinus should alone be used. The free vent thus given to the matter, and the suppuration supervening, will frequently remove very considerable callosities.

SECT. VI.

On the Callous Ulcer.

AN ulcer is said to be callous when its edges, instead of contracting and diminishing the size of the sore, keep at a distance, turn ragged, and at last, by acquiring a preternatural degree of thickness, often rise considerably above the level of the neighbouring parts—the discharge
afforded

afforded by it, is commonly a thin vitiated matter. Varicose veins also occur as a symptom, and particularly when the disease is seated in the lower extremities; hence the name of varicose ulcer, which this species has acquired, from a supposition that it was produced from matter supplied by these veins, which frequently have the appearance of opening into the sore. The varices seem to originate chiefly from an obstructed return of blood, by the pressure of the callous parts on the vessels.

The causes of callosities in ulcers may be all reduced to neglect and mismanagement. When, from these circumstances, the small vessels of the edges of ulcers are prevented from proceeding in a proper direction, are forced to push upwards, and even sometimes backwards, they, by the pressure of bandages, will necessarily acquire at length a morbid hardness or callosity.

In the *cure* of this disease, the causes originally producing it are first to be removed; and the callosities may then be taken away.

Recent cases are often cured merely by the repeated application of warm emollient cataplasms—and also by gum-plasters; but when the parts have acquired much hardness, the only remedies are the caustic, or scalpel. And as the first is equally certain with the other, it should, as the easiest method, be always employed. For the reasons formerly given, the lunar caustic should here likewise be preferred. The solution of silver or of mercury in nitrous acid, may be also used to advantage. Either of these should be applied to the callous edges every two days, while the cataplasms are still continued as long as any degree of foulness remains in the sore.

For the cure of the varices, it is not only necessary to remove their primary cause, the callosity, but likewise to restore the tone of the vessels weakened by their distention,

distention, by the application of the laced stocking, or a roller*.

A considerable swelling of the adjacent parts very commonly occurs; when this does not go off after the hardness is removed, the use of a flannel bandage will usually prove effectual in dissipating it.

S E C T. VII.

On the carious Ulcer.

By the term carious ulcer we understand that species of the disorder only which is connected with a local affection of a bone: whether the disease of the bone may have been always confined to the part, or exists after a general diathesis which originally gave rise to it has been removed.†

When a bone is at first laid bare, it is impossible to determine whether it will become carious; as in a great many instances this does not follow even a removal of part of it. A cure should, however, never be attempted until this can be ascertained.

If at the end of the fourth day after the denudation of a bone, it retains its natural appearance, we may conclude, with tolerable certainty, that a caries will not succeed. For when this is to happen, it generally begins in three days or four at farthest. The bone begins to lose its natural healthy appearance, turns first of a pale white, and then of a pale yellow. It sometimes remains in this state for some days,

* The growth of varices may be retarded by the use of the roller or laced stocking judiciously applied; but I never was able to cure old extensive varices by these or any other means.

† Caries appears evidently from its symptoms, causes, and method of cure, to be a disease exactly of the same nature with a sphacelus or gangrene of the soft parts. B.

days, and by degrees gets a more deep tallow-like appearance. It continues thus for a longer or shorter time, according to the degree of violence with which the injury has been done; and afterwards goes through the different stages of brown and black, until it has acquired a black of the deepest dye.

The discharge from ulcers of this kind, is generally thin; and of a most disagreeable foetor, which always becomes more considerable as the disorder advances; at last it acquires a blackish hue, and often a considerable degree of acrimony. As the several degrees of blackness go on, small holes appear in the bone, and increase so as at length to render it quite spongy. The carious part then generally becomes loose, and when pressed, a large quantity of a fattish, intolerably foetid matter is forced out. This taints the whole discharge; and the smell of it is so very *peculiar*, as to afford one of the most characteristic marks of caries.

The granulations in this ulcer are soft and flabby, spring up in clusters, and have a dark brown, together with somewhat of a glassy appearance. They usually advance very fast, and if not carefully attended to, will be apt to form large and troublesome excrescences.

All the phenomena abovementioned, occur in greater or less degree, whether one lamina, or the whole substance of a bone is affected.

When the bone has not been bared, it is often a matter of considerable difficulty to discover a caries. If we are able to introduce a probe, and by that means find a roughness on the surface of the bone, we may, with certainty, conclude it to be carious. And when it is impossible to reach the diseased part with an instrument, we may commonly ascertain the existence of a latent caries, by the appearance of the fore and the nature of the discharge.

The *causes* of caries may be, in general, whatever destroys the circulation in the whole or any part of a bone: as wounds which affect either the periosteum or bones; violent contusions and inflammations of the periosteum, terminating in abscess or gangrene; the acrid matter of ulcers penetrating to, and destroying the periosteum; and the improper application of sharp acrid spirits and powders to bones merely laid bare.

It is to be remarked, that destruction of the periosteum, or even the removal of part of a bone is not always followed by caries; and this is seldomer a consequence of such injury to the cranium than to any other part of the body; probably from the greater number of blood-vessels distributed to that part.

The *prognosis* in caries must depend principally on the following circumstances: The situation of the diseased parts; the nature of the affected bones; the nature and degree of the cause; the size of the caries; the age and habit of the patient.

Thus a caries in any of the bones of the skull, ribs, or vertebræ, from their situation near the vital organs, must be attended with more risk than when it affects the bones of the extremities. And a caries near a joint from the danger of this becoming diseased, is always more to be feared than when it is confined to the middle of the bone. The texture of a bone should have also considerable influence in the prognosis; as well as the nature of the cause: exfoliations being much more tedious in the hard and compact, than in the more soft and vascular bones, and a wound with a sharp instrument, does not generally produce so deep or extensive a caries as that which commonly succeeds to violent contusions. The cure is likewise produced in a longer or shorter time as the caries is extensive or not.

And, lastly, the habit and age of the patient must have considerable

considerable weight in making a prognosis. For the cure of caries generally proceeds so slowly, that few can support the discharge it produces, if they have not previously been perfectly healthy.

The *healing* of an ulcer, attended with caries should never be attempted, until the diseased bone is removed. For if the soft parts above should be united, an abscess would be produced by the irritation of the bone beneath, and force them open.

In a healthy state of the body, the separation of the carious bone is produced, as in gangrene, by the intervention of a slight degree of inflammation excited on the extremity of the sound parts—Suppuration follows, and this, together with the rising of granulations, soon detach the dead from the living parts. If we suffer ourselves to be directed by this process of nature, we may often accomplish in a few weeks what would otherwise require many more months to effect. The principal indication of cure therefore, it is evident, should be, by repeated and judicious applications to excite such a degree of inflammation, in the adjoining sound parts of the bone, as may be requisite for the separation of those mortified.

If the bone is not bared, it should be exposed to view either by laying open the soft parts or removing some of them. The safest and easiest mode of exciting the necessary inflammation, is by making a number of small perforations in the diseased part, with the pin or perforator of a trepan fixed in its handle, to such a depth as to give a little pain, every third or fourth day. When the caries is very deep and extensive, it will shorten the process to use the small head of a trepan.—As soon as any part of the bone becomes loose at the edges, its separation will be much hastened, by daily insinuating below them the end of a spatula or levator, so as to press them up-
wards

wards. During the separation of the bone, in order to obviate the fœtor, the fores should be washed with a decoction of bark, of walnut leaves, camphor dissolved in spirits, or *lime-water*. The latter I would advise to be always used, as it not only corrects the fœtor, but likewise dissolves the cohesion of the bony matter. Pledgits of lint dipped in these should be laid on the bone, while the rest of the fore is dressed in the ordinary way.

After the separation of the caries, the ulcer is to be treated as a simple purulent fore.

When a very large portion, or the whole circumference of a bone is carious, the shortest process is to take out *all* the diseased parts by the head of a trepan, or a straight or circular spring-saw. This may be done in all cases where the disease is confined to the middle of a bone, except, perhaps, when the thigh bone is affected. There are many instances of the regeneration of whole bones; hence we should never despair of a cure where the part diseased can with safety be removed. When the thigh bone is extensively affected, or when the ends of the larger bones forming joints, are carious, amputation is almost the only remedy to be depended on. See chap. on *Amputation*.

During the treatment of caries, the same attention is requisite to the patient's habit of body, diet, and regimen in general, as we have recommended in other species of fores.

The bark is almost the only remedy that should be used internally; but when the soft parts become very painful and inflamed, slight scarification, or bleeding with leeches, should be employed, and opiates should be given freely.

S E C T. VIII.

*On the cancerous Ulcer.**

CANCERS have generally been divided into the occult and open. By the former are meant such hard schirrous swellings as are attended with frequent shooting pains, and which generally terminate at length in the latter. By the open, or ulcerated cancer, we understand that species of sore which commonly succeeds to hard swellings of the glands, although in some instances, it occurs without any previous hardness. The edges of this ulcer are hard, ragged,

* The following observations on Cancers, are the result of the experience of Mr. Berchien, a Swedish surgeon of eminence; and who, in consequence of having purchased Mr. Guy's remedy for twenty years, had a very great number of patients with cancerous complaints under his care from all the northern parts of Europe. They were published in the Swedish language by Mr. Berchien, and by him sent to Dr. Adam Kuhn, the present professor of the practice of physic in the university of this place, who has favoured me with a translation of them.

There are three species of cancers: the cancer *genuinus*, *fungosus*, and *scrophulosus*. The *cancer genuinus*, or genuine cancer, is the most common. It usually appears first in the form of a very small, hard, and moveable tumor or schirrus: this is usually smooth and round: but in some instances, it feels like a small tendon or string. After some increase of size, it often retains its smoothness; but in other cases, it becomes rough and angular, assumes the form of a cone, an almond, &c. It often continues of the same size for a number of years; but it also frequently continues constantly to increase in magnitude from its first appearance. The tumor is at first moveable, but after it has made some progress, it becomes attached to the adjacent parts. When it advances near to the surface, it becomes very perceptible to the eye, and the skin contracts a wrinkled appearance.

A pain, in some instances, is felt before any evident tumor, particularly in the cord-like cancer. In other cases, there is no pain until the tumor appears; and in others again, which is most frequently the case, the pain

ged, and unequal, very painful and reversed in different directions. The surface of the fore is commonly very unequal. The discharge is for the most part a thin fœtid ichor; and is often so acrid as to excoriate and even destroy the neighbouring parts, and by this means it sometimes produces considerable hemorrhagies. There is a considerable sense of heat over the whole ulcerated surface, which is the most tormenting symptom of the disease, and violent, shooting, lancinating pains.

These are the most frequent symptoms of cancer, but they

pain does not come on until the tumor has acquired a considerable size; but after the pain begins, the swelling constantly increases in magnitude. Sometimes a momentary shooting pain only is felt during the menstrual flux, or upon changes of weather; but in other cases it is continual.

Not long before the cancer becomes ulcerated, the skin changes to a red colour, and is painful to the touch; it soon after becomes chapped, and a thin sanies issues from the fissures. The edges of the fore soon become hard and uneven, and are reflected in various directions. There is never a good pus afforded, but the discharge is a thin sanies or ichor, which often destroys the contiguous parts.

This species of cancer attacks various parts of the body; but particularly the lips, nose, and breast.

The *cancer fungosus* chiefly occurs in fat women of a lax habit of body and who have large breasts. It begins like the genuinus, with a small moveable hard tumor; but it is more spongy, elastic, like a cluster of small tumors, and not so hard. Its progress is astonishingly *rapid*: in some instances it has grown from the size of a nutmeg, to the bigness of a man's head, in the course of eight or ten months. Little blue or reddish spots, often appear over the surface of the tumor; which, when opened, discharge blood, or a bloody serum.

When the cancer ulcerates, it discharges such quantities of a bloody ferous matter, often all at once, that no dressings can keep it dry. From one or more of the openings, arise large spongy lobe-like excrescences, which sometimes have a resemblance to sheep's liver, and at other times have the form of the head of a cauliflower; and are hard and cartilaginous to the touch. These often spread over the whole breast, and are, in some instances, strangulated at their base by the skin.

This species affects not only the breast, but also the neck, shoulders, arms, and legs.

they are often so varied, that it is not always easy to distinguish the disease. When however, two, three, or more of these concur, we may always be pretty certain of the ulcer being cancerous.

We may be assisted in the diagnosis by the situation of the fores: thus they generally affect glands, or parts in which glands are numerous. Hence a far greater number occur in the lips and in the breasts of women than in every other part of the body.

Various circumstances have been assigned for the production

The *cancer scrophulosus* begins sometimes like the two other species with a single schirrus; but in most instances, there are several near each other, and which often seem connected: These are not so hard as in the genuinus, and give little or no pain until they become open fores, and even then but little. In the advanced stages, the breast appears covered with reddish blue spots, and is flat and hard. The integuments and substance of the breast being drawn in, so as to produce a furrow in the middle, and firmly fixed to the muscles and ribs. This attachment often occasions a considerable impediment to respiration. The subcutaneous lymphatic glands become hardened in every part of the breast, and particularly those towards the axilla.

There are many openings formed; some of these often dry up in a little time, and get a thick white scab: others continue open—some of them discharge pus, others a thin fetid black ichor. The edges of the ulcers are frequently red and fungous; and the discharge often penetrates at length to the ribs and sternum, and even into the thorax.

In this species, there are usually indurated lymphatic glands in various parts of the body, and other marks of scrophula; and it evidently depends on a general affection.

Tumors in the breast from milk, have been accused of terminating in cancer; but there is no good evidence of this; and where it has apparently been the case, I have no doubt that there has, at the same time, been a schirrus in the breast, which has become cancerous from the irritation produced by the milky tumor.

The general exciting causes of cancers, are passions of the mind, particularly grief or terror, and external violence. In the cancer genuinus and fungosus, these operate *locally* by producing, probably an obstruction in the lymphatic vessels, and a consequent schirrus from a gradual accumulation of lymph, and absorption of its thinner parts; but in the cancer scrophulosus there is a general disease connected with the
 topical

duction of cancers; and at least an equal number of remedies have been proposed for the cure of them; but our *little* success in the treatment of the disease shows clearly, that the ideas adopted, and the remedies offered, have been more founded on theory, than on observation and practice.

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topical affection From hence it is evident, that the cure of the latter can only be effected by conjoining the general remedies of scrophula with proper applications to the cancerous part; whilst the genuine and fungous cancers may be effectually removed by timely, topical remedies alone. The scrophulous cancer may sometimes be cured by an early and judicious use of mercury, general and topical, and by hemlock; but both of these are injurious in the other species; for the cure of which, we can with safety, only depend on early extirpation, or Guy's powder.—

As a confirmation of the accuracy of this interesting account of cancers, I am happy to give the testimony of Dr. Jones, of this city, whose long experience has afforded him an ample opportunity of ascertaining its agreement with the phenomena, nature, and proper method of treating these dreadful diseases.

The Doctor thus expresses his opinion on the subject:—Mr. Berchien's observations on cancers, appear to be the result of accurate observation, and great experience; from which alone any genuine improvement can be made in the cure of diseases.

His distinction of cancers into the three general species of *genuinus*, *fungosus*, and *scrophulosus*, is well founded, and merits the serious attention of all those who wish to treat this terrible disease with propriety. The two first may be radically cured by extirpation with the knife or caustic, as they appear to be local diseases: but the cancer *scrophulosus* requires the aid of internal medicine, to correct the vitiated habit; though very few instances occur of perfect cure.

The cancer *fungosus* appears to be more liable to relapse than the *genuinus*; and instances have been known, where the cancer *fungosus* has broke out after it appeared to be perfectly cured by Guy's powder, and remained sound above ten years.

The same species of cancer has been frequently closed by the use of arsenic; but has often broke out again, and at last baffled all remedies. Similar consequences have attended a quack nostrum, which has been much boasted of in this city for two years past.

From these instances, it appears to be a melancholy truth, that there are cancerous ulcers which baffle all the remedies hitherto discovered.

It however appears evident to me, that cancer is generally a *local* affection, not originally connected with any constitutional complaint; and that a general cancerous taint, seldom, or perhaps never occurs, but in consequence of the cancerous virus being absorbed into the system from some local affection. This opinion is more particularly rendered probable, by the success of extirpation in curing cancers. From a statement of Mr. Hill, surgeon in Dumfries, it appears that of eighty-eight cancers he had extirpated before the year 1768, in 1770 there were two of the patients not cured: in nine they had broke out again; one was threatened with a relapse; and about forty remained alive and sound. From these and many other authenticated facts, we think ourselves warranted in drawing the above mentioned conclusion. The ill success of some surgeons, and particularly of hospital practitioners, may more justly be attributed to the inveteracy of the cases in which they have been usually consulted, than to any thing really incurable in the nature of the disease.

Cancers succeed to external accidents: to tumors of the breasts in nurses and lying-in women mismanaged; to fevers and other internal disorders, of which they seem to be the terminations: and they happen to women about the time of the cessation of the menses.

All these circumstances probably operate in bringing on cancer, by first inducing a preternatural determination of fluids to the part, which necessarily distend and obstruct its vessels: from the small degree of irritability in these, the part affected being usually glandular, an indolent tumor or schirrus is thus gradually produced by the accumulation of fluid: this, at length, either from increase of bulk or from external violence is excited to inflammation; which, at a longer or shorter period, finally terminates in the formation of the cancerous virus.

This explanation will perhaps be admitted as agreeable

at least to probability, if we consider that glandular parts, which are almost always, if not in every case, the seat of cancer, never afford a good discharge: and, from the analogy of many other sores which often produce a matter nearly as acrid as the cancerous virus, we may certainly be allowed to infer, that some peculiar affection of these parts may induce the formation of a matter as acrid as that of cancers: and when the virus is thus formed, it may in time be absorbed, and produce a general cancerous diathesis.

There is no *remedy* to be depended on in cancers but *extirpation*; and it should be had recourse to immediately on the discovery of the disease. With respect to the particular modes of performing this operation, we must refer to what will be said hereafter; and shall only observe in this place, 1. That caustics, on account of the irritation and inflammation they produce, should *never* be preferred to the scalpel. 2. Wherever the disorder is situated, every part that has the least appearance of disease, every indurated gland in the neighbourhood should be always taken off*, otherwise the cancer will certainly return; but no more of the integuments should be removed than is absolutely necessary: for the smaller the cicatrix that remains, the less will be the consequent irritation; and from this, perhaps, the chance of the disease returning may be lessened. The teguments should, as far as possible, be brought to cover the wound by the employment of the

interrupted

* From a circumstance which occurred in a case of occult cancer of the mamma extirpated by Dr. Hutchinson, of this city, and of which I was a witness, I should think it very proper, in every instance, to avoid cutting the tumor. After the operation, the Doctor's pupil wishing to examine the whole substance of the cancer, made an incision into it, and there immediately issued forth a considerable quantity of a thin ichorous matter. The patient very soon recovered; which, perhaps, might not have been the case had this matter been discharged into the wound. For it is very well known that cancerous sores have been sometimes produced from the application of the virus, even to parts covered with the integuments.

interrupted or twisted suture. 3. After the removal of the cancer, if the teguments do not entirely cover the wound, and a hemorrhagy ensues, dry lint should be used as a dressing; but if there is no discharge of blood, the lint should be spread with some emollient ointment. The fore should afterwards be treated as a simple ulcer, and healed as soon as possible. 4. Some little time before the healing of the fore, an issue should be introduced—and this is probably done with greatest advantage, if made within the vicinity of the cancer. Issues seem particularly necessary in cases of cancer that proceed from suppressed evacuations, and have continued a long time; and we have no doubt, but that they often prevent the return of the disease.

The circumstances that should prevent the extirpation of cancers, are, in general, 1. The appearance of cancerous ulcers and schirrous glands in several parts of the body at the same time. 2. The connection of them with other parts that cannot be removed without danger. Thus cancers adhering to the trachea, or to the coats of a large artery, can never, without the greatest risk, be extirpated. But large portions of muscles and tendons have been taken away with cancers without producing much inconvenience. And there have occurred many instances of cancerous mammæ, in which there were adhesions to the periosteum of the ribs, to the clavicle, and sometimes a chain of indurated glands, extending to the bottom of the arm-pit, and yet all the diseased parts were with perfect safety removed.

3. An operation can never be adviseable, where the parts affected are so situated, as to prevent their being *totally* extirpated; as is the case in cancers of the uterus and rectum. The indication then, is to palliate the different symptoms, so as to render the disease as tolerable to the patient as possible. As, for this purpose, the great object

is the abatement or prevention of pain, nothing should be exhibited internally, or applied externally, that can have the least effect in producing irritation or inflammation. A diet of milk, and the lightest vegetables should be ordered: no animal food, fermented or spirituous liquors, should be allowed; and all violent exercise should be carefully avoided.

The fœtor of cancers is considerably corrected by the use of hemlock. This may be taken internally in powder or extract, and applied externally with emollient poultices in powder, if the juice cannot be had. It commonly also mends the discharge; and this much sooner than the carrot-poultice that has been so much recommended in foul fores*.

When a good discharge is obtained, the sore should be treated as a simple purulent ulcer—and particular attention should be paid to avoid long exposure of the ulcerated surface to the air. The violent shooting pains are relieved sometimes by cicuta—and sometimes by emollient fomentations—when neither of these succeed, we must have recourse to opiates.

Besides a variety of other remedies, cicuta, belladonna, and arsenic†, externally as well as internally, have been much employed and recommended for the *cure* of cancers; but we
have

* Similar good consequences have succeeded the use of common poke—the ley-poultice—and of fixed air.

† Arsenic has been probably the basis of most of the quack medicines for cancer; such as Guy's, Plunket's, and others. Dr. Rush has proved, by a chemical analysis, that Martin's remedy contained this substance. It has been observed to occasion various spasmodic affections in some instances, and particularly to affect the muscles of the eyes. We have good evidence of its producing beneficial effects in many instances, and of effecting cures in some.

If it is proposed to apply arsenic to an occult cancer, it will be necessary to destroy the cuticle by the lunar caustic or some other substance, or
by

have never seen any of them produce any permanent advantage. Mr. Justamond has spoken highly of an escharotic medicine composed of steel and sal ammoniac, infused in spirit of wine, with a certain proportion of oil of tartar and spirit of vitriol. The edges of the cancers, as well as the hard excrescences that occur in them, are to be constantly moistened with this liquid; and during the use of it, he likewise advises the internal use of flores martiales. From the trials I have made of these remedies, I have not experienced any real advantages.

S E C T. IX.

On the Cutaneous Ulcer.

THERE are few diseases less understood than those of the skin. The descriptions given of them are so confused; and they are so variously named by different writers, that it is difficult to collect any thing on the subject satisfactory. We shall here confine ourselves to some general observations on those topical complaints of the skin that are apt to produce troublesome ulcers. These, as well as some others, have all been included under the general term of *Herpes*, from their being apt to spread from one part to another.

The chief varieties of herpes may be comprehended in the four following species, viz. the *Herpes farinosus*, *pustulosus*, *miliaris*, and *exedens*.

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by a knife, previous to its use. Mr. Justamond does not think it necessary in any case to apply it over the whole surface of the tumor, but merely to its circumference. He is of opinion that arsenic operates in separating the cancer by exciting an inflammation, and consequent suppuration, of the sound parts connected with those diseased. The arsenic is usually applied either in form of a watery solution, as strong as it can be made, or mixed with some unguent, or powder.

The *herpes farinosus*, or what may be termed the *dry tetter*, is the most simple of all the species both in its nature and treatment. It appears indiscriminately in different parts of the body; but most commonly on the face, neck, arms, and wrists, in pretty broad spots of exceeding small red pimples. These are generally very itchy, but not otherwise troublesome; and after continuing a certain time, they at last fall off in form of a white powder, similar to fine bran; leaving the skin below perfectly sound; and again returning in form of a red efflorescence, they fall off, and are renewed as before.

The *herpes pustulosus* appears in the form of pustules, which are originally separate, but afterwards run together in clusters. At first they seem to contain nothing but a thin watery serum, which afterwards turns yellow; and exuding over the whole surface of the part affected, it at last dries into a thick crust or scab. When this falls off, the skin below frequently appears entire, with only a slight degree of redness on its surface; but on some occasions, when the matter has probably been more acrid, upon the scab falling off, the skin is found slightly excoriated. Eruptions of this kind appear most frequently on the face, behind the ears, and on other parts of the head; and they occur most commonly in children.

The *herpes miliaris* breaks out indiscriminately over the whole body; but more frequently about the loins, breast, perinæum, scrotum and inguina, than in other parts. It generally appears in clusters, though sometimes in distinct rings or circles, of very minute pimples, which from their resemblance to millet, have given the denomination to the species.—The pimples are at first, perfectly separate; and contain nothing but a clear lymph, which, in the course of the disease is excreted upon the surface; and there forms into small distinct scales; these at last fall off, and leave a considerable degree of inflammation below, that still continues to exude fresh matter, which like-
wife

wife forms into cakes, and so falls off as before—The itching in this species is always very troublesome: and the matter discharged from the pimples is so tough and viscid, that every thing applied to the part adheres in such a manner as to occasion a great deal of uneasiness on its being removed.

The different species of herpes are in common known by the names of *tetter*, *shingles*, and *ring-worm*; but the last is most frequently applied to the herpes *miliaris*.

The *herpes exedens*, so called from its destroying or corroding the parts which it attacks, appears commonly at first in the form of several small painful ulcerations, all collected into large spots of different sizes, and of various figures, with always more or less of an erysipelatous-like inflammation. These ulcerations discharge large quantities of a thin, sharp serous matter; which sometimes forms into small crusts that in a short time fall off; but most frequently the discharge spreads along the neighbouring parts, where it soon forms ulcers of the same kind.

Although these excoriations or ulcers do not, in general, proceed further than the true skin; yet sometimes the discharge is so corrosive as to destroy the skin, cellular substance, and on some occasions, even the muscles themselves. It is this species that should properly be termed the depascent or phagedenic ulcer; but ulcers of the herpetic kind have, with great impropriety, been commonly supposed connected with *scurvy*, and thence have been termed *scorbutic*: Whereas it is very certain, that herpes is a complaint generally joined with a state of the body entirely opposite to that which takes place in scurvy, viz. the plethoric and inflammatory, is very different in its appearance from scorbutic ulcers, and requires very opposite remedies.

This species of herpes appears at different times in every part of the body, but most frequently about the loins, where it often spreads so as to surround the whole waist.

It seems to be easily communicated by contagion; that is, by the application of the virus, by the intervention of clothes and other substances. I have known even the dry species of the disorder communicated thus.

There is as much confusion and uncertainty among authors respecting the *cure* of cutaneous diseases, as with regard to their description. It has always been supposed, till lately, that these complaints originated from some general morbid affection of the system. And it was even believed to be unsafe to attempt their cure in any other way than by correcting the disease of the fluids which it was supposed produced them. But it is strange that this opinion should not have been rejected when it was known that they could be cured by topical applications. It was formerly the practice to direct long debilitating courses of medicines—but whenever internal medicines are now directed, it is with a view to restore the diminished discharge of perspirable matter; which, from want of cleanliness, and from some other causes, being long retained on the surface of the body, and there turning acrid, may often, it is probable, give rise to many cutaneous affections. And, accordingly we find, that all such remedies prove more or less effectual as they keep up a more or less free perspiration. And what puts it beyond a doubt that they produce their good effects in this manner is, that warm bathing and cleanliness alone, in many instances, will cure these diseases effectually.

In the treatment of all the species of herpes, the first and principal circumstance to be attended to is, that not only the parts affected, but even the whole surface of the body, be kept as clean and perspirable as possible; for which purpose nothing is of so much importance as the frequent use of warm bathing, together with gentle frictions, with clean linen cloths; this last, in the dry species, may be applied over the diseased parts. When these circumstances are
properly

properly attended to, few or no internal remedies are necessary in the slighter degrees of herpes.

Of *external applications*, the several drying and astringent remedies are most to be depended on—lime-water, decoctions of the different kinds of boles, and of the astringent earths, often remove slight cases of these complaints. A watery solution of saccharum saturni, applied in cataplasms, or on soft linen rags, is somewhat more powerful—But in inveterate cases, a solution of corrosive sublimate of mercury in water is more to be depended on than any of these. About 10 grains to ℥j. of water is in general a proper proportion.

Ointments prepared with these substances are not more effectual than the watery solutions; the latter are more cleanly, and therefore claim a preference.

When the disease has been of long standing, and especially if large quantities of matter are discharged, it becomes necessary to have recourse to other remedies.

The more obstinate and virulent such complaints are, the greater attention becomes requisite to the promotion of a free discharge by the skin; for which purpose, together with warm bathing, warm diluent drinks, should be plentifully allowed. New whey answers in this view very well. Although sarsaparilla and mezereon have been much recommended for this purpose, I never knew them to produce more beneficial effects than the common decoction of the woods. This may be rendered occasionally more diaphoretic by adding fifteen or twenty drops of tincture of antimony to each cup full. A free perspiration may in common be kept up by taking two or three pounds of the decoction in the course of every twenty-four hours.

Crude antimony, to the quantity of two drachms in the day, is also a useful and gentle diaphoretic. Its efficacy is often rendered greater by conjoining a small quantity of
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gum guaiacum with it, by which means it proves gently purgative.

In plethoric patients, laxatives often prove serviceable. Those of the cooling kind only should be used. Sea-water answers very well, when the patient's stomach will bear it; but cream of tartar made into an electuary with an equal quantity of sugar, and some mucilage of gum arabic, forms a much more agreeable laxative.

An issue is always necessary in the more inveterate species of herpes, and should be one of the first remedies; without which, as in ulcers, the disease is very apt to return after being cured.

As considerable inflammation sometimes attends herpes, and particularly the herpes exedens, the saturnine applications become very necessary. Warm poultices and fomentations almost constantly tend to increase the disease, by spreading the humour.

When the ulcers penetrate deep, it is necessary to dress them with ointments, composed either of zinc, saccharum saturni, or white precipitate of mercury, and hog's lard. The proportions of zinc and axunge may be $\zeta ij.$ in fine powder of the former to $\zeta vi.$ of the latter.

When these remedies do not succeed in the cure of herpes, which is seldom the case, there will be reason to suspect that some other disease subsists at the same time—This, on accurate examination, will frequently be found to be the lues venerea. In this case, mercury must be added to the remedies already advised.

A combination of scabies or the itch with herpes sometimes occurs, and produces a tertium quid, almost as loathsome as the leprosy. In this case, the treatment necessary for scabies must be joined with that used for the removal of the herpes. Mercury will frequently cure the itch, and often removes herpes; but as it sometimes fails
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in the former disease, and sulphur hardly ever does, the latter should be preferred.

In every herpetic eruption to which children are liable, sulphur seems the most effectual remedy; and when others have failed it should always be tried. The sulphur vivum is much stronger than the flores sulphuris, and should therefore be used in preference.

There is a variety of herpes, which frequently affects the face, and occurs more particularly in females, exceedingly distressing and difficult to remove—All the common remedies are often ineffectual in curing it. I have succeeded in many such cases by the use of the following preparation: ℞. lac. sulphuris ℥ii. sacchar. saturni ℥j. aq. rosar. ℥viii. ʒ. The eruption is to be bathed with this, morning and evening, first shaking the vial. When, however, it is thought proper to use mercury, the unguentum citrinum, prepared with a less quantity of acid than is usually employed, is the most effectual preparation of it I have ever used.

The tinea capitis and crusta lactea of children, belong to the species of herpes pustulosus, and require the same general treatment. In the former, it is of great consequence that the hair should be cut short; and the solution of sublimate succeeds remarkably well.

Issues seem particularly useful in curing and preventing herpetic diseases in children; and they may, with the greatest safety, be healed up after the fifth or sixth year of their age. As the quantity of fluids which, before that period, appears to be discharged by different eruptions upon the surface, seems then necessary to be applied to the secretions of the body.

S E C T. X.

On the Venereal Ulcer.

WE now come, in order, to consider the ulcers connected with a general affection of the system; and shall first treat of the venereal ulcer.

Although, by the term venereal ulcers, is generally meant those which are a part of syphilis; yet chancres, which are not always connected with any general disease are also included under it. They may therefore be divided into those that appear as primary symptoms of the disease, and such as may be more properly considered as symptomatic.

Of the former kind are chancres in general, wherever situated, whether upon the parts of generation, the nipples, or lips. Those ulcers may also, in some cases, be reckoned primary, which remain after the bursting of buboes that have arisen from an infection lately communicated, and before there is a probability that the whole system is affected.

Such ulcers are considered as symptomatic, as arise in consequence of a general taint of the habit. Of this kind are all those which succeed to old buboes, and such as appear along with other venereal symptoms a considerable time after infection; the most common situations of which are, the throat, palate, nose, the parts immediately above the bones of the cranium, tibia, humerus, and other hard bones thinly covered with flesh.

In many cases, it is difficult to make this distinction in venereal sores; but unless it is always done, we cannot direct the proper mode of treatment. The principal means of distinction are obtained either by information from the
patient

patient, or from the appearance of the different sores themselves.

If, soon after exposure to infection, an ulceration appears upon the part to which the virus was immediately applied, together with swellings of any of the glands in the course of the lymphatics, we may be almost convinced that these are only local affections. Such ulcerations are termed *chancres*. They appear at first, as small military spots, which soon rise and form little vesicles; these upon bursting, discharge sometimes a thin watery fluid, and on other occasions, a more thick yellow matter. The edges of such sores are generally hard and painful; and as well as the glandular swellings already described, are commonly attended with more or less inflammation.

The symptomatic venereal ulcers are in general, more troublesome than chancres. They are distinguished, 1. By information from the patient. 2. By their situation; and, 3. By their appearances. Thus if a patient who has symptoms of infection in his constitution, is attacked with one or more ulcers, whether in consequence of external injuries or not: and if they resist the common methods of cure, there can be little doubt of their being infected by the general taint. But when it cannot be ascertained that the patient is affected, by his own information, we must endeavour to form a judgment from the situation and appearances of the ulcer itself.

Venereal ulcers from an old infection generally appear immediately above the bones, and particularly above such as are but thinly covered with muscles. They first appear in the form of a red, and somewhat purplish efflorescence, considerably diffused. This soon rises into a number of very small pustules, which ooze out a thin fretting serum. At first, these pustules when observed through a glass, appear perfectly distinct; but they at last run together, and form one large ulcer, whose edges are

commonly ragged and somewhat callous; and there is generally a light red appearance, extending a considerable space beyond the fore and efflorescence.

Sores of this kind have frequently the form of a cup, with the narrow part at the bottom. But when carious bones lie at the lower part, they are generally filled up with fungous excrescences. They are *seldom* attended with much pain. The discharge from them is at first thin, but at last puts on a very characteristic appearance; being of a consistence rather more viscid and tough than good pus, with a very loathsome, though not the ordinary fetid smell, and a very singular greenish yellow colour.

The distinction of venereal sores into primary and symptomatic, is of consequence in directing the proper treatment. For the former might be cured merely by destroying the venereal matter with caustic, if attended to before any absorption had taken place. But as it is impossible to ascertain whether the virus has entered the system or not, when we are applied to, the cure of chancre should never be trusted to topical applications; but, together with these, mercury should be always used internally; and to prevent a further absorption of matter, the healing of the sore should be accomplished as soon as possible.

This distinction points out to us likewise, that in ulcers from an old pox, we ought never to make use of such dressings as have a tendency to heal them soon; but should rather trust entirely to the internal use of mercury, and to such applications as merely keep them clean and easy. For the healing of such sores then affords the surest index of the removal of the general disease.

As we are seldom called early enough to destroy the virus in chancres by caustic, and indeed until it would be somewhat dangerous to attempt it, after wiping the sores clean, I generally sprinkle them with finely powdered red precipitate of mercury, and over this apply lint spread
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with common ointment. This answers very well in all cases unattended by inflammation. It seldom occasions much pain or irritation: and produces a slough, which in the course of a dressing or two, generally comes away, and leaves the ulcer perfectly clean. When in this state, the sore would probably heal if nothing more than cerate was applied to it, but for fear any venereal matter should still remain, I commonly then dress it with the strong mercurial ointment. In this manner chancres are in general easily cured, and with much less mercury given internally than is allowed to remain open a considerable time.

By long continuance however, and the neglect of proper remedies, these ulcers put on the appearances and nature of those that depend on a general infection; and consequently require the same method of treatment. They are very apt to become inflamed and very painful; and more especially when seated on the penis. Where this is the case, it is sometimes necessary to order bleeding: but in general, the saturnine poultice will be sufficient to moderate the inflammation. After the removal of the inflammatory symptoms, the best application is common wax ointment.

There are two modes of throwing mercury into the system; the one by giving it internally by the mouth, and the other by introducing it into the body through the absorbents on the skin by means of friction; but, as the last method is by much the most troublesome and inconvenient, and is not attended by any peculiar advantages, the former is now, I believe, generally preferred.

Those preparations in which the mercury has undergone no other operation than triture, as the quicksilver pill, P. Edinb. are in general the best. When this is not found to answer, the *mercurius corrosivus sublimatus*, or *mercurius calcinatus*, may be tried: and it is sometimes necessary to use a variety of preparations before a cure can be effected.

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But, in whatever form mercury is employed, it should always be continued until a soreness of the mouth is induced, as that is the only certain indication of its having entered the system. This soreness in very *slight degree*, should be supported until the cure is perfected.

In order to guard against the mercury's running off too quickly by the mouth, and producing troublesome salivation, which it is very apt to do, it has been recommended to determine the operation of the medicine in some degree to the skin by the use of warm bathing—not only during the use of the mercury, but previous to its being begun—This effect may, in some degree, be obtained with less risk from cold, by the use of a flannel shirt, by drinking plentifully of decoction of the woods or sarsaparilla: and by avoiding cold. Where the warm bath can be conveniently used it should, as being more powerful in its effects, without doubt be employed. It also has a good influence in preventing the operation of the mercury on the bowels.

By the use of these different remedies, venereal ulcers will commonly soon be removed. The mercury should be continued for a longer or a shorter time after the disappearance of the symptoms, according to the inveteracy or standing of the disease.

It sometimes happens that after a long exhibition of mercury, and when there is reason to suppose that the venereal taint of the habit is altogether eradicated, the ulcers cannot be brought to heal. In this case there will be room to suspect that some other disease may have subsisted in the constitution together with the lues venerea, and that both may have had some share in the production of the ulcers. When the nature of this disorder is ascertained, proper remedies to correct it must be conjoined with those before given.

Venereal ulcers are sometimes rendered obstinate by a caries of some bone, independent of any other disease. This is to be suspected when they are seated upon or near any of the bones, and particularly if there occur fungous excrescences. To the remedies for the venereal affection, we must then add the treatment proper for caries. See section on the *carious Ulcer*.

When neither caries nor any constitutional affection seem to prevent the healing of such ulcers, and they appear to grow worse; and particularly when the system seems much debilitated by the confinement and effects of the remedies, the best and most effectual mode of treatment is, to order a light nourishing diet, with fresh air and exercise. This by invigorating the body often produces surprising cures. The Peruvian bark is here also of service.

Old sores of this kind, on account of the sloughs with which they are usually covered, require stimulant dressings. The following ointment is very proper, ℞ ung. basil. flav. ℥j. merc. præc. rubr. ℥ij. M. When they become clean, they are to be treated in the usual way.

When the glands are the seats of venereal ulcers, it is sometimes necessary to destroy the whole, or a considerable part of such as are much hardened, by caustic, before a cure can be obtained.

Although venereal ulcers are in general to be cured by proper treatment, yet some instances have occurred, in which they have resisted all the efforts of nature and art, and at last have carried off the patient in great misery.—* Such cases probably are only to be met with in hospitals.

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* They are sometimes met with in private practice, and after resisting all the methods recommended by different writers, have been known to recover solely by the use of a free diet and exercise.

S E C T. XI.

On the Scorbutic Ulcer.

THE characteristic marks of ulcers that occur in scurvy, are as follow:—They never afford a good pus; but a thin foetid sanious matter, mixed with blood; which at length has the appearance of blood coagulated, and is with difficulty separated from the surface of the sore. The flesh beneath this is soft, spongy, and very putrid.—Escharotics to remove the sloughs answer no good purpose, for they certainly appear again at the next dressing—Their edges are generally of a livid colour, and puffed up by excrescences beneath the skin. If compression is employed to keep the fungus from rising, it generally produces a gangrenous disposition, and always renders the member œdematous, painful, and for the most part spotted.

As the disease increases, they shoot out a soft bloody fungus, resembling boiled liver; which often rises in a night's time to a monstrous size; and if destroyed by caustic or the knife, bleeds plentifully, and returns again by the next dressing. They continue a considerable time in this condition, without affecting the bones—and are produced by the slightest wound or bruise, in scorbutic persons.

This description is only applicable to scorbutic ulcers that accompany very great putrescency in the system at large; for such inveteracy is not often met with, except in long sea-voyages; but in Scotland, slighter degrees of the same kinds of sores are often seen, and sometimes accompanied with the most characteristic mark of scurvy, viz. soft spongy gums. They generally appear among the lowest class of people, and seem to originate rather from want of food in general, than from confinement to a particular

particular kind. They seldom are produced in parts previously found; but ulcers already formed, and wounds inflicted during the prevalence of a scorbutic affection, always degenerate into sores of this kind. Most of the ulcers of the poor in Scotland partake of a scorbutic taint.

The immediate or proximate cause of scorbutic ulcers, as well as of every other symptom of scurvy, may be referred to a certain degree of putrescency in the fluids. This may be induced by a variety of causes, the most material of which are, living constantly upon salt provisions; a total want of vegetables; with exposure to a cold, moist atmosphere. See *Pringle, Lind, and Huxham*, on the *Scurvy*.

The cure of scorbutic ulcers must depend chiefly on the correction of the putrid diathesis of the system; for which purpose, vegetables of all kinds, but especially those of an acescent nature, with milk and whey, are found to be certain remedies. The different secretions, especially those by the kidneys and skin, and more particularly the last, which is in common almost entirely obstructed, should be gently promoted. Laxatives, as tamarinds, manna and cream of tartar, are also very serviceable—These remedies, joined with total abstinence from salted food, and attention to avoid all the other exciting causes, commonly remove *all* the symptoms of scurvy. The ulcers should be dressed with powerful antiseptics. Lind recommends ung. ægyptiac. and mel rosarum acidulated with spirits of vitriol.

In the scorbutic ulcers that occur in Scotland, it is seldom necessary to confine the patient to an antiscorbutic course. And they are more effectually removed by the gradual allowance of a generous diet, with a moderate proportion of good wine, or perhaps what is better, of porter or strong beer. Peruvian bark internally

internally, and applied to the ulcers in decoction, is a very useful remedy in these cases; but the best external application while much putrescency remains, is the carrot poultice; when this is removed, the ulcer is to be dressed as in other cases. Issues are also to be used occasionally.

S E C T. XII.

On the Scrophulous Ulcer.

By scrophulous ulcers, are meant those sores which are consequent to swellings, symptomatic of scrophula or king's evil.

Scrophula begins with indolent, somewhat hard, colourless tumors; which at first chiefly affect the conglomerate glands of the neck; but at length attack the cellular substance, ligaments and bones.—These swellings are more moveable than schirri, softer, and seldom much painful; they are tedious in coming to suppuration; very apt to disappear suddenly, and again to rise in some other part of the body. There is a remarkable softness of skin in this disease, a kind of fulness in the face, and generally large eyes, and a very delicate complexion.

Scrophulous ulcers seldom yield a good discharge; affording upon their first appearance, a viscid, glairy, and sometimes a whitish curdled matter, that afterwards changes to a more thin watery sanies. The edges are frequently painful: and always much tumefied. As long as there is any scrophulous diathesis in the system, such sores often remain for a great length of time, without showing any disposition either to heal or grow worse: at other times they heal very quickly, and again break out in some other part of the body.

A variety of causes have been mentioned as tending to produce scrophula, viz. a crude indigestible food; bad water;

ter; living in low damp situations; its being an hereditary disease, and in some countries endemic, &c. But, whatever may be the exciting or predisposing causes, the disease itself either depends upon, or at least is much connected with a debility of the constitution in general, and probably of the lymphatic system in particular: the complaint first shewing itself by affections of the latter. This is evident from the nature of many of the causes, and from such remedies as are found to prove most serviceable in the cure.

Gentle mercurials are sometimes of use as resolvents in scrophulous swellings*; but nothing has such good effects as the large use of peruvian bark. Chalybeate and sulphureous waters too, have frequently proved serviceable: and a long use of mild saline aperients have been found beneficial. Cold bathing, and particularly in the sea, together with moderate exercise, is often of singular service; as likewise change of air, especially to a dry climate.

Until the general scrophulous taint is removed, it is dangerous to heal the ulcers; all that should be done, therefore, should be, to give as free a vent to the matter as possible, and to prevent the formation of sinuses.

The best applications are the saturnine preparations: these remove that inflammatory complexion they assume when relaxants are employed; and tend much to prevent the spreading of the sores.

When, however, the ulcers become swelled and painful, and discharge a very corrosive matter, we may suspect a caries to be at the bottom of the sores. Nature must then be assisted, where it is practicable, by the removal of such parts of the bones as are most diseased, and have become loose. But this cannot be done when the large joints are

I affected:

* Compresses dipped in a solution of sal ammoniac, in vinegar and water, and applied to the tumors before any inflammation appears, have been found useful.

affected: In that case, as amputation is not always advisable, for fear of the disease returning, we must trust to nature for a cure. Here the general remedies, formerly mentioned, should be diligently employed. I think I have seen cicuta have very good effects in mending the discharge from the ulcers, when joined with the bark.

When it will be safe to heal the ulcers, issues should always be introduced. Gentle compression has uncommonly good consequences in sores of this kind.

C H A P. III.

S E C T. I.

Of the Symptoms and Causes of White Swellings of the Joints.

THE term *white swelling* has commonly been applied to such enlargements of the joints as are not attended with discolouration of the integuments; the only symptoms which at first take place, being a greater or less degree of swelling, with a deep seated pain. In the progress of the disease, however, inflammation affects all the adjoining parts, as well external as internal; and when this terminates in suppuration, it is not uncommon for openings to be formed all around the diseased joints.

There seem to be two species of this disease, entirely different in nature from each other. In the one, a cure is often in part, and sometimes wholly obtained; whereas the other is always beyond the reach of art.

Swellings of this kind occur more frequently in the large than in the smaller joints; thus, at least twice as many are met with in the knee and ankle joints, as in all the rest of the body besides.

§ 1. *Of the Rheumatic species of White Swelling.*

THIS disease begins with an acute pain, which seems to be diffused over the whole joint, and frequently even extends along the tendinous expansions of the muscles. There is from the beginning, an uniform swelling of the whole surrounding teguments in greater or less degree: but is always so considerable as to occasion an evident difference in point of size between the diseased, and the sound joint of the opposite side. A considerable tension generally prevails; but there is seldom, in this period of the disorder, any external discolouration.

The patient from the beginning, suffers much pain from the motion of the joint; and, finding it easiest in a relaxed posture, keeps it generally bent; this often produces a rigidity in all the flexor muscles, which is often afterwards with difficulty removed. If the disease is not now carried off, the swelling augments gradually; and has sometimes acquired thrice the natural size of the part. The cuticular veins become turgid and varicose: the limb below the tumor decays considerably in its fleshy substance, at the same time that it frequently acquires an equality in point of thickness, by becoming œdematous; the pain now begins to be more intolerable, especially when the patient is warm; and abscesses form in different parts of the swelling, and run in various directions, but frequently without inter-communication. In these a fluctuation is generally evident upon pressure.—These swellings have a peculiar elastic feel.

When the collections of matter have an opening formed to them, they discharge at first a pretty good pus: this, however,

however, soon degenerates into a thin foetid ill-digested fæces; and has never any remarkable influence in reducing the size of the swellings. If the sores are not kept open by art, they soon heal up, and others are formed by collections in different places; so that in some cases, the surrounding teguments are entirely covered with cicatrices remaining after such ulcers.

Long before this period, the patient's health suffers considerably: first from the pain, which is often so violent as to take away both sleep and appetite, and afterwards from the absorption of the matter.

When the discharge of matter commences, the effects of its absorption begin to appear; these are quick pulse, night sweats, and weakening diarrhœa, which generally at last carry off the patient, unless the disease is cured.

I have had several opportunities of examining limbs affected with white swellings, that were amputated in very early periods of the disease, on account of the intolerable pain, and an apprehension of the complaints being incurable. In all these instances the only morbid appearance, was a preternatural thickens of the surrounding ligaments, without any disease of the joint whatever. The degree of this enlargement did not appear always proportionate to the duration of the complaint. In an advanced stage, it always was considerable; and was generally attended by an effusion of a thick glairy matter into the surrounding cellular substance, which probably causes the peculiar elastic feel of the swelling.

The different abscesses run in various directions through this matter, without seeming to mix with it.—A great many small hydatids are also observed in some instances, in different parts of the tumor—And, in the farther progress of the disease, all these together form a confused mass.

All these appearances I have met with, without any concomitant affection of the bones of the joint. When the complaint,

complaint, however, has continued very long, the ligaments are destroyed by the acrimony of the matter, which in consequence abrades the cartilages, and then renders the bones carious. The tendons are neither enlarged nor hardened.

§ 2. *Of the Symptoms of the Scrophulous White Swelling.*

IN this species the pain is generally more acute than in the other; and instead of being diffused, is more confined to a particular spot, most frequently to the middle of the joint. The pained part appears sometimes to be no larger than a dollar. The swelling is at first commonly very inconsiderable. The least motion gives pain; hence a contraction of the limb is at length produced as in the other species. As the disease advances the pain and swelling increase; and an evident enlargement of the ends of the bones takes place.

In process of time the tumor acquires the same elasticity as occurs in the rheumatic species; varicose veins appear—abscesses are formed—On examination the bones are found carious, and parts of them are discharged at the sores that are produced.—By the farther continuance of the disease, the constitution suffers in the same manner, as in the variety first described.

When joints are dissected in the first stages of the disorder, the soft parts seem to be very little affected; but in all that I have examined, there was constantly observed an enlargement either of the whole ends of the bones, or of their epiphyses; frequently of those on one side of the joints only; but in some, both bones have been diseased. This enlargement sometimes is the only morbid appearance; but generally, and always in the advanced stages, the soft spongy parts of such bones are found to be dissolved into a thin, fluid, fetid matter; and that in some cases without the cartilages being much affected. These, however, are at length dissolved; and then the
different

different hard and soft parts intermixing, exhibit an inconceivably confused mass.

In the advanced stage of the complaint the soft parts are generally affected. The ligaments become thickened, and the cellular membrane is filled with the same glairy matter that is produced in the rheumatic white swelling.

§ 3. *Of the Causes of White Swellings.*

THE causes of the rheumatic species may be, sprains that particularly affect the ligaments of the joints, bruises, luxations, and whatever can tend to produce inflammation of the ligaments. A rheumatic diathesis or disposition is probably also a principal cause of this disease. For rheumatism is known to attack particularly the ligaments, or other deep seated membranes, and more especially affects the larger joints—Hydarthrus or white swelling also occurs in the same habits that are most subject to rheumatism, viz. the young and plethoric.

That it is the ligaments that are first affected in this disease is evident from the history and dissections. From these we may conclude, that this complaint is at first always occasioned by an inflammation of the ligaments of the joints. And we may consider the different matters that are formed, to depend on the difference of parts affected in the course of the disease.

The other species of the disorder, from the symptoms enumerated, and the appearances on dissection, seems evidently to be originally an affection of the bones; the soft parts seeming only to suffer in the progress of the disease from their connection with and vicinity to these. It seldom is the consequence of any accident; and the patient is seldom able to account for it.

This disease is generally attended with known symptoms of scrophula; or the patient has had them at an earlier period

riod of life, or at least is of scrophulous parents. From these, and the above described circumstances, it is probable the disorder is of a scrophulous nature.

S E C T. II.

Of the Treatment of White Swellings.

IN the rheumatic white swelling, as it is always at first of an inflammatory nature, considerable advantages are obtained in common, by the use of an antiphlogistic course. The first remedy which should be employed is blood-letting—This is most effectual if the blood is drawn immediately from the affected part, by cupping, performed on each side of the joint. At least eight or ten ounces should, if possible, be discharged at each time, and this should be repeated according to circumstances. When a sufficient quantity of blood cannot thus be obtained, leeches should be had recourse to.

A small blister should be immediately applied on the anterior part of the joint; and the part afterwards kept running until the wounds from which the blood was discharged, are so far healed, that a vesicatory may be laid on one side and as soon as this is nearly healed another should be placed on the opposite side of the joint. By thus applying them alternately to each side, a constant stimulus is kept up; which, in deep-seated inflammations, seems to have a greater effect than the discharge produced from them.

Cooling laxatives, at proper intervals, are also of use; and the patient should, *in every respect*, be kept upon a strict antiphlogistic course. From an attention to all these circumstances the disease has frequently been removed.

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The inflammatory symptoms being mostly gone, and while there are yet no appearances of the formation of matter, mercury, not given so as to salivate, but merely to affect the mouth gently and to keep it somewhat sore for a few weeks, I have sometimes known of use. The best form of employing it in this case is by way of unction— $\bar{5}$ ij. of a weak mercurial ointment should be rubbed into the part three times a-day; and as the friction may be very serviceable, it should be continued an hour each time. By the French writers, fells of warm, and of cold water, on swellings of this kind are much recommended. There is the greatest reason to suppose, from the known relaxing powers of moisture when joined with heat, that a proper application, and particularly of warm emollient steams may prove more useful than any other remedy. The friction in the use both of warm and cold water has probably a considerable influence; and the chief effect I think, can be attributed to that only in the latter case. I have sometimes seen it employed with advantage.

Although by the use of these remedies, the disease is often entirely removed; yet, in many instances, when the pain and swelling are chiefly or entirely gone, it frequently happens, from the bent position in which the limb has been kept, that the use of the joint is entirely lost, and it contracts such a rigidity, that very great pain attends any attempts to move it.

It has unfortunately happened that this contraction has been generally attributed, either to an union of the ends of the connected bones, or to an inspissation of the synovia; both of which are incurable. But from dissections we may confidently conclude, that except in the most advanced state of the disease, the first does not occur in one case in twenty; and that it is very doubtful whether the last is ever produced.

The immobility of the joint is consequently to be considered as the effect of a contracted state of the flexor muscles, and tendons; which, in several instances, some of which were thought to be of the worst species of ankylosis, I have seen totally removed by the application of emollients. See chap. on *Contractions of the Limbs*.

After the formation of matter, no considerable advantages can be expected from any of the remedies we have above recommended. In that case, the discharge of the collections should be made as soon as possible, by the employment of the seton—This can easily be effected, and sometimes has been the means of saving many such diseased joints.

Amputation should never be had recourse to unless the patient's constitution is so much reduced, that there would be considerable risk from any farther delay.

When the disease has destroyed the ligaments, and perhaps the cartilages and bones of the joint, amputation is the only resource. See chap. on *Amputation*.

All the above remarks, relate particularly to the rheumatic white swelling. With respect to the more fatal species, the scrophulous, we can offer nothing satisfactory. When the small joints are affected, and the diseased parts of the bones begin to cast off, a cure may be sometimes promoted by assisting the efforts of nature; but in all the larger joints, it is not probable that any other resource than amputation will ever afford much relief. And even the effects of this can seldom be depended on as lasting; for while the scrophulous taint subsists in the constitution, the disorder will most probably appear again in some other part. On account of the violence of the pain, it is however necessary sometimes to run the risk of this.

When it does not appear adviseable to perform the operation, we must trust to palliatives. Of these, opiates in large doses, by moderating the pain and procuring sleep, are generally the most useful. The general remedies and diet proper in scrophula, are also to be recommended.

C H A P. IV.

Of Sutures.

THE intention of futures, is to unite parts that have been divided. The futures in present use are distinguished into the *true* or bloody, and the *false* or dry. The true futures are the *interrupted*, the *glover's*, and the *twisted*; these are performed by the needle. The union of parts produced by the medium of adhesive plasters has been termed the *dry* future.

S E C T. I.

Of the Interrupted Suture.

THIS is the species of future that has generally been made use of in deep wounds; but we shall endeavour to make it appear hereafter, that it is not so well adapted to such cases as the twisted future.

In order to a proper retention of the parts, in forming futures in general, it has usually been considered necessary to carry the needle to the bottom of the wound, so as to give no room for the accumulation of matter; and this has commonly been done by introducing it from without inwards, and then from the wound to the same distance on the opposite side. But, the interrupted future is more neatly and easily performed, by passing both ends of the thread from within outwards, by means of a needle fixed on each. When they are carried through, the needles are to
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be removed, and the threads remain untied, until all that are found necessary are passed.

The number of ligatures must depend chiefly on the extent of the divided parts. One suture has generally been said to be sufficient for an inch of wound, but when muscular parts are cut transversely, a greater number in proportion to the extent of the sore will be necessary. A ligature should be introduced at every angle of a wound, however inconsiderable it may be.

In passing the ligatures it has been a rule to pierce the skin at a distance from the edges of the wound equal to its depth, in order to prevent them from cutting through the parts. But it is very seldom proper to make the space more than an inch, or less than half an inch. The form of the crooked needle proper for forming the interrupted suture is delineated in plate vii. fig. 6. The size of the needle, as well as the strength of the ligature, must always be proportioned to the depth of the wound, and the retraction of the parts. The ligatures ought nearly to fill the eyes of the needles; and in order to make them pass easily, to render them durable, and easily susceptible of a flattened form, by which they are less liable to cut through the contained parts, they should be well waxed. While the surgeon is tying the threads, the lips of the wound should be pressed together by an assistant. The ends of the ligatures are usually carried twice through the first noose, to prevent them from slipping. This forms the surgeon's knot. The insertion of lint beneath or between the knots, as recommended by some, prevents them from being well made, and has little good effect. It is necessary to tie the threads immediately above the wound, in order to give an equable support to each edge of it.

S E C T. II.

Of the Quilled Suture.

THE quilled future is formed by a quill, or piece of plaster, rolled up into the form of a quill, and placed on each side of a wound, one of which is included in the doubling of the ligature, and the other is pressed by the knot.

This future has been used in very deep wounds, and supposed to give better support than ligatures alone, which sometimes cut through the parts; but it is evident that the threads must make as great a pressure when the quills are used, as when they are not; and consequently, that this species of future might with propriety be entirely laid aside.

S E C T. III.

Of the Glover's Suture.

The glover's future consists in a series of stitches connected with each other, and continued in an oblique spiral direction along the course of the divided parts. The use of this future has been confined to wounds of the intestines: but even these may be more perfectly united by the interrupted future. See chap. on *Wounds of the Intestines*.

It will therefore follow, that the glover's stitch is entirely unnecessary to a surgeon.

S E C T.

S E C T. IV.

Of the Twisted Suture.

IN making the twisted future, we unite divided parts by means of threads twisted around pins or needles pushed through their edges. This future has seldom been employed, except in the hare-lip; but it is preferable to any other species in all wounds that are not more than an inch and a half in depth, because better calculated to retain the parts in contact. In very deep wounds the interrupted future must necessarily be used, on account of the difficulty and pain that would attend the introduction of pins to form the twisted future.

The pins made use of for twisting the threads upon, should be flat, as in plate ix. fig. 7.; as the whole pressure falls upon them, and when thus made they are not so apt to divide the parts as ligatures. Those usually employed are of silver, with steel points; but as gold pins are not so liable to acquire a crust by immersion in fluids, and require no steel points, they should be preferred. They ought, in general, to be from an inch to an inch and an half in length, of a proportionate breadth, and have heads for the fingers to press upon.

In performing this operation, the divided parts must be brought nearly into contact by an assistant, leaving only such a space as will allow the surgeon to see that the pins are carried to a proper depth. A pin is then to be introduced on one side externally, pushed inwards to within a little space of the bottom of the wound, and carried through the opposite side, to the same distance from its edge that it was made to enter at on the other side. The distance at which the pin should be entered from the edge must be determined by the depth of the wound, and the degree of retraction of its sides, as in making the interrupted future. If the pins
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do not pass easily, the instrument termed *porte-aiguille* may be used to push them forward.

The first pin being thus passed very near one end of the wound, and the parts still supported, a firm waxed ligature should be carried three or four times around and across it, so as to describe the figure of 8, and sufficiently tight to draw the lips of the wound into close contact. The thread should then be secured by a loose knot, and another pin introduced. The ligature is now to be loosened, and applied to this pin as directed for the first, and others passed at proper distances, the whole length of the wound, all being connected by the same ligature.

A pin should always be placed near each end of the fore, to prevent the separation of its extremities. In large wounds the pins should be three-quarters of an inch distant from each other; but in the smaller, a greater number in proportion to the extent of fore will be necessary. When the futures are all formed, the wound should be covered by lint wet with mucilage, to exclude the external air. The introduction of lint beneath the ends of the pins has a tendency to make them cut the parts. When they give uneasiness, a piece of thin linen spread with adhesive plaster will be better. I have never known the application of a bandage after this operation productive of good effects, but have often seen it occasion troublesome inflammation.

In general, the pins should be suffered to remain from five to seven days, according to the depth of the wound. But when the patient is unhealthy, a longer time may be necessary*.

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* In young healthy subjects the union is often completed in half the time; but perhaps the safest way is to leave the pins in the parts till a small degree of digestion appears.

As soon as they are removed, a bandage may be used with advantage, to support the newly-united parts. But perhaps strips of leather spread with glue, applied to each side of the cicatrix, and connected by ligatures, would be preferable.

Of the dry suture we shall treat hereafter.

C H A P. V.

Of the Ligature of Arteries, and other artificial means of stopping Hemorrhagies.

IN every wound, the first circumstance to be attended to is the hemorrhagy. This is either produced from the large arteries, or by a general oozing from the smaller vessels. In the first case, a temporary stoppage of the discharge should be immediately attempted by compression, until the permanent security of ligatures can be obtained. In the head and trunk, the easiest method of pressure is formed by lint or soft linen retained firmly on the mouths of the vessels by the hand or a bandage; or if the superior part of the vessels can be compressed it answers better, as ligatures can then be applied with more ease.

When the wound is in the extremities, and compression can be made on the superior part of the artery, it should immediately be done by means of the tourniquet. Plate iii. fig. 5.

Previous to the application of the tourniquet, a cushion, three inches in length, and one and an half in breadth, should be placed immediately above the principal artery, and well secured by two turns of a roller. Over this roller the strap of the tourniquet is to be firmly fixed, the screw being on the side of the limb opposite to the cushion: one turn of the screw is generally sufficient. See *plate and explanation*.

As the ancients were ignorant of the use of the tourniquet and of ligatures, they endeavoured to remove hemorrhages by applying actual cauteries or hot irons to the large vessels, and lint covered with styptic powders, to the smaller. But these often failed. Even lately, agaric, chalybeate solutions, and the mineral acids have been much recommended. These in many cases do not produce the desired effect. When ligatures can be well applied, they invariably succeed; and in the larger vessels should alone be depended on.

Various methods have been used for tying arteries. The common practice at present is, by means of a curved needle to pass a ligature of sufficient strength around the mouth of the vessel, including a quarter of an inch of the contiguous parts: but, as tying the nerves and muscles often produces not only partial but general spasms, and always a great deal of pain, it is advisable to include the artery only in the ligature, by employing forceps, or rather the tenaculum, Plate vii. fig. 5. In very deep wounds the needle may be necessary; but such cases rarely occur. Experience from repeated comparative trials has convinced me, that the mode recommended is as secure as that by the needle; and when it is used the ligatures come away much sooner, generally at the third or fourth dressing; which is often of very great advantage. I have seen instances of the ligatures remaining for weeks when the needle was employed, and some cases in which they were at last cut away by the surgeon.

The forceps do not answer well in tying small arteries; they might therefore, with propriety, be entirely laid aside, as the tenaculum or hook is equally applicable to the large and small arteries. The manner of using it is as follows:

In order to detect the arteries to be tied, the tourniquet must be loosened, and as soon as the largest artery is discovered, the surgeon fixes his eye upon it, and immediately again tightens the tourniquet. An assistant then forms a noose in the ligature, and placing it over the end of the vessel, the operator pushes the point of the tenaculum thro' the sides of the vessel, and pulls as much of it out as he thinks should be included in the surgeon's knot now to be made by the assistant. For greater security a second knot should also be formed. In making the knots, a very small addition to the force requisite for restraining the hemorrhagy, is sufficient.

In this manner *all* the arteries that can be distinguished should be secured: For fatal hemorrhagies have sometimes been produced from very inconsiderable vessels, when the patient has become warm in bed. Loss of blood, fear, or cold, often occasion such a retraction of the smaller arteries, that it is difficult to detect them:—To effect this, the tourniquet should be loosened, and the wound well washed with a sponge and warm water; and if the patient is faintish, a glass of wine or some other cordial should be given.

As in some instances we are unable to tie arteries by means of the tenaculum, we should be provided with needles of various forms and sizes. Those used in forming the interrupted suture are very well adapted to the tying of arteries. In using the needle, it should be introduced, armed with a ligature, at the distance of a sixth or eighth of an inch from the artery, pushed to a depth sufficient for retaining the thread, and carried one half round the vessel.

It must now be withdrawn, and being again pushed forward till it has encircled the mouth of the artery, is then to be pulled out, and a knot formed on the ligature as already directed.

Hemorrhagies to an alarming degree are frequently produced in extensive wounds by a general oozing from the surface of the sore; and sometimes it is with difficulty they are suppressed. They seem to proceed from two very different circumstances: 1st. In robust habits, either from too great a quantity of blood, an excess of tone in the vessels, or a combination of both; or 2dly. And more frequently, in relaxed debilitated habits, from a dissolved state of the blood, a want of tone in the vessels, or a concurrence of both these.

In healthy constitutions, the discharge of blood from the smaller vessels of wounded parts is commonly soon removed by the contraction of these vessels, and the discharge of a glutinous fluid from them, which is diffused over the surface of the wound: But when it continues in such degree as to shew a morbid state, it is to be attributed to one of the causes abovementioned. In robust habits relief is to be obtained by opening a vein; or perhaps more effectually by untying one of the principal arteries of the part and suffering it to discharge freely; by keeping the patient cool; giving him cold acidulated drinks; obliging him to avoid motion, particularly of the part; covering the wound with lint; and by applying a bandage over it. In *all* these cases, and particularly when violent spasmodic affections supervene, a large dose of opium is one of the most effectual remedies, and should be exhibited as soon as the patient has been bled and put to bed. When we have reason to suppose the disease is supported by the second set of causes mentioned, a generous diet, and a free use of Port, Madeira, or other good wines, should be allowed;

lowed; the patient should be kept cool; mineral acids, particularly the vitriolic, must be given; rest of body enjoined; and opiates, to obviate pain or spasm, liberally administered.

Together with these general remedies, particular dressings, adapted to the state of the system, should be applied. Dusting the parts with starch or wheat flour, or gum arabic in fine powder, has been useful in all states of the body, but particularly in that of debility. In this case, lint moistened with tincture of myrrh, traumatic balsam, and other stimulating applications, are very serviceable. When these do not prove effectual, an equable pressure by a bandage, or the hand applied over the dressing, will seldom fail*.

* This last mode of pressure is much the best, and has succeeded in some aneurisms, where it could be made immediately upon the orifice of the wounded artery.

CHAP.

C H A P. VI.

Of Blood-letting.

S E C T. I.

Of Blood-letting in general.

IN all general affections where blood-letting is considered necessary, the blood is discharged by an opening made in an artery or vein. The former operation is called *arteriotomy*; the latter *phlebotomy*. In local affections, particular benefit is often afforded by dividing a number of the smaller vessels of the part diseased; this is termed *topical* bleeding.

We shall first consider *phlebotomy*. The choice of a vein in this operation, must be determined by the particular circumstances of the patient. The veins from which blood is usually drawn, are those of the arm at the flexure of the cubitus or fore arm, the jugular veins, and those of the ankles and feet. On certain occasions, blood is also taken from the veins of the hands, tongue, and other parts.

In blood-letting in general, as the position of the patient has some influence on the effects of the operation, it should be precisely fixed. When fainting is likely to be induced, and we do not wish to risk it, an horizontal posture is to be preferred; but if we expect advantages from the fainting, the patient should be placed erect. The part

to be operated upon should be so situated, as that the principal light of the apartment may fall directly upon it: and the surgeon ought always to be seated; as he will then bleed with much more steadiness and nicety than if he stands*. When the patient is properly fixed, a bandage should be applied to the member to be operated upon, to produce an accumulation of blood in the veins; but not so tight as to obstruct its passage in the corresponding arteries.

Various instruments have been invented to bleed with; but there are only two now in use: the *lancet* and the *phleme*.

The phleme is placed immediately on the part to be cut, and by means of a spring is struck suddenly into the vein. Its inconveniencies are, that we must regulate the depth to which it is to go, before we apply it; on which account, if the vein lies deeper than supposed, we may not reach it; and there is danger of its wounding arteries, or other parts beneath the vein, if it should go too far†. These disadvantages do not attend the use of the lancet, and therefore it certainly ought to be preferred.

The lancet should be spear-pointed—it then enters the integuments with little pain; and forms an opening in them very little larger than the orifice in the vein, which renders it an easy matter to stop the discharge.—These advantages are not derived from the broad-shouldered lancet in common use.

The ligature having been made for a short time to produce some swelling in the veins, that vein is to be selected
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* This depends upon habit—those accustomed to operate standing will perform with more ease to themselves, than if they were seated.

† Notwithstanding these obvious objections, the phleme is very universally used here, among the bleeders, in preference to the lancet; and even some medical practitioners employ it. I have very seldom heard of any material bad effects from its use—never but of one case of aneurism.

which rolls less than the others on being pressed with the finger, even if it should be somewhat deeper than those near it—Veins that lie contiguous to arteries and tendons should, if possible, be avoided; although a dextrous operator may often open them with perfect safety.

When a vein is made choice of, the surgeon, if he is to use the right hand, grasps firmly the member, an inch and an half below the part to be operated upon with his left, and makes such a pressure on the vein, with the thumb, as will interrupt the communication between the inferior part of it, and the part above the thumb, and will render the teguments somewhat tense. The lancet being bent to rather more than right angles, is then to be taken between the thumb and fore-finger of the right-hand of the operator, and leaving one half of the blade uncovered, he rests his hand on the remaining fingers, and then pushes the point of the lancet into the vein, and carries it forward in an oblique direction, until the orifice is sufficiently large. The point ought neither to be raised nor depressed, lest it should wound parts unnecessarily. The instrument is now to be withdrawn, and the left hand removed as soon as the cup for receiving the blood is applied. While the blood is flowing, the member should be kept in the position it had when the incision was made; otherwise the skin may slip over the orifice in the vein, obstruct the discharge, and produce ecchymosis.

If the wound is made longitudinally, it does not admit of a free discharge; and if across the vein, it is difficult to heal. The size of the orifice must depend on the circumstances of the disease for which the bleeding was ordered. In general, when the spear-pointed lancet is used, an eighth of an inch will be sufficiently large; but when we employ the common lancet, a quarter of an inch will not be too much.

It sometimes happens that the blood is not freely discharged, either from faintishness, or from the opening in the skin receding from that in the vein. In the first case, it will be proper to admit a stream of air into the apartment, to give some wine or other cordial, and have the patient placed in a horizontal posture. If the blood does not then flow as we wish it, the part should be put into a variety of positions, the muscles should be thrown into action by moving something in the hand, if the arm is operated upon; and if the pulse is feeble in the inferior part of the member, we should loosen the ligature.

As soon as a sufficiency of blood is drawn, the compression should be taken off, and if the discharge does not then cease, the thumb should be applied above, and the fore-finger below the orifice, and it being well washed and cleared of blood, its sides should be brought exactly together, and there retained by a strip of adhesive plaster. This will generally be sufficient; if it is not, it will be proper to apply a linen compress over the plaster, and secure both with a roller.

The wound will commonly heal by the first intention, or without the formation of pus; but troublesome consequences sometimes ensue. Of these the most material are thrombus or ecchymosis; wounds of arteries, nerves, or tendons contiguous to the vein; and inflammation of the internal coat of the vein operated upon.

S E C T. II.

Of a Thrombus or Ecchymosis.

A thrombus is a small round tumor produced by extravasated blood insinuating itself into the cellular membrane. When this swelling is more diffused it is termed an ecchymosis.

mosis. In bleeding, it is commonly induced by the orifice in the skin receding from that in the vein. Immediately on the appearance of such swellings the ligature should be removed, and again applied, as soon as the limb is brought into the position it had during the operation. Should not this succeed in dispersing the tumor, or at least in procuring a free discharge of blood, the ligature must again be taken off; and if the necessary quantity of blood has not been drawn, another vein should be opened.

These swellings in general go off of themselves; but if they do not, they may often be dispersed by the application of compresses wet with brandy, or a solution of sal ammoniac in vinegar. If these have not the desired effect, the tumor should be laid open, the blood taken out, and the wound then healed in the usual mode.

S E C T. III.

Of Wounds of the Arteries.

THE only certain method of knowing whether an artery is wounded through the vein, in bleeding, is to compress the vein above and below the orifice; if the artery is wounded, the discharge will then continue, or be increased; if it is not, it will cease. The flow of blood being per saltum, is a fallacious criterion, because it may happen from a vein lying immediately above an artery.

As soon as we are certain of an artery being thus wounded, as much blood should be suffered to flow as the state of the body will admit of, and the wound should then be closed by adhesive plaster; rest should be enjoined, and the body kept cool; gentle purgatives must be given, and blood-letting repeated occasionally. By these means, the system will be relaxed, and we shall have some chance of
healing

healing the wound. If this is not accomplished, the effusion of blood forms a species of aneurism.

It has been the common practice in wounds of the arteries, to apply immediate and strong compression, by means of compresses and bandages; but it is evident that this, from the obstruction it gives to the passage of the blood, according to its degree, must either increase the hemorrhagy by producing an increased action in the artery, or cause a gangrene in the parts below.

S E C T. IV.

Of Wounds in the Nerves and Tendons from Bleeding.

THESE accidents arise from carrying the lancet through the back part of the vein; and may be avoided by keeping the point of the instrument in a straight direction*, instead of depressing it after it has entered the cavity of the vein.

If immediately on the introduction of the lancet the patient complains of exquisite pain, we may rest assured that either a nerve or tendon has been wounded.

In some cases, by proper management, the pain will gradually go off entirely without any bad consequence whatever. At other times, however, the pain soon increases, a small degree of swelling takes place; the lips of the fore become somewhat hard and inflamed; and in the course of about twenty-four hours from the operation, a thin watery serum begins to be discharged at the orifice.

If relief is not soon obtained, these symptoms generally continue nearly in the same state for two or three days longer. At this time, the pain becomes greater, and in-

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* See Section I.

stead of being acute as before, is now attended with a burning heat, which gradually augmenting proves, during the whole course of the disease, exceedingly distressing. The fulness and hardness in the lips of the wound begin to increase, and the swelling by degrees extends over the whole member; from the foot, if the operation has been performed there, over the whole lower extremity; and from the elbow, if the bleeding has been done in the arm, down the fore-arm, and along the humerus over the pectoral muscle and other contiguous parts.

The parts at last become exceedingly hard and tense; an erysipelas frequently appears over the whole member; the pulse becomes generally very hard and quick; the pain intense, and the patient very restless; twitchings of the tendons occur, on some occasions, a locked jaw and other convulsive affections supervene; and all these symptoms continuing to increase, it most frequently happens that the sufferings of the patient are only terminated by death.—All the instances of accidents of this kind that I have seen have ended fatally.

By some, the symptoms we have enumerated have been attributed to wounds of the tendons; others supposing tendons to be destitute of sensibility, have imputed them, in all cases, to wounds of the nerves: And Mr Hunter of London, is entirely convinced that they are the consequence of an inflammation of the internal coat of the vein operated upon—He has traced this inflammation in horses, and even in the human subject, to a considerable extent in the vein, and in some instances, even to the heart. The matter formed in consequence, Mr Hunter supposes to produce death, by being carried to the heart in the course of the circulation. But although there can be no doubt that this inflamed state of the vein may often occur, yet we are clearly of opinion, that the violent pain experienced immediately af-

ter the puncture, cannot be occasioned by the wound of the vein; and that the inflammation of its internal surface ought rather to be considered as symptomatic of the previous affection of a nerve or tendon, than as the sole and primary cause of the symptoms which we have above described as consequent to bleeding.

In order to obviate the usual consequences of this accident, a considerable quantity of blood should be immediately discharged at the orifice, the limb should be kept perfectly at rest, for some days, care being at the same time taken that the muscles of the part be all preserved in as relaxed a state as possible; the patient should be kept cool, and on a low diet; and if necessary, laxatives should be administered.

By this treatment, we may frequently prevent all bad symptoms; and when these do occur, from injudicious management, they prove fatal as much from negligence in the subsequent treatment, as from any thing peculiarly bad in the nature of the accident.

When, however, notwithstanding the employment of the means recommended, the lips of the wound grow hard and inflamed, the pain increases, and especially if the swelling becomes more considerable, we must have recourse to other remedies. Topical bleeding, by leeches applied as near as possible to the lips of the wound, frequently affords much relief: and when the pulse is full and quick, it is necessary to employ general bleeding to a very considerable extent.

As applications to the part, warm emollient poultices and fomentations have been strongly recommended. I have used them; but never with good effect—And it is probable, that as the membranous parts affected are incapable of yielding a good pus, to produce which, has been the object of their use, they prove hurtful by the heat they communicate.

By Heister and others, instead of emollients, oil of turpentine, tincture of myrrh, and other heating applications are advised. But suspecting that they would increase the symptoms, by irritating parts rendered already exquisitely sensible by disease, I have never employed them.

I can, however, from repeated experience assert, that cooling astringents, and particularly the saturnine preparations, afford much more ease and effectual relief than warm emollients. In all such cases, therefore, immediately after bleeding, the swelling ought to be covered with soft linen moistened with the saturnine solution; and this being kept constantly wet for a few hours, the part should then be covered by pledgits spread with the saturnine or Goulard's cerate. These preparations should be alternately used till the tumor entirely subsides.

The febrile symptoms must be moderated by keeping the patient cool; on a low diet; preserving a lax state of the bowels; and if necessary, by repeating blood-letting.

For the violence of the pain, which often prevents the patient altogether from sleeping, opiates should be *freely* exhibited; and when twitches of the tendons and other convulsive symptoms occur, medicines of this kind become still more necessary; but it is to be observed that unless they are given in large doses, they certainly aggravate instead of lessening the disease.

When every thing we have advised proves ineffectual, and the life of the patient appears to be in imminent danger, the only remedy from which much advantage is to be expected, is a *free and extensive division* of the parts in which the orifice producing the mischief was at first made.

In performing this operation, in order to prevent an inconvenient discharge of blood from the smaller vessels, or a dangerous hemorrhagy from the larger, it will be necessary to have a tourniquet applied on the superior part of the limb. When this is done, a large transverse incision should

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be made through the teguments of the parts chiefly affected, and carried across the original orifice in the vein. The surgeon must then, by cautious dissection, wiping the blood away frequently with a sponge, and avoiding the tendons, larger arteries, and veins, endeavour to discover the wounded nerve; if he cannot accomplish this, he should still continue the incisions till he gets to the periosteum. The tourniquet should then be loosened; and if the wounded part has been divided, the pain will cease. If the pain continues, the adjacent tendons, and particularly that which lies beneath the vein, should be accurately examined; and the one in which a wound or inflammation is discovered should be entirely divided. If neither wound or inflammation appears, the tendon which lies most contiguous to the vein should be cut through; and if one or two others should be liable to suspicion from their situation, we should not hesitate to divide them all. When this is done, it seldom happens that relief is not immediately derived from it.

The tourniquet must now be slackened as much as possible, and such arteries as have been wounded must be secured. The parts are then to be covered with soft easy dressings, and the wound is to be treated as in other cases.

The mode of treatment here recommended, I have seen practised with the greatest success.

S E C T. V.

Of Blood-letting in the Arm.

It appears to me, that the fixing on the fore part of the arm at the elbow, as the usual place for blood-letting, is a very capital error, on account of the risk we run of wounding the nerves, tendons, and arteries contiguous to the veins;

veins; and especially as it can be performed with equal ease, and with much less danger, in the neck, the lower part of the legs, the ankle, and the feet. The only reason that can be given for the practice is, that the veins appear here more conspicuous than in other places.

In applying the ligature previous to bleeding in the arm, we should place it about an inch or an inch and a half above the joint of the elbow, and the knots should be made on the outside of the arm, that they may not interfere with the lancet.

As the median basilic vein appears in general more conspicuous than any of the rest, and is less covered with cellular substance and the tendinous expansion of the biceps muscle, it should be preferred. The incision also gives less pain on account of these circumstances.

The operation is more neatly performed, if the right hand is used in bleeding in the right arm, and the left in the left arm of the patient, than if the right hand is used in both cases.

In very corpulent people, it sometimes happens that the larger veins cannot be seen; but when they can be sensibly felt, they may be opened with perfect safety. In some cases again, the veins of the arm can neither be seen nor felt. The ligature may then be applied to the middle of the fore-arm, and a vein of the wrist or back of the hand, may generally be opened with ease.

S E C T. VI.

Of Blood-letting in the Jugular Vein.

THIS operation is sometimes judged necessary in inflammations of the throat, disorders of the eyes, and other affections of the head.

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There is no branch of the external jugular vein that can be opened with propriety, but its principal posterior-ramification; and even this lies so deep, that a considerable degree of pressure is necessary to bring it well into view. In order to produce this, it is commonly advised to place the thumb upon the vein, about an inch or an inch and an half below where the opening is to be made. This, however, is seldom sufficient; for the blood on being stopped in this branch, passes off by others communicating with it: so that unless the vein on the other side of the neck is also compressed, the vein to be opened can never be fully distended. In order to do this, a compress should be applied over it, and a ligature carried above this, and knotted under the opposite arm-pit.

The patient's head being supported, the operator should then make a firm pressure on the vein with his thumb, and with a lancet penetrate at once into the vessel, making an opening somewhat larger than that advised in bleeding in the arm, on account of the greater difficulty of procuring a sufficient quantity of blood. Adhesive plaster alone commonly restrains the discharge.

It has been directed to make an incision down to the vein with a scalpel, and to use the lancet merely for opening the vein: but this precaution is entirely unnecessary, and sometimes may injure the operator in the opinion of the patient.

S E C T. VII.

Of Blood-letting in the Ankles and Feet.

IN these cases, the ligature being applied just above the ankle joint, all the branches of the vena saphena, both in the inside and outside of the foot, generally come into view; and wherever a proper vein appears, it may be opened with safety.

The use of warm water prevents us from ascertaining the quantity of blood discharged, and is perfectly unnecessary.

The bleeding generally ceases immediately on the removal of the ligature, so that nothing more than a strip of adhesive plaster is necessary to be applied to the wound.

WHEN it is found necessary to discharge blood from the penis, the veins can easily be brought into view by the application of a ligature; but in the tongue, in the external hemorrhoidal veins, and other parts where compression cannot be applied, all that the surgeon can do, is to make an orifice in the most evident part of the vein, and if a sufficient discharge is not thus produced, to immerse the parts in warm water, where this is practicable.

S E C T. VIII.

Of Arteriotomy.

ARTERIOTOMY seems hardly in any case, to have better effects than opening a vein; and is always attended with much hazard, notwithstanding what has been said by theorists to the contrary, when practised on the larger vessels. The different branches of the temporal artery are those only from which blood is taken in ordinary practice; but any of the small arteries that lie superficial, or contiguous to bones, and admit easily of compression, might be opened with perfect safety; as those of the fingers at the middle of the last phalanx. The opening may be made as in common phlebotomy; but if the artery is deeply covered with cellular substance, it will be necessary to
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expose it to view by the scalpel, before making the orifice with the lancet; for if the vessel should be entirely divided, it would retract and put a stop to the evacuation.

If the blood should not flow freely, it will be proper to compress the artery immediately above the orifice; And when a sufficient quantity is obtained, we may commonly restrain the evacuation by applying a compress and roller as directed in venæsection.

If this does not stop the discharge, it may with tolerable certainty be suppressed, either by cutting the artery entirely across at the orifice; by taking it up with a needle and ligature; or by obliterating its cavity by a gradual and constant compression. For this last purpose, a small semi-circular strip of steel covered with leather, to reach from temple to temple, with a compress of linen, answers much better than a common bandage.

S E C T. IX.

Of Topical Blood-letting.

TOPICAL bleeding is performed either by means of leeches; by slight scarifications with the shoulder or edge of a lancet; or by the instrument termed a scarificator. When the last mode is employed, it is necessary, in order to produce a sufficient discharge of blood, to apply cupping glasses over the divided parts. These promote the evacuation by having the air contained in them rarified immediately previous to their application.

With a view to produce this rarefaction and consequent suction, heat is now usually applied to the cavity of the glass, either by supporting the mouth of it for a few seconds above the flame of a taper, or by throwing into it a piece of bibulous paper impregnated with spirits of

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wine, and set on fire. The last is the easiest and best mode—by the former we are very apt to crack the glass if the flame be suffered to touch it. The cup should be applied directly upon the part, when the paper is nearly extinguished.

As soon as this is done, the scarifications, if well made, begin to discharge freely; and as soon as the glass is nearly full of blood, it should be taken away; which may be easily done by raising one side of it. When more blood is wished to be taken, the parts should be bathed in warm water, then dried, and another glass exactly of the size of the former, instantly applied—and thus, if the scarifications have been sufficiently deep, almost any necessary quantity of blood may be drawn; but when this cannot be obtained from one operation, the trial should be repeated, as near as possible to the parts already cut.

When it is wished to discharge the blood as quickly as possible, two or more cups may be applied at once, and previous to the scarifications, for a few seconds, as well as afterwards.—The wounds made by the scarificator should be well cleared of blood, and dressed with soft linen or lint dipped in milk or cream.

Dry cupping consists in the mere application of the glasses, without any scarification. This may be very useful where we wish to determine a quantity of blood to a particular spot.

When cupping cannot be used, we generally have recourse to *leeches* for the topical evacuation of blood. In order to make these animals fix on a particular spot, they should be suffered to creep upon a dry cloth or board for a few minutes previous to their application;—the part should be moistened with milk, cream or blood:—and they should be confined to it by a small wine glass. As soon as the leeches have separated, the bleeding is in common promoted

promoted by covering the parts with linen wet with warm water; but the application of cupping glasses answers the purpose much better.

Scarification with the edge or shoulders of a lancet is sometimes necessary, and particularly in inflammations of the eye-ball, where it often proves a very effectual remedy.

In performing this operation, the upper eye-lid being supported by an assistant, and the lower by the left hand of the surgeon, a number of slight scarifications should be made through the vessels that seem most turgid on the tunica conjunctiva. The eye should then be bathed in warm water to encourage the discharge.

It has been recommended to use a speculum in order to keep the eye steady; but this is totally unnecessary, and by its pressure it may perhaps be injurious.

The beards of barley, drawn over the surface of the eye in a direction contrary to their spiculæ, have been much extolled to produce a discharge of blood—but this gives such exquisite pain that it is now going out of use.

C H A P. VII.

Of Aneurifms.

S E C T. I.

General Remarks on Aneurifms.

ANEURISMS are tumors formed either by the dilatation of the coats of arteries; or by blood effused from arteries into the contiguous parts. The first species has usually been denominated the *true aneurifm*; but it may with greater propriety be called the *encysted*. The latter species has been generally termed the *false*; but from its appearances, I think it ought to have the appellation of the *diffused aneurifm*.

In the true or encysted aneurifm, when externally situated, the tumor, when first observed, is commonly very small and circumscribed; the skin retains its natural appearance; when pressed with the fingers, a pulsation corresponding with that of the artery below is evidently distinguished; and with very little force, the tumor may be made to disappear entirely. If it is not removed when in this state, after some time the swelling gradually increases, and becomes more prominent; but the skin for a considerable time retains its natural appearance. The tumor is not painful, even on pressure; continues of an equal softness; and its contents may generally still be made to disappear by pressure. At length, when the swelling

swelling becomes very large, the skin grows pale, and in the more advanced stage of the disease, œdematous; the pulsation still continues; but the tumor, now in some parts soft, in others hard, does not yield much to pressure.

The swelling continuing to increase, becomes gradually exceedingly painful; the skin turns livid, apparently verging to a gangrenous state; at last a bloody serum oozes from the teguments; and if a mortification does not take place, the skin cracks in different parts, and the blood bursts forth from the artery. In the large vessels of the trunk, this generally produces almost instant death; but in the extremities, the hemorrhagy may be restrained by the tourniquet.

In aneurisms of the larger arteries, the contiguous parts suffer considerably. The bones appear to be particularly affected: and in different cases are much deranged, and sometimes entirely dissolved. These consequences have even occurred in the thigh and arm.

Various causes may be supposed necessary to the production of encysted aneurisms.

1. As we know of no reason why partial debility should not occur in arteries as well as in other parts, we may consider this as one of the most frequent causes of the disease, when it cannot be traced to any external accident; as is commonly the case in aneurisms of the aorta, and other internal arteries. And when weakness is produced in the smallest degree, a dilatation must necessarily follow, and be constantly increased, from the action of the blood.

2. The external coat of an artery being destroyed by a wound, the inner tunic will be incapable of resisting the impulse of the blood; and thus an aneurism will be readily induced. Such cases are most frequently produced by blood-letting in the arm.

3. The external coat of an artery is sometimes destroyed

ed by the matter of abscesses and ulcers, and occasions aneurismal swellings in the manner just explained above.

4. As arteries receive, in many situations, considerable support from the adjoining parts, aneurisms may be produced from a removal of these parts. This appeared to be the only cause of several aneurismatic tumors that occurred in a case of gangrene which destroyed a part of the thigh.

5. In blood-letting in the arm, it sometimes happens that the artery is wounded through the vein when it lies in contact with it: a communication being thus formed, the arterial blood, by its impetus, produces a dilatation of the coats of the vein, and thus forms what has been termed the *varicose aneurism*. This may with propriety be considered as encysted, because the blood is confined to the cavity of the vein. Soon after the injury, the vein communicating with the wounded artery, begins to swell, and gradually acquires a large size: and when any considerable anastomosis occurs near to the part affected, between it and the contiguous veins, these also become much enlarged. By pressing upon the swelling, it may be made to disappear entirely; and if it is of considerable size, the blood on being forced out of it, makes a very *singular, hissing* kind of noise. This, when it occurs, is a very characteristic symptom; but it is not always met with.

There is a very singular tremulous motion discovered in the dilated vein, attended with a perpetual hissing noise, as if air was passing into it through a small aperture. If a ligature be applied immediately below the swelling, and made so tight as even to stop the pulsation in the limb, the swelling in the veins does not seem affected, and when removed by pressure, instantaneously returns on the pressure being taken off. If the swelling is removed, and a slight pressure be made on the orifice in the artery by the point of the finger, the veins will remain perfectly flaccid, until

the removal of the compression from the orifice; and this happens even if the circulation in the artery is not entirely obstructed below.

In the same manner, if the artery be compressed above the orifice, so as to stop the passage of the blood, that tremulous motion and hissing noise in the swelling ceases instantly; and if the veins are now emptied as before, they will remain so until the pressure upon the artery is removed. In some instances, it happens that if a ligature be applied an inch or two above the swelling, and another as much below it, so tight as to prevent the circulation in the tumor, by compression, all the blood contained in it may be made to pass into the artery; from whence it immediately returns on the pressure being removed.

When this disease has continued for any length of time, and the swelling has become considerable, the trunk of the artery above the orifice generally grows preternaturally large, while the branches below become proportionably small. Hence the pulse in the inferior part of the member is always more feeble than that in the sound limb.

The diminution of the branches of the artery may be readily accounted for from the direct passage of so great a part of the arterial blood from the trunk into the corresponding vein; but no satisfactory reason has yet been given for the enlargement of the artery above the swelling.

The diffused or false aneurism occurs in various parts of the body; but we shall here confine our description to that species which we know to be most frequently occasioned by a wound made directly into an artery, and which it is commonly in the power of art to relieve.

This disease is frequently produced by a wound of the artery in blood-letting in the arm; and indeed when the artery is thus wounded, an aneurism is almost always
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the consequence. The following is the usual progress of the complaint.

A small tumor, about the size of a horse-bean, generally rises just at the orifice in the artery, soon after the discharge of blood has been stopped: at first it is soft, has a strong pulsation, and yields a little upon pressure; but it soon acquires a firm consistence by the coagulation of the contained blood.

If the swelling is not now improperly treated by compression, it generally remains nearly of the same size for several weeks, when it begins gradually to increase; and if seated in the usual place of blood-letting in the arm, it proceeds rather farther up than the orifice, and extends more inwardly than towards the outer part of the arm, probably on account of the expansion of the biceps muscle being there less firm than in the external and under part. The enlargement of the tumor proceeds with much more quickness, and is much more diffused in some instances than in others; this seems to depend chiefly on the degree of laxity of the parts into which the blood is effused. Thus, in some instances, swellings of this kind have been many months, and even years in arriving at any considerable size; whilst in others the blood has been diffused over the whole arm, from the elbow to the shoulder, in the course of a few hours after the artery was wounded.

I am convinced that the compression commonly advised in wounds of the arteries, has also a considerable influence in producing a diffusion of the blood. If the pressure could be applied over the orifice alone, it might be advantageous; but by every mode yet recommended, the resurgent blood is much obstructed in its passage; and this must evidently distend the wounded artery in an equal proportion, and increase the quantity of blood which escapes by the orifice.

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When compression has not been applied to such tumors, unless there is a very unusual degree of laxity in the surrounding parts, the swelling increases in a gradual manner; but it does not become much more prominent, rather diffusing itself among the adjacent parts; by degrees it acquires a very firm consistence; and the pulsation, which was at first considerable, always diminishes in proportion to the hardness and size of the tumor, inso-much that it is sometimes scarcely perceptible.

In the first stages, if the blood thrown out lies very deep, the skin preserves its natural appearance, and does not change its colour till the disorder is much advanced. It frequently happens however, that the blood is thrown out at first with such violence, as to get into immediate contact with the skin, and change it to a livid colour; and in some instances, either from the quantity extravasated, improper treatment, or negligence, a mortification has been induced.

As the tumor increases, the patient, who in the first stage did not complain of much uneasiness, is distressed with severe pains, stiffness, want of feeling, and immobility of the whole member; and these symptoms continuing to augment, if the tumor is not previously operated upon, the teguments at last burst; and when the artery is of considerable size, and we do not have immediate recourse to means to prevent it, death must certainly be the consequence.

A variety of causes may be productive of the diffused aneurism.

1. Violent bodily exertions may be considered as the most frequent origin of the rupture of arteries internally situated; but these cases do not come properly under our consideration in this place.

2. The corrosive matter of sores and abscesses by en-
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tirely destroying the coats of arteries, may occasion this species of the disease.

3. The sharp splinters of a fractured bone being pushed into a neighbouring artery, have produced aneurisms.

4. Violent blows have been known to bring on aneurisms. This can scarcely happen in any other situation than on the head; on account of the arteries being there so particularly exposed, and lying so near a firm bony substance.

5. It has been affirmed by respectable authority, that diffused aneurisms have been produced, although rarely, by the arterial coats bursting before the teguments with which they are covered in cases of the encysted species.

6. The most frequent causes are punctures with sharp instruments, as swords and cutlasses, but particularly the lancet: which last may be considered as having been productive of nine-tenths of all the aneurisms that ever have occurred.

It has happened, in many instances, that aneurisms have been mistaken for abscesses and other collections of matter; have been opened; and death has been the consequence. Swellings of this kind are sometimes with much difficulty distinguished from some others. In the beginning of the disease, the pulsation and other circumstances characterise it sufficiently; but in an advanced stage, when the tumor is very considerable, and has lost its pulsation entirely, nothing but a very minute attention to the previous history of the case, can enable us to form a judgment of its nature.

Those swellings with which aneurisms are most likely to be confounded, are soft encysted or scrophulous tumors and abscesses, situated either immediately above, or so nearly in contact with an artery, as to receive the influence of its pulsation; which is often communicated in a very considerable degree when the artery is large. But there is one symptom, which, when it occurs, and is
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connected with a strong pulsation in the tumor, may certainly determine the disease to be an aneurism; viz. the contents of the tumor being made to disappear with ease upon pressure, at the same time that they return instantaneously on the compression being removed. This symptom, however, cannot attend when the contents of the swelling have become hard and firm. Upon the whole, therefore, as in many instances the nature of the disease cannot be with certainty ascertained, the practitioner should always, in such doubtful cases, proceed upon the supposition of its being aneurismatic.

It is only in the trunk of the body, in the neck, axilla, upper part of the thigh, or groin, that so much caution is necessary; for when tumors of this nature are seated on the lower part of the extremities, or on the head, we may with safety open them; because if they should chance to be aneurisms, there will be no danger in removing them in the mode hereafter recommended.

In forming a prognosis in aneurisms, we must chiefly attend 1. To the manner in which the disease appears to have been produced. 2. The part of the body in which it is situated; and, 3. The age, and habit of body of the patient.

1. If an aneurism has come on in a gradual manner, without any apparent injury having been done to the part, and without any violent bodily exertion having immediately preceded it, there will be great reason to suppose that the disease depends upon some paralytic or other general affection, either of the trunk of the vessel in which it occurs, or perhaps of the whole arterial system; so that no great success is to be expected from any means attempted for the patient's relief: whereas, there will be room to suppose, if the tumor has evidently succeeded to a bruise or other external accident, that the operation will be attended with complete success, provided the ligature

to be made, does not entirely destroy the circulation in the part.

In the varicose aneurism, we may generally venture to make a more favourable prognosis than in any other species of the disease: for it has been found in different instances, that this does not make so rapid a progress as the others; that after acquiring a certain size, it does not afterwards grow much larger; and that any inconvenience produced by it, may be sustained with tolerable ease for many years. Drs. Hunter, Cleghorn, Pott, and others, relate instances that confirm these circumstances, and prove that the operation can very seldom be necessary to remove this variety of the disease.

2. When an aneurismal swelling is so situated, that no ligature or compression can be applied for putting a stop to the circulation in the part, if the artery is large, there would be the utmost hazard in opening it; as the patient would probably lose more blood than his strength could bear, before the artery could be secured. Hence in aneurisms situated on the trunk, neck, axilla or groin, we can never make a favourable prognosis; for the tumor will certainly at last burst, and the most fatal consequences will probably ensue. And in the humeral or femoral arteries before their division, the success of the operation will always be doubtful; although there are well attested instances of the limbs preserving nearly all their powers after the destruction of the principal trunk. In those cases, the circulation must be carried on by the smaller branches, from their anastomosing with each other.

In aneurisms of the extremities, as the success of the operations depend, in a great measure, on the probable chance there is for the circulation going on in the under part of the limb, our prognosis should, all other circumstances being alike, be more or less favourable according to the lower or higher situation of the disease—But when they

they arise from an external cause, other circumstances being favourable, it may be established as a general rule, that they should be always removed when the life of the patient might be endangered by the bursting of the tumor.

3. The age and habit of body of the patient, in every instance, should have considerable influence in determining the opinion of practitioners as to the effects to be expected from the operation: for in no instance does health and youth give greater advantages, than in the operation for the removal of aneurisms.—In the earlier periods of life, the vessels can easily accommodate themselves to the changes thereby produced; but, in old age, we may readily suppose the smaller arteries to be altogether incapable of that degree of distention which is necessary for supplying the want of the principal artery of a part.

A difference in these circumstances may account for the various success that has attended the operation in many instances where the causes and appearances were nearly alike; and more particularly for the bad success that has followed the removal of aneurisms in the popliteal artery.

S E C T. II.

Of the Treatment of Aneurisms.

THE use of pressure has been indiscriminately recommended in every species of aneurism, and in all their stages; but it should never be employed in any period of the diffused aneurism. In the early stages of the encysted, indeed, while the blood can be pressed entirely out of the sac into the artery, it often happens, by the use of a bandage of soft and somewhat elastic materials, properly fitted to the part, that much may be done in preventing the swelling from increasing; and on some occasions, by the
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continued support thus given to the weakened vessel, complete cures have been obtained. In the varicose aneurism more particularly, pressure is very useful*.

It is to be observed that the pressure should never be greater than to afford an easy support to the parts affected; for if it is, by the reaction which will be excited, it will do more harm than good. During the use of compression, the patient should be kept on a low diet; when necessary, blood should be drawn; the bowels should be kept lax; and all violent exercise, particularly of the part affected, should be carefully avoided. When there is much pain, opiates should be freely exhibited.

This treatment will apply to every aneurism not intended to be operated upon; but is particularly proper in all swellings of this kind, situated on parts where the operation is inadmissible.

When the operation for the aneurism is judged necessary, the first step to be taken in it, is to apply a tourniquet to the superior part of the member diseased. The patient should be fixed on a table of such a height as will allow the surgeon to be seated. The limb being properly secured by an assistant, the operator is now with a scalpel to make an incision through the teguments, beginning about half an inch above or below the swelling, and carrying it
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* Aneurisms of the leg may sometimes be cured by compression—two instances have occurred, where the posterior tibial artery was opened, and a large aneurismal sac formed in the usual way—the operator having fully dilated the sac, and cleared it of coagulated blood, applied a small bit of sponge fixed to the extremity of a ligature, to the orifice in the artery; then filling the wound completely with dry lint, continued a compression with the hand during twenty-four hours, after which, compression by a pretty close bandage, prevented any further hemorrhagy, and the eighth day the lint was removed: the sponge adhering two or three days longer, and coming away with some difficulty, induced the operator, in a second instance, to make use of lint alone. The wound was filled up in three weeks, and the man preserved the perfect use of his limb.

along the whole course of it, and about a half an inch beyond it. The blood should then be wiped away, and the softest part of the tumor being discovered, an opening ought to be made into it with a lancet large enough for admitting the operator's finger; which being introduced into the orifice, the whole tumor is to be laid open by running a blunt-pointed bistouri along the finger, first from below upwards, and then from above downwards.

All the coagulated blood and tough membranous filaments that are commonly found here, being now removed by the fingers of the operator, the cavity is to be well dried; the tourniquet must then be entirely loosened, in order to discover the orifice from which the blood has flowed. This being done, we must next prevent any farther effusion. Various means have been proposed to accomplish this. In order more effectually to preserve a free circulation of blood in the inferior part of the member, it has been recommended, 1. To apply a piece of agaric, vitriol, alum, or other astringent, to the orifice, in order if possible to produce a re-union of its sides; and 2. To make use of the twisted future, with the same intention*.

To the first of these methods it may be objected, that no astringent with which we are acquainted, is possessed of

* Mr. le Comte, in wounds of the arteries, instead of the usual modes, from experiments on sheep and dogs, recommends the introduction of a quill split and covered with ribband, in such a manner as to include the whole artery; and to secure it by tying the ends of the ribband.—Mr. Vicq d'Azyr made some experiments in presence of his pupils on the crural arteries of dogs, to ascertain the effects of this treatment. A good deal of inflammation and discharge was produced—the apparatus was removed with some difficulty in about three days; and the wounds healed in about fifteen—In three instances the cavity of the artery was entirely obliterated, yet the animals did very well. In some others, the circulation was well carried on afterwards through the arteries.

In every case, the hemorrhagy was entirely restrained, immediately on tying the ribbands. Hist. de la Soc. Roy. de Med. tom. i. page 302.

of such powers as to deserve much confidence; for although they have often put a temporary stop to such hemorrhagies, yet there are very few well authenticated instances of their having produced any permanent advantage; and when trusted to, they have generally given a great deal of distress to the patient and trouble to the surgeon.

With respect to Mr. Lambert's ingenious proposal of stitching the orifice in the artery, it would probably succeed in restraining the bleeding; but it is evident that it could not be employed when the artery lies at the back part of the tumor, which is the case almost in every instance. And by the diminution of the cavity of the artery which it must necessarily produce, there is every reason to fear that it must tend very much to the production of a dilatation immediately above the stricture.

This mode has yet been employed but in one case, that I know of: the above objections arise merely from reasoning on the subject; its utility must therefore be decided by future observation.

Neither of the abovementioned methods being found eligible, we now proceed to describe the ordinary manner of securing the orifice in the artery by means of ligatures.

A small probe being introduced at the opening in the vessel, and the artery thus raised from the adjacent parts in order to avoid the nerves*, a firm, broad, waxed ligature must then be passed round, about the eighth of an inch above the orifice, and another at the same distance below it by means of a blunt curved needle, plate viii. and tied in the mode formerly directed in chapter V.

We direct the ligatures to be made as near as possible to the orifice, for fear of losing the benefit of anastomosing branches. And we advise a blunt needle, because when the

* It will facilitate this part of the operation, when the disease is on a joint, to bend the limb. B.

the sharp-pointed needle is used, there is a risk of injuring parts unnecessarily, and the operation is performed with more difficulty.

After the upper ligature is made, the tourniquet should be loosened, in order to see whether any blood will be discharged by the wound in the artery. If it flows in any considerable quantity, it affords a proof that the circulation will be tolerably well carried on, by the smaller branches, in the inferior part of the limb. But we are not to despair of success if this should not be the case.

The ligatures should be left long enough to hang out at the edges of the wound, that they may be easily withdrawn when necessary.

It has been advised to insert two other ligatures very near to those first made, and leave them untied, in order to guard more effectually against hemorrhagy; but the tourniquet is a sufficient and better security, and should always be left on the member for several days after the operation.

When the ligatures are formed, the tourniquet should be loosened entirely; and if no blood is then discharged at the orifice in the artery, we may be satisfied that they have been properly made. The wound is to be now covered with soft lint, with a pledgit of some emollient over it; and a compress being applied, the whole is to be supported by a bandage, just tight enough to keep on the other applications.

The patient is then to be put to bed, and the member laid in a relaxed posture upon a pillow; and as the operation is always tedious and painful, a full dose of laudanum should be given, and repeated occasionally according to the degrees of pain and restlessness.

In some cases, the pulse in the inferior part of the member has been perceptible immediately after the operation: This, however, is a rare occurrence; for as the disease is seldom met with but in the joint of the elbow, as a conse-

quence of bleeding, and as the brachial artery before its bifurcation, is most commonly the subject of the operation, it can but rarely happen.

Immediately after the operation, the patient complains of want of feeling in the whole member; and as it is generally cold for a few hours afterwards, it will be proper to keep it covered with flannel, and have it gently rubbed now and then. In the space of ten or twelve hours, although the numbness still continues, the heat of the parts generally begins to return; and it often happens that in the course of a few hours more, all the inferior part of the limb becomes preternaturally warm.

In the mean time, the patient being properly attended to as to regimen, by giving him cordials and nourishing diet when low, and confining him to a low diet, if his constitution is plethoric, the limb being kept in an easy posture, towards the end of the fourth or fifth day, and sometimes sooner, a very feeble pulse is discovered in the lower part of the member; which becoming gradually stronger, the patient in the same proportion recovers the feeling and use of the parts.

As soon as matter forms freely about the fore, which is generally about the fifth or sixth day, an emollient poultice should be applied over it for a few hours, to soften the dressings, which may then be removed. The ligatures should not be taken away before the second or third dressing. The dressings being renewed every second or third day, according to the quantity of the discharge, the fore commonly heals easily; and although the limb may remain some time numb and weak, yet it generally at last recovers its powers.

We have hitherto described the most favourable termination of the operation—In some instances, instead of a return of circulation, and of the feeling and use of the parts, they continue cold and insensible. From mere

want of blood, therefore, a mortification commences, and proceeds to its last stages, notwithstanding every thing that can be done to prevent it. If the patient survives the effects of the gangrene until a separation occurs between the diseased and healthy parts, amputation of the member will then be the only resource.

C H A P. VIII.

Of Herniæ.

S E C T. I.

Of Herniæ in general.

THE term Hernia, in its general acceptation, implies a tumor produced by the protrusion of some part or parts from the cavity of the abdomen.

The situations in which these swellings usually appear, are the groin, scrotum, labia pudendi, the upper and fore-part of the thigh, the umbilicus, and the different points between the interstices of the abdominal muscles.

Part of the intestinal canal or omentum, are the most common contents of herniæ; but there are instances of ruptures of the stomach, uterus, liver, spleen, and bladder.

From these circumstances of situation, and contents, all the different appellations are derived by which herniæ are distinguished. Thus they are termed inguinal, scrotal, femoral,

femoral, umbilical, or ventral, from the part in which they make their appearance. When the tumor is confined to the groin, the hernia is said to be incomplete, and is termed bubonocele; but when it reaches to the bottom of the scrotum, it is said to be complete, and receives the name of oscheocele. When a portion of intestine alone forms the tumor, it is called an enterocele or intestinal hernia; when a piece of omentum only is protruded, it is termed epiplocele, or omental hernia; and if both intestine and omentum are down, it is called an entero-epiplocele, or compound rupture.

The term rupture arose from a supposition that in most cases of hernia there was a laceration of the peritonæum, or membrane surrounding the abdominal viscera; and this seemed to be confirmed by these viscera being, in some cases of scrotal hernia, found in contact with the testicle; but it is now well ascertained, that in hernia the peritonæum is never ruptured except from external violence; and that in common cases it is merely carried before the protruded part, and only suffers from dilatation. When the part displaced is found in contact with the testis, it always passes down along with the testis, or before the opening by which that descends is at all or firmly closed. This species is usually termed the *hernia congenita*, and hardly ever is produced except in the early months of infancy.

The production of hernia in the usual form, is to be explained from one or more of the following circumstances:

1. Whatever tends to produce a diminution of capacity in the cavity of the abdomen, must occasion a proportional risk of some of the contained parts being pushed from their natural situations. Violent coughing, crying, laughing, or great bodily exertion, frequently operate in this manner in producing herniæ.

2. Falls, in consequence of the violent derangement they

they produce in the abdominal viscera, are often the immediate causes of ruptures.

3. Persons of a preternatural laxity of frame, are very liable to herniæ, on the application of the abovementioned causes; from the containing parts not being sufficiently firm to resist the weight of the different viscera.

4. Sprains induce a laxity of the part injured, and operate in the manner of general weakness in occasioning herniæ.

5. It has been observed, that the inhabitants of those countries in which oil is much used as an article of diet, are particularly liable to herniæ.

These various causes, it is evident, must most readily operate in inducing herniæ, in those parts of the parietes of the abdomen that are weakest. Hence we find them to occur most commonly at the openings of the external oblique muscles, under the arch formed by Poupart's ligament, and at the umbilicus. They happen also in the interstices of the muscles, but not frequently.

Whenever an hernia is formed, except in the case of the hernia congenita, a portion of the peritonæum must go along with the protruded viscus, and forms what has been termed the hernial sac.

On the first appearance of the disease, the sac is commonly small, as such swellings seldom acquire any great bulk at once; but by repeated descents of the bowels, it often becomes very large; and then frequently gets a very considerable degree of firmness and thickness.

Hernial swellings frequently arise and continue a length of time, without occasioning any bad symptoms; but as troublesome consequences often succeed to them, when their reduction can be accomplished with propriety, it should always be effected as quickly as possible.

All the bad symptoms occurring in hernias, proceed either from obstruction to the passage of the fæces, when the

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the intestinal canal forms the tumor, or from a stoppage of circulation, by stricture on the prolapsed parts: hence they will always be more or less hazardous according to the nature of the parts protruded. Thus an omental hernia is not so dangerous as a rupture of an intestine, or other part more essential to life; but even this may occasion the most fatal effects.

The following are generally the symptoms of a stricture on the protruded viscera sufficient to produce either a stoppage of the circulation, or of the fæcal contents of the alimentary canal, when this is affected.

An elastic colourless swelling is observed on the part affected; a slight pain is felt not only in the swelling itself, but if part of the intestines is down, an uneasiness is felt over the whole abdomen; and this is always increased by coughing, sneezing, or any other violent exertion. The patient complains of nausea; frequent retching; can get no discharge by stool; becomes hot and restless; and his pulse is commonly quick and hard.

If the swelling is entirely formed by intestine, and no fæces are contained in it, it has a smooth equal surface, is easily compressible, and immediately returns to its former size on the pressure being removed; but when fæces are collected in the gut, as they are apt to be when the disease is of long standing, it has considerable inequalities. When the tumor is composed both of omentum and gut, its appearance is always unequal, and it feels soft and somewhat like dough, and of course not so elastic as when intestine alone is down. If omentum alone forms the swelling, no obstruction to the discharge of fæces ever occurs, and of course the symptoms are never so alarming as when the intestine is concerned, and the tumor is weighty in proportion to its size.

But although in simple herniæ the contents may be in general distinguished; yet, when they are complicated, it can never be done with any certainty.

Should

Should not the symptoms we have described be now removed, the nausea and retching terminate in frequent vomitings, first of a bilious, and afterwards of a more foetid matter; the belly becomes tense; the pain grows more violent; a distressing convulsive hiccup comes on; the fever, which before was trifling, now becomes considerable; and a total want of rest, and great anxiety continue through the whole complaint. These symptoms, after some duration, are succeeded by a sudden cessation of pain: languid and interrupted pulse; cold sweats; languor of the eyes; and subsidence of the tension of the belly. The swelling of the affected parts disappears; the teguments covering them change from a reddish inflamed cast to a livid hue; and a crepitous windy feel is distinguishable all over the swelling.

If the protruded parts have not of themselves entirely gone up, their return is now generally with ease produced by slight pressure, and the patient then discharges freely by stool; but the cold sweats increasing, the hiccup becomes more violent, and death is at last ushered in by its usual forerunners, *subultus tendinum*, and other convulsive affections.

As the stricture which prevents the return of the protruded parts is the cause of all the morbid symptoms, the indication of cure is to effect its removal. This is to be accomplished either by a reduction of the displaced parts without a division of the strangulating part, or by an incision into or through the part producing the stricture, so as to admit of a replacement of the substances deranged.

In the treatment of hernia, the first circumstance to be attended to, is the placing the patient in such a posture as will probably favour the return of the protruded parts. Thus when the swelling is in the groin or forepart of the thigh, the thighs and legs should be raised considerably
higher

higher than the head and trunk; and, in some instances, it has been found necessary to have the patient placed perpendicularly upon his head, and there well shook about. In exomphalos, or umbilical rupture, the body should be erect; and in cases of ventral hernia, a horizontal posture is to be chosen.

While the patient is thus fixed, the surgeon should endeavour to produce a return of the parts, by gentle pressure with the fingers. In the inguinal and scrotal herniæ, this should be made obliquely upwards towards the os ileum; in the femoral, it should be made directly backwards; in the umbilical, downwards and backwards; and in the ventral hernia, directly backwards.

When the hernia is of considerable size, the pressure is most conveniently and effectually made, by grasping the swelling with one hand from the bottom upwards, while with the fore and middle fingers of the other hand, we endeavour to push up the contents of the tumor. This operation has been termed *taxis*.

If a very moderate degree of pressure, for none other should ever be applied, does not reduce the swelling, other means should immediately be employed. Blood-letting according to the strength of the patient, is here particularly serviceable, and may safely be carried to very great extent; and it has sometimes been found useful to manage it so as to induce fainting.

To remove the obstinate costiveness that so commonly attends, it has been a general practice to order stimulating purgatives; but these, in almost every case, do much injury by increasing the nausea, and by adding to the tension and pain of the swelling. The best mode of opening the body, is by injecting clysters of tobacco smoke, by means of the machine, plate v. fig. 8. until it has the desired effect, or until much nausea is produced, or some swelling of the abdomen.

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Although this remedy frequently fails, yet it is much preferable to purgatives given by the mouth; and if it should not be laxative, it may always be serviceable by the anodyne quality which it possesses. Acrid suppositories have been used at the same time with purgatives, but no great dependance should be placed on them.

Opiates are often of great use, not only by easing pain, but by tending to relax the stricture*. As their exhibition by the mouth is commonly prevented by the nausea, they may be given clysterwise, alternately with the tobacco smoke. General warm bathing is a very serviceable remedy; but warm applications to the swelling do injury by rarefying the contents of the hernia, and thus increasing its size.

The applications on which I place most dependance are the cold saturnine solutions, and vinegar and water; with these cloths are wet, and kept constantly on the swelling. In several instances I have used ice and snow with evident advantage.

By these several means herniæ are often entirely removed; but it also frequently happens that they produce no relief; and the symptoms instead of lessening become more violent. In this situation, the division of the parts producing the stricture is our only resource.

It is one of the most difficult points in surgery to ascertain when this operation should be put in practice. If it should be too long delayed, the patient will infallibly die; and if performed too early, we may be subjected to blame. There are many instances of strangulated herniæ continuing for eight or ten days, and being then replaced, the patient has done very well: whilst, on the other hand,

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* Several cases of strangulated hernia, attended with great pain and tension, have been happily reduced by a strong opiate, without any manual assistance, the protruded parts retiring themselves as soon as the opiate had produced sleep.

they have proved fatal, and when apparently in the same degree, within forty-eight hours.

From hence, although the operation is attended with some risk, it may with propriety be established as a general rule always to proceed to it, if a strangulated hernia is not otherwise relieved in two or three hours at farthest.

The French surgeons seem to be more successful than the German or British, entirely from the circumstance of their having more early recourse to the operation.

Although in general it is proper to reduce herniæ as soon as possible; yet there are some instances in which it would be improper to attempt it. Thus, herniæ sometimes continue a long time without producing any bad symptoms whatever, and contract adhesions to the surrounding parts, which can only be removed by the operation. In such cases, unless symptoms of strangulation come on, nothing more should be done than to keep the bowels lax, and apply a suspensory bandage to the swelling.

Where a hernia has been reduced either by taxis or division, its return can only be effectually prevented by the proper application of a steel truss, (plate vi. fig. 1.) and by avoiding violent exercise, and particularly sudden exertions.

Many years since, there were a variety of methods used to cure herniæ radically, such as ligatures applied so as to close the sac, and caustics to destroy it; but all of these have been found ineffectual to accomplish the end proposed, and many of them have been fatal to the unhappy patients.

S E C T. II.

Of the Bubonocèle.

IN the bubonocèle the swelling begins in the groin, and gradually descends into the scrotum in men, and into the labia pudendi in women.

The diseases with which inguinal and scrotal herniæ are most likely to be confounded, are glandular swellings in the groin, hernia humoralis or inflamed testicle, and the different kinds of hydrocèle.

Buboes are readily distinguished from herniæ by their hardness in the first stage, and the fluctuation of fluid in their suppurated state, and by the absence of the general symptoms of herniæ.

In hernia humoralis the hardened state of the testicle and epididymis; their exquisite painfulness to the touch; the want of swelling in the spermatic process and of the general symptoms of hernia, afford sufficient means of discrimination.

In hydrocèle the swelling is more equal than in hernia, and usually begins below; but in hydrocèle of the spermatic process, it sometimes happens that the tumor commences even within the opening of the abdominal muscle, and by degrees falls downwards: in this case, the absence of the general symptoms of hernia will generally establish the nature of the case. But in some instances, it seems impossible to ascertain with certainty the real state of the disease. In these circumstances we can only proceed with safety upon the supposition of its being hernial.

When every other means recommended for the removal of hernia in general has failed in bubonocèle, we must then have recourse to the operation; which is thus to be performed:

A table of convenient height being placed in a good light, the patient must be laid upon it, having the head and body almost horizontal, and the buttocks somewhat raised by pillows. The legs hanging over the edge of the table, ought to be so far separated as to admit the operator between them; and should be secured by an assistant on each side, who should keep the thighs so much raised as to relax all the abdominal muscles.

The patient should empty the bladder; and the parts having previously been shaved, an incision should now be made with a scalpel through the skin, beginning at least an inch above the superior end of the tumor, and continuing it down to the *bottom* of the scrotum. This should always be done: it enables us to finish the operation more conveniently, and prevents a lodgement of the matter afterwards formed.

The operator then goes on to divide slowly the cellular substance and the tendinous-like bands, which, unless the disease is very recent, are universally met with, either loose upon the surface of the hernial sac, or on some occasions, passing as it were into its substance. Even this incision should be made very cautiously, because there are some instances upon record, in which the spermatic vessels have been found on the anterior part of the swelling, although they are almost always behind it; and we would run a risk of wounding them, should this be the case, by a hasty incision.

Before making the division of the skin and cellular substance, the tumor should be grasped with the left hand, so as to render it somewhat tense on the anterior part, and kept so while the incision is made with the right hand.

The hernial sac should now be very cautiously dissected through, as near the lower part as possible, because that is generally filled with bloody serum, and we consequently there have the least chance of wounding the intestine.

We may tell when the sac is cut through by a blunt probe passing easily in. The sac in recent cases, and particularly of bubonocoele, is thin, but in long continued herniæ, it often acquires an astonishing thickness.

The opening first made being enlarged so as to admit the fore-finger, a narrow blunt-pointed bistoury, (plate vii. fig. 9.) should be introduced, to which the finger serving as a director, the hernial sac is to be divided its whole length, from below quite up to the opening in the muscle.

The protruded parts* now come fully into view; and should be very carefully examined; if they are not gangrened, even although they should seem considerably inflamed, they should, if possible, be immediately returned into the abdomen.

In making the reduction, whether intestine, omentum, or both have been found, those parts which appear to have come out last should be first pushed back; and the finger should be applied to that part of the gut with which the mesentery is connected; as by these precautions we are less liable to do mischief, and accomplish the reduction with more facility. During the reduction, the thighs should be somewhat more elevated than during the previous part of the operation. When the disease is recent, and has not often occurred, it sometimes happens that by pulling out a little more of the gut than was before in the sac, the obstruction to its replacement will be removed; however, when we cannot do this with great ease, it should not be attempted.

If our attempts for reduction of the part fail, we must proceed then to the enlargement of the opening in the tendon. This is to be performed by entering the finger at the opening above the protruded parts, introducing the

* In enterocoele, late observations have taught us, that the coccum, appendix vermiformis, and part of the colon, have as frequently been contained in herniary sacs as the ileum or any other part of the tube.

the blunt bistouri, and the finger serving as a director, and being kept a little beyond the point of the instrument, a free incision should be made obliquely upwards, so as merely to continue the separation in the fibres of the tendon, without dividing them.

It often happens in long continued cases, that adhesions not only of the protruded parts to those adjacent to them take place, and to each other, but also that they are discovered by the introduction of the finger, internally. The opening should therefore be large enough to admit a separation of the latter. When adhesions of the parts displaced to each other occur, if slight, they should be separated by the fingers or the scalpel; but if considerable, the parts should be returned as they are. When adhesions of the intestines to the sac or omentum are found, and are very firm, parts of the latter two may be with safety dissected off; or when there is a firm connection between the gut and sac, or omentum and sac, part of the sac may be safely dissected off, and returned into the abdomen.

When the omentum protruded is gangrened, or by the pressure it has sustained in the sac any considerable portion of it becomes much hardened, such part should be expanded on the hand, and cut off with a pair of scissors; and if any considerable vessel is divided, it should be tied. It has been observed that ligatures on the omentum, as formerly recommended, have been productive of bad consequences;—none such have succeeded the return of it without them.

When a part of the intestine is discovered to be mortified, it should be cut out; and if this does not extend the whole circumference of the gut, the part above it should immediately be connected by ligature to the wound in the abdomen. By this means, the fæces will be discharged externally, and in some instances the wound in the intestine

tine has gradually healed. Where the mortified part is considerable, the sound ends of the gut should if possible be brought into contact, united as directed in the chapter on gastroraphy, and both connected to the wound. In some instances where a very considerable portion, a foot e. g. has been gangrened, by this mode the ends of the intestine have coalesced, and the patient has done very well. But should not this fortunately happen, a passage is secured to the fæces by the groin: the consequence of their being voided internally would inevitably be death.

When the sound intestine is connected to the wound, and not till then, the opening in the tendon should be enlarged as much as is necessary; if it is done before, the mortified portion may slip up together with the sound part. When the sac is found to be thick, hard, and much enlarged, as its preservation can answer no good purpose, all the lateral and fore parts of it may be cut off with safety; but the posterior part should be suffered to remain, because it is commonly connected to the spermatic vessels.

The operation being now finished, the wound is to be dressed with soft lint, retained by a suspensory bag stuffed with lint, and the patient put to bed; taking care that his loins be somewhat higher than the rest of the body. An opiate should then be given; he should be kept cool; if plethoric, in order to remove the fever which succeeds, he should be bled; a low diet should be directed; and a frequent use of laxatives. When, however, the body has been previously much debilitated, a nourishing diet should be advised.

The fore having easy dressings applied to it as often as seems necessary, and the proper diet, &c. being attended to, if the patient survives the first three or four days, he will in general recover. And as soon as the wound is well cicatrized, a truss ought to be properly fitted to the parts, and worn constantly afterwards.

It has been recommended to stitch the external wound ; but as this may prevent the discovery of protrusions of the intestine, which are apt to occur during the cure, it ought never to be done.

It has been advised by many French surgeons to endeavour to reduce the intestine, &c. without dividing the sac ; but although, if this is practicable, we might in some instances do right, in many others we should probably return mortified parts, which would certainly be followed by death. And besides, there are some cases in which the strangulation has been produced by one part of the intestine being wound around another, as the appendicula vermiformis around the ileum ; when it is obvious no good effects could result from the operation.

By some authors again, it is recommended to reduce not only the bowels, as just described, but even the hernial sac itself, without opening it : by others, among whom is Mr. Pott, this is deemed impossible. But I have seen a hernia of five or six days duration in which it certainly occurred ; the patient died, and dissection put it beyond a doubt. Mr. le Dran relates instances of the same kind. The same objections occur to this practice that operate against returning the intestines without examination of them.

Although bubonocoele happens most frequently in males, yet it sometimes also takes place in females ; and in some cases, the protruded part has descended to the bottom almost of the labia pudendi. The general method of treatment is the same in both sexes.

In modest women, this disease sometimes occurs to considerable degree without our being made acquainted with it ;—it should always be suspected when the symptoms of colic occur to a very alarming degree, and examination should be made to ascertain it.

S E C T. III.

Of the Hernia Congenita.

THE treatment of this species of hernia, in general accords with that of common bubonocoele. In laying open the parts, when the operation is advisable, great caution is necessary, as the thin vaginal coat of the testis forms the hernial sac. And in dressing the wound, the vaginal coat should be brought to cover the testis; and great care should be taken to avoid irritating dressings, and long exposure to the air.

S E C T. IV.

Of the Crural or Femoral Hernia.

THE seat of this species of hernia is the upper and anterior part of the thigh, under the firm tendinous aponeurosis of the fascia lata; the parts being protruded through the opening by which the femoral artery and vein pass out. In some instances they are found immediately over these vessels; in others on the outside of them; but more frequently they lie on the inside, between them and the os pubis.

The same general treatment that was recommended in inguinal hernia is applicable here; but it must be observed that the pressure in reduction should be made directly upwards.

In performing the operation, the external incision should extend from an inch *above* to an inch *below* the tumor: and when all the parts above the ligament are divided, if those protruded are to be returned, their reduction may

here be often accomplished without cutting the ligament, by placing the patient in a favourable posture. This should therefore be always attempted; for it is almost impossible to make a free division of the ligament in any direction, without wounding the spermatic vessels and epigastric artery; and it is by no means so easy a matter to secure the latter as has been represented. On this account an instrument, (pl. v. fig. 7.) has been invented for dilating the opening; but this probably would seldom be of any use, because the ligament, it is to be supposed, is stretched nearly as much as possible by the protruded parts.

I have once used a method which answered very effectually, and was without the risk of the mode commonly advised. It consisted in gradually dissecting the ligament until a very thin lamella only was left; which then admitted of a sufficient distention to suffer the return of the displaced parts. I guarded the parts below by insinuating my forefinger into the opening between the gut and ligament, and then made my incision, which was about an inch long.

In this as well as every other case of hernia, except bubonocele, it is better to use an adhesive plaster to retain the dressings than any bandage.

Women are most subject to femoral rupture;—they are relieved in the manner above directed.

S E C T. V.

Of Exomphalos, or Umbilical Rupture.

THE parts in this rupture pass out at the navel; its contents are very various; most commonly they consist of omentum; sometimes of intestine; and in some instances of part of the stomach, the liver, and even the spleen. The sac becomes sometimes so connected with these parts, that doubts

doubts have been entertained of its existence; but it is always very evident in recent cases. The sac and integuments have been in some instances bursted by the contents.

Umbilical hernia occurs most frequently in infancy, soon after birth; of adults, the corpulent are most liable to it, from the greater perviousness of the umbilicus in them, produced by the constant distention of the abdominal muscles; and for the same reason pregnant women, in the latter months, are particularly subject to it.

A proper bandage or truss will generally be effectual in preventing returns of this hernia: and pregnant women should be particularly attentive to it on its first appearance, as their particular situation has a tendency to render it worse.

As omentum commonly forms herniæ of this kind, they are seldom productive of dangerous symptoms: but when these occur, and cannot be removed without, the operation must be had recourse to as in other cases. The division of the part producing the stricture may be safely made in any direction; but those who wish to avoid wounding the umbilical ligament or former vessels, may make it on the left side, a little upwards and outwards. In other circumstances we must proceed as in other cases of hernia.

S E C T. VI.

Of Ventral Hernia.

IN this species of hernia the parts are protruded into the interstices of the abdominal muscles. It occurs in every part of the abdomen, but most frequently near the linea alba; and when the stomach forms the swelling
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it appears just under, or by the side of the xiphoid cartilage.

The treatment recommended for the exomphalos is applicable to all ventral herniæ.

S E C T. VII.

Of the Hernia of the Foramen Ovale.

THE general mode of treating hernias is proper here, except that instead of dividing the ligament, which would be attended with the utmost risk of cutting some large vessel that it would be impossible to command, it will be proper to attempt its gradual dilatation, by the blunt curved hook (pl. v. fig. 7.), when an operation is necessary.

The tumor is generally so small that this disease is not often detected from the appearance of swelling, till it is too late to apply an effectual remedy, unless pain and other symptoms of strangulated hernia occur to point it out.

In this rupture the tumor is formed in men near the upper part of the perinæum, and in women, near the under part of one of the labia pudendi. In both sexes it lies upon the obturator externus, between the pectinæus muscle and the first head of the triceps femoris, and passes down through the foramen ovale by the side of the blood vessels and nerves.

S E C T. VIII.

Of the Hernia of the Urinary Bladder.

THE hernia cystica occurs in the groin or scrotum through the opening in Poupert's ligament; in the fore
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part of the thigh, under this ligament; in the perinæum through the muscular interstices; or in the vagina. The part of the bladder protruded, is never covered by the peritonæum. It sometimes is protruded by itself, and at other times is accompanied by intestines and omentum. When complicated with bubonocèle, it is found behind the hernial sac, and between that and the spermatic process.

This hernia is usually known by a tumor attended with fluctuation, which subsides when the patient voids urine. When the swelling is small, water is made without pressure; but if large, it is necessary not only to press it, but often to lift it up.

A simple hernia cystica is commonly produced by a suppression of urine. In the treatment therefore, this should be guarded against as much as possible; and when no adhesions take place, and the bladder can be reduced, a truss should then be worn for a considerable time. When the parts cannot be returned, a suspensory bag is the only probable means of relief. When the bladder falls into the vagina, after reducing the parts by laying the patient on her back with the loins elevated and pressing with the fingers from the vagina, future descents may be prevented by the use of a proper pessary: and the same means may be used when the intestine protrudes into the vagina.

When the operation is necessary to remove cystic herniæ, the dissection should be very cautious, on account of there being no sac.

It sometimes is thought proper to cut into the bladder in order to remove stones from the protruded part; in this case, as well as when it is accidentally wounded in the operation, or part of it has gangrened, it will be advisable to preserve its prolapsed situation until the wound is healed, in order to prevent the evacuation of the urine internally, which would probably have bad effects.

C H A P. IX.

Of the Hydrocele.

S E C T. I.

General Remarks on Hydrocele.

THE term Hydrocele is applied to watery swellings situated in the scrotum or spermatic cord.

These, as well as every other species of tumor in the scrotum or groin not immediately produced by the protrusion of parts from the abdomen, are by ancient writers, termed *false* or spurious herniæ, in opposition to those described in the last chapter, which they distinguished by the appellation of *true* herniæ. This distinction is of no kind of use; and indeed nothing written on the subject of herniæ until within a century past, is of much useful application: the discoveries of late anatomists and surgeons have now, however, made it intelligible and satisfactory.

All the varieties of hydrocele may be comprehended under the two following species, viz. the anasarcaous and the encysted. In the former, the water is diffused all over the part affected; and in the latter, it is confined to one or more distinct bags, and a fluctuation of fluid is generally perceptible to the touch. The scrotum and its contents, as well as the spermatic process, are liable to both species of the disease.

S E C T. II.

Of the Anasarcaous Hydrocele of the Scrotum.

THIS disease is usually symptomatic of general dropsy; but in some few instances, it is merely a local affection. Thus it has been the consequence of the pressure of a tumor on the lymphatics of the part; of external injury; and of the effusion of urine from a rupture of the urethra.

As soon as water is collected in any considerable quantity in the scrotum, a soft, inelastic, and colourless tumor is observed over the whole of it; this gradually increases, and often extends up into the groin and penis; and distends the parts so much as at length, in some instances, to burst them. After some continuance the skin acquires a whitish shining appearance; and the largeness of the swelling is frequently productive of a great deal of inconvenience and distress.

This disease is so well characterized, that there can be no danger of confounding it with any other. As it commonly depends on a general cause, its radical cure must be accomplished by the general remedies of dropsy; but we are often under the necessity of affording a temporary relief, by evacuating the fluid of the particular part. This has been done in four different ways; by seton, by the trocar, by incisions, and by punctures. All these, except the trocar, evacuate the water very effectually; but punctures have the least troublesome consequences, and therefore should be preferred.

The trocar, seton, and scarifications, often produce, in a little time after their use, erysipelatous inflammation and consequent gangrene; and even punctures have had such effects, but much more seldom.

Scarifications

Scarifications are usually made about an inch in length, to the depth of the cutis vera, and about two or three in number, with the shoulder of a lancet. Punctures are made to the same depth with the point of the lancet, and about five or six generally suffice. They may be repeated in a few days if the first seem insufficient; and the parts should be kept as dry as possible after the operation.

When inflammation succeeds, a cold solution of saccharum saturni, or aqua calcis, are the best applications to remove it. Should these fail, and gangrene come on, the remedies for gangrene in general should be had recourse to.

Although in these cases, mortification often terminates fatally; yet very unexpected cures are sometimes obtained. There is an instance of the whole scrotum separating and leaving the testes bare; but these were soon covered by a cellular substance, and the patient recovered.

When this disease is induced by swellings in the abdomen or groin, obstructing the return of the lymph, they should, if possible, be removed; if this cannot be done, punctures must be made as palliatives.

It sometimes happens that suppression of urine, producing a bursting of the urethra, induces this complaint in a very sudden manner. In order to prevent the formation of sinuses, which will be apt to occur in these cases, an incision should be made into the most depending part of the scrotum, and carried deep enough to reach the wound in the urethra. By this means a free vent will be given to the urine which has been collected, or will be discharged. If a stone in the urethra produces this suppression, it should be cut out; if it originates from a collection of matter, this should be discharged; and if the obstruction arises from caruncles in the urethra, they should be removed by bougies.

The cause being thus removed, if there is no constitutional affection, and the wound is dressed with soft applications,

cations, the opening into the urethra will commonly heal; but where there are general complaints, and particularly if the patient is syphilitic, it often happens that it baffles all the powers of medicine.

Local scrotal anasarca has been also produced from the rupture of a hydrocele of the tunica vaginalis testis, when large, by jumping from a great height, or a violent blow; and also in the operation of tapping in that disease, from suffering the orifice in the teguments to recede from that in the vaginal coat before the water is all discharged.

In both these cases, the cure should consist in laying open the tumor; not only for the evacuation of the diffused water, but also for producing a radical cure of the hydrocele of the vaginal coat.

Of the *encysted hydrocele* there are two varieties: 1. When the water is contained in the tunica vaginalis: and, 2. When it is contained in the sac of a hernia.

S E C T. III.

Of the Hydrocele of the Vaginal Coat of the Testis.

THIS disease is induced either by a too abundant deposition of the fluid usually exhaled into the cavity of the vaginal tunic, or a defective absorption of it.

In the commencement of the complaint, a fulness is observed at the lower part of one of the testicles, which gradually increases, and produces a tumor often of considerable size. This although compressible at first, can never be made to disappear by pressure; and as it increases the skin becomes more tense. The tumor is at first globular, but gradually becomes pyramidal, being larger below than above; and after some continuance it often rises quite up to the opening in the abdominal muscles; so that

if it is not combined with hernia, or hydrocele of the cord itself, the spermatic process may always be distinctly felt in the early stage of the disease. The weight of the swelling being now very considerable, the skin of the parts adjacent is dragged along with it in such a manner, that the penis shrinks considerably, and sometimes almost disappears; and the testicle, which commonly lies at the back part of the tumor, cannot now be evidently discovered. On a minute examination, however, a hardness may be felt where the testis is connected to the scrotum; and a fluctuation of fluid may in general be distinguished.

It sometimes happens when the tumor is very tense, that the fluid cannot be evidently discovered; neither this, however, nor the want of transparency in it when exposed to the light of a candle, should determine against its existence; for the last mentioned circumstance may be occasioned by a discolouration of the fluid, or a thickening of the tunic. When the swelling, however, appears transparent, as it frequently does, it affords a corroborating proof of the existence of water.

The tumor itself is not painful, but its weight always produces some uneasiness in the back; this may however be prevented or alleviated by the use of a suspensory bandage.

These are the common symptoms when the disease is confined to one side of the scrotum, which is usually the case; but in some instances both sides are equally affected.

The diseases with which this is most likely to be confounded are, scrotal herniæ; the anasarous hydrocele of the scrotum; the encysted hydrocele of the spermatic cord; the sarcocele or schirrous testicle; and the hernia humoralis, or inflamed testicle.

But if we attend to the characteristic marks of each of these affections, there can in general be little danger of mistake: these have been already given, or will be taken
notice

notice of hereafter. In some cases of sarcocele combined with an effusion of water into the vaginal coat, there will be some difficulty, and it is even sometimes impossible to ascertain the complaint: however, no danger will arise from the mistake, if we proceed in the cautious manner hereafter pointed out.

In forming a prognosis in this disease, we must be directed almost entirely by the habit of body of the patient. The affection is in general local, and in a healthy constitution it may almost always be removed, and that with little or no risk; but in constitutions otherwise diseased; in old people; and in infirm habits, although the complaint may often be cured, yet there is always some danger to be feared from the consequent inflammation, fever, and supuration.

As long as a swelling of this kind keeps within moderate bounds, which often happens for a considerable time, patients generally submit to the inconvenience it occasions, rather than have an operation performed to relieve them: and this is the only means to be depended on; for notwithstanding what has been said of the beneficial effects of purgatives in these cases, I have never seen them of any kind of service*.

The methods of treatment proposed are either intended to produce permanent relief, or only a temporary ease. The last is termed the palliative, the former the radical cure.

When the tumor has acquired such a size as to become inconvenient, if the patient either refuses to submit to the operation for the radical cure, or his state of health renders that improper, the palliative treatment, or a mere evacuation

* Dr. Shippen, professor of anatomy and surgery in this city, has in more instances than one, removed this disease by the free use of drastic purges, and anointing the part with mercurial ointment. But the Doctor is of opinion with Mr. Bell, that they will generally be ineffectual; and in his lectures strongly recommends the use of the knife if the patient will suffer it to be employed.

evacuation of the water by puncture, is the only means we can employ; and this is hardly ever at all hazardous.

The puncture is made either by a lancet or the common trocar. To the use of the lancet it may be objected, that it does not produce a free evacuation of the water; for as the opening in the skin recedes from that in the vaginal coat, the water is either entirely stopt or insinuates itself into the cellular substance of the scrotum.—The difficulty of introducing the common trocar, renders it a dangerous instrument on account of the contiguity of the testicle; and many instances have occurred wherein the testis has thus been materially injured, even in the hands of expert operators. The objections to these instruments do not, however, apply to the trocar with a lancet point, (plate vii. fig. 3. 4.) which I some time since recommended: it ought therefore to be preferred to both of them.

In performing this operation, the patient should be seated on a chair, with the tumor hanging over the edge of it: the operator with his left hand grasping the swelling on the back part, so as to push the water as much as possible into the anterior and under part where the puncture is to be made; he then makes an opening through the skin and cellular substance, of half an inch in length, with the shoulder of a lancet. This ensures an easy passage to the trocar, gives but very little pain, and divests the operation of all hazard.

The trocar is now to be taken in the right hand of the operator, the head of it being fixed in the palm, and the fore-finger placed along the course of the instrument, so as to leave as much uncovered as it is thought proper should enter the vaginal coat; and this being introduced in a gradual easy manner, the stilette is to be withdrawn immediately on the end of the canula having entered the cyst. If the tumor is not very large, all the water may be evacuated at once; but if it is of considerable size, the sudden

sudden discharge of the fluid might, by taking away too quickly the support it afforded to the vessels of the testis and its coat, endanger a rupture of some of them; it will therefore be better to stop the discharge now and then for a few seconds; and when the whole is evacuated, the wound may be closed by adhesive plaster, a soft compress applied above this, and both secured by the T bandage.

The patient being laid in bed, it commonly happens that in a few hours all uneasiness goes off, and he may go about his ordinary business; in some instances, however, the wound inflames and suppurates; and there are not wanting cases in which a permanent cure has thus been obtained.

This operation is easily performed, and seldom productive of mischief; but when the patient has been allowed to go about immediately after the operation, or the tapping has been incautiously performed, it has sometimes been succeeded by very troublesome symptoms. And even when properly managed, if the patient is very infirm, this may happen. Mr. Pott relates two instances of this kind that terminated fatally. Hence it should not be risked in very diseased habits.

The intention of every means at present in practice for the radical cure of this species of hydrocele, is either to admit of a union between the cellular substance of the scrotum and the tunica albuginea, by a destruction of the tunica vaginalis, or by exciting such a degree of inflammation on the parts as may obliterate the cavity of the tunica vaginalis, by making it adhere to the tunica albuginea.

The several modes of effecting these intentions, are excision of the tunica vaginalis; the application of caustic; the use of a seton; and a simple incision of the sac.

The three last are almost the only methods now in use; and the caustic is the only one of them by which the sac has been supposed to be destroyed; but it is exceedingly doubtful

doubtful, notwithstanding what Mr. Else says to the contrary, whether this ever takes place.

By Mr. Douglass we are recommended to destroy the vaginal coat entirely; he directs us, first to dissect out an oval piece of the scrotum, and having then laid the vaginal coat open, to cut it away by a pair of scissars; but if any one is inclined to follow this mode, he will seldom find it necessary to cut off any part of the scrotum, and will perform the operation more easily with a scalpel than with scissars.

The method of cure by caustic is thus conducted at present; the scrotum being shaved, a piece of common caustic paste, of the size of an English six-pence, is to be applied upon the anterior and lower part of the scrotum, and to be there well secured by adhesive plaster, in order to prevent it from spreading. It is to remain five or six hours, and then be removed. An emollient poultice, or some digestive, must afterwards be applied over the scrotum, and the whole suspended by a bandage.

Inflammation we are told, is soon induced over the whole tunica vaginalis; and the febrile symptoms which succeed are to be moderated by blood-letting, clysters, &c. In a few days the eschar separates and comes away; and in a gradual manner, in the course of four, five, or six weeks, the whole tunica vaginalis comes off; when the wound immediately cicatrizes, and a complete cure is obtained.

When the seton is to be used, the following is the method directed by Mr. Pott. He uses a trocar; a silver canula, five inches in length, and of such a diameter as to pass easily through the canula of the trocar; and a probe, six inches and an half long, having at one end a fine trocar steel point, and at the other an eye which carries a cord of coarse white sewing silk, of such a thickness as will pass easily through the long canula. With the trocar, the inferior and anterior part of the tumor is to be pierced;

pierced; and as soon as the perforator is withdrawn, and the water discharged, the seton canula is passed through that of the trocar, till it reaches the upper part of the tunica vaginalis, and can be felt in the very superior part of the scrotum. This being done, the probe armed with its seton is to be conveyed through the latter canula, the vaginal coat and teguments to be pierced, and the seton drawn through the canula till a sufficient quantity is brought out at the upper orifice, when the canulas are to be withdrawn.

About the end of the third day, the parts begin to inflame; fomentations, poultices, a suspensory bandage, temperate regimen, and laxatives, are ordered to keep the symptoms moderate: as soon as the inflammation subsides, which is generally about the tenth or twelfth day, the seton is to be diminished at every subsequent dressing, by withdrawing six or eight threads: the dressings consist of a small pledgit on the wounds, and a plaster of ceratum saturninum over the scrotum.

This mode of performing the operation I approve of, except in the circumstance of introducing the seton, which I think is more easily executed, and with less danger of injuring the testicle, in the manner directed in the section on abscesses.

The operation by the simple incision is thus performed. The patient being placed on a table of convenient height, and being properly secured by two assistants, with the scrotum lying nearly upon the edge of the table, the operator should grasp the tumor with one hand so as to hold it firmly, and make it somewhat tense on its anterior part; and with a common scalpel in the other, he should now divide the teguments from the superior part of the tumor, along its anterior surface down to the most depending part.

The

The scrotum retracting a little, the vaginal coat is laid bare, and the operator is to make an opening into it with a lancet large enough to receive his fore-finger, at the superior part where the first incision began; the finger being inserted, the probe pointed bistouri is to be carried along it until the sac is divided quite to its lower extremity.

The incision is directed to be made from above, on account of its being thus most easily performed; and to be carried the whole length of the tumor, because the formation of sinuses is then prevented.

When the sac appears much thickened, it will facilitate the cure to remove part of it on each side: but when this is not the case, the dressing should be immediately finished, in order to prevent any bad effect from the air coming in contact with, and irritating the testis.

The testicle is generally found to be of a soft texture, and pale; in some instances it is considerably enlarged; and in others it is reduced to a very small size: as the cure advances, however, it generally regains its former bulk.

It sometimes happens that both sides of the scrotum are affected with hydrocele; in such cases, we are by some directed to lay both open at the same time by a double incision; but it has been more common, on account of the inflammation thus induced, to subject the patient to two distinct operations, by delaying one until a recovery from the effects of the other. But it is much more advisable, instead of either of these modes, to lay open the septum scroti, after operating on one side, and thus effecting the cure of both diseases at once. The partition of the scrotum is entirely cellular, consequently we run no risk of doing injury by dividing it. I have done this in two instances with complete success.

The

The success of this operation depends very much on a proper dressing of the wound. If the testicle has been pushed out of the scrotum, it should be immediately replaced, and a thin piece of soft lint inserted between it and the edges of the wound, the whole length of the tumor, so much being left out as will cover the lips of the sore, and the remainder pushed about half way to the bottom of the sac. A compress of soft linen is then to be applied over the tumor, and the whole supported by a suspensory or T bandage. The patient being now carried to bed, an anodyne should be given to him; and he should be directed to avoid motion as much as possible.

The lint is introduced in order to excite an inflammation over the whole surface of the tunics, and thus prevent partial adhesions and consequent sinuses.

When the inflammatory symptoms which succeed to this operation do not run high, it is not necessary to do any thing for some days; but when they are considerable, we must employ blood-letting, laxatives, and a cooling diet; and apply fomentations and poultices to the part, in order to induce a plentiful suppuration, which tends more effectually than any thing else to take off bad symptoms.

In general, about the fourth day the parts should be fomented and poulticed; and by the fifth or sixth the dressings come off. The edges of the sore now appear hard and swelled, and the matter discharged is thin and discoloured; the lint should then be all removed as soon as it will come away easily, which is usually at the third or fourth dressing. The sore should be dressed every day or two, according to the quantity of the discharge; and the poultices should be continued till a plentiful suppuration comes on, which generally happens by the twelfth or fourteenth day.

The swelling and sore now gradually lessening, the only dressing necessary, is lint covered with a pledgit of cerate;

and in four, five, or six weeks, according to circumstances, the cure is completed.

From an attentive observation of the effects of the three modes of operation last described, in a very great variety of cases, in different places, I am induced to conclude that they are all equally capable of producing a radical cure; but that the simple incision effects this with less trouble to the operator and risk to the patient than either of the other two; and that of the others, the caustic is to be preferred to the seton.

I have seen all these methods produce troublesome symptoms; such as great pain and tension of the abdomen, inflammation and fever; but the seton, from the irritation it gives to the testicle, more frequently occasions them than either of the others. The seton induces such a plentiful suppuration also, in many cases, that the matter cannot be evacuated at the openings, and in consequence forms troublesome sinuses.

Another important objection is, that it does not admit of a free examination of the testis, or of the fluid contained in the sac. In simple hydrocele this would be of no consequence; but if the testicle should be much diseased, the irritation of the cord on it might produce very troublesome and alarming symptoms: And there are several instances upon record in which the first surgeons have mistaken hydro-sarcocele for simple hydrocele, and vice versa; indeed in some cases, there is no certain means of discrimination: In such, the surgeon should always proceed upon the supposition of the disease being hydrocele; and if on laying open the swelling, the testicle should be in such a state as to require extirpation, it should be immediately removed.

The fluid in hydrocele is frequently contained in hydatids: This forms another objection to the seton; which is obviously ill calculated for its removal in that case.

The treatment by caustic is liable to one very material objection, viz. that of being productive of sinuses and abscesses in the scrotum and cellular substance connecting this to the tunica vaginalis. This is never the consequence of the simple incision; and on this account, because it brings the state of the testicle more evidently into view; and because experience has taught me that it produces the least troublesome symptoms, I am clearly of opinion that it ought to be chosen in preference to the cure by seton or caustic*.

S E C T. IV.

Of the Hydrocele of a Hernial Sac.

THERE are several instances of this disease upon record; and as it occupies nearly the same situation with the simple hydrocele of the tunica vaginalis, it is often a matter of difficulty to distinguish them, and sometimes an impossibility.

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* The latest experience seems to justify this opinion; and instead of applying warm poultices and fomentations, if soft compresses, dipped in a solution of the saccharum saturni, are immediately laid on the simple dressings, and kept constantly wet, no more swelling or inflammation will attend the operation, in most cases, than is necessary to induce a union of the tunica vaginalis with the testicle.

These tumors are sometimes of a most enormous size.—A man who had laboured under one for nine years, and worn a suspensory truss for it as a rupture, had the operation performed by incision, and two gallons of a brown turbid fluid, with a large quantity of a substance like that of the meliceris, was discharged. The veins of the scrotum were enlarged like those of the gravid uterus in the last month of pregnancy. Warm spirituous fomentations and dressings were employed in this case to restore the lost tone of the parts, and in about six months the wound was closed, the scrotum and tunica vaginalis contracting to a very moderate size.

In this species the testicle is usually more evident at the lower part of the tumor than in simple hydrocele; but when the disease is combined with hernia congenita, as it frequently has been, this will not be the case. When the parts forming the hernia are down, the fulness they produce along the spermatic cord, serves in some measure to denote the complaint. And if the water can be made to pass into the abdomen by pressure, this affords a certain characteristic: But where it happens that the neck of the sac has been closed by the pressure of a truss, or any other cause, this mark cannot appear. In such a case, the only means of distinction will be, an acquaintance with the previous history of the disorder:—no bad consequence could however ensue from a mistake, as the treatment adapted to simple hydrocele applies equally to this variety.

When the protruded parts still remain down, unless the operation for bubonocoele is submitted to at the same time, no other should be attempted than that of discharging the water by means of a small trocar, when the size of the swelling renders it necessary: because the exposure of the intestines to the air might be productive of material injury.

The simple incision should always be used for the radical cure of this disease, on account of the risk of injuring parts that might be protruded, by the employment of the seton, or of caustic.

S E C T. V.

Of the Anasarcaous Hydrocele of the Spermatic Cord.

THIS disease is seated in the cellular membrane which envelopes the spermatic process of the peritonæum.

It is, in some instances, symptomatic of ascites or anasarca;
in

in other cases, it is a local affection, and is produced from an obstruction in the lymphatic vessels of the part, by schirrous abdominal viscera, or by the pressure of a truss.

When the disease is symptomatic, it is clearly marked; when it is merely local, it appears as a colourless tumor in the course of the spermatic cord, soft and inelastic, and not attended with fluctuation. In an erect posture it is oblong, but in a recumbent situation it is more flat, and somewhat round. It does not in common extend lower than the inferior part of the groin; but in some cases, it goes quite to the bottom of the testicle, and stretches the scrotum to a great size. By pressure the swelling can be made to recede entirely, or at least in great part, into the cavity of the abdomen; but it instantly returns to its former situation on removing the pressure.

When this disease depends on a general affection, it commonly disappears with the removal of that affection; but when it is local, and has become inconvenient, an incision is to be made into it, the whole length of the tumor, so as to evacuate all its contents; and the wound is then to be dressed with lint, and treated as a simple sore from any other cause.

S E C T. VI.

Of the Encysted Hydrocele of the Spermatic Cord.

IN this disease the water is contained in one or more distinct cysts, or cells. It commonly begins by a small tumor in the spermatic process, just above the epididymis; although, in some instances, it begins in its superior part. By degrees it extends upwards, and on some occasions so far downwards, as to reach from the abdominal muscles to the bottom of the scrotum. The testis can always
be

be distinguished at the back part of this swelling, and quite unconnected with it; and a fluctuation of fluid is always perceived on pressure. The tumor is commonly of a pyramidal form, and is not at all altered in size by pressure.

When the water is contained in two cells, the line of division is commonly evident, by the tumor being there somewhat puckered, or sometimes diminished in its diameter. A similar appearance takes place when this species is combined with a real hydrocele of the tunica vaginalis at the upper extremity of the tunic.

The diseases with which this is most likely to be confounded, are the hydrocele of the vaginal tunic, the anasarctous hydrocele of the spermatic cord, and a hernia of the intestines or omentum. But an attentive consideration of the phenomena of these complaints, and of those attending the one we are treating of, will in general effectually prevent the mistaking one for any other of them.

This, as well as the anasarctous hydrocele of the cord, and the œdematous tumor of the scrotum, are all frequent in infancy. They are then, in common, soon removed by the application of spirit of wine, or infusion of rose leaves with alum. Dr. Monro recommends the fumes of benzoin. But in adults, these applications are seldom effectual; and we are under the necessity of employing an operation, as in hydrocele of the vaginal tunic, when it arrives at an inconvenient size.

In accomplishing a radical cure, the incision is particularly proper on account of the water being sometimes contained in more than one cyst; and because there is a possibility of confounding this disease with hydrocele accompanied by hernia.

In the description we have given of the five species of hydrocele, we have necessarily enumerated the particular symptoms of each uncombined with those of any other; but it sometimes happens that two, three, or even
four

four, occur at the same time in the same person. In such cases there will sometimes be considerable difficulty in ascertaining the precise state of the complaints; we can only form a judgment of this, however, from an attention to the symptoms which usually happen in the separate state of each variety.

C H A P. X.

Of the Hematocele.

THE hematocele is a tumor in the scrotum or spermatic cord produced by extravasated blood. Its usual seat is in the tunica vaginalis; but it is sometimes produced in the spermatic process, and now and then in the dartos.

Tumors of this kind are usually the consequence of a rupture of some of the blood vessels of the parts, from external violence. They have been occasioned by blows, and by a wound from a trocar or lancet in tapping for the hydrocele. In the latter case, the water drawn off is, in common immediately tinged with blood; but in some instances, this is not the case; and the effects of the accident do not appear until all the water is evacuated, and then a tumor of considerable size is frequently produced in a very short space of time. In very large hydroceles the blood vessels have been ruptured merely from taking away the support which they have received from the pressure of the water by its sudden evacuation.

Hematocele

Hematocele when seated in the scrotum, is to be distinguished from hydrocele by the livid colour of the parts; and when in the tunica vaginalis, by the greater weight of the tumor in proportion to its bulk, and often by the manner of its production.

In the beginning of the anasarca or diffused hematocele, whether it be seated in the scrotum or spermatic process, when produced by slight external violence, the application of ardent spirits, or of a solution of alum, will sometimes effect a discussion: but if this fails, the tumor is to be laid open, and treated as a hydrocele; except that if a ruptured blood-vessel is discovered, it will be absolutely necessary to secure it by a ligature. The hematocele of the vaginal coat is to be removed by a similar operation: But when the bleeding vessels cannot be detected, as sometimes happens also in the hematocele of the spermatic process, and the hemorrhage cannot be restrained by the usual remedies, we are under the necessity of having recourse to extirpation of the testicle, as the only effectual means of relief.

Mr. Pott describes a species of hematocele, in which the blood is contained within the tunica albuginea testis; which he thinks proceeds from a relaxation or dissolution of part of the vascular structure of the testis; and which when any considerable quantity of fluid is collected, produces a fluctuation somewhat like that of a hydrocele of the vaginal tunic.

When this affection is mistaken for a hydrocele, and an opening is made with a trocar, a dark-coloured blood is discharged nearly of the consistence of thin chocolate; but although the swelling is somewhat lessened by the operation, yet no considerable alteration is effected by it; and as the testicle is rendered useless by the disease, Mr. Pott advises its removal, as the only effectual remedy.

I have met with a disease very similar to this; except that the blood never appeared to be extravasated, but to be still contained

contained in the vessels of the testis; although they were in an enlarged state. In such cases, when nothing more was done than merely to support the parts by a suspensory, they have continued stationary for a great length of time; a circumstance which does not occur either in true hemocele, or in hydrocele: but where upon the supposition of the collection being a hydrocele, an instrument was introduced for the evacuation of its contents, the tumor became painful, and increased, and at length grew so troublesome by frequent discharges of blood, that castration was rendered absolutely necessary.

But even extirpation of the testicle does not afford relief in every case; for the blood-vessels of the whole spermatic cord sometimes become so soft and spongy, that fresh hemorrhagies occur, perhaps at every dressing, and render repeated ligatures necessary. And in one case in which I was concerned, the hemorrhage burst out so repeatedly, that the patient at length died from the effects of it.

This tumor is to be distinguished from hydrocele, by being heavier in proportion to its size; by the fluctuation being less evident; and by an increase of it being prevented by the use of a suspensory bandage.

C H A P. XI.

*Of the Varicocele, Cirfocele, Spermatocele,
and Pneumatocele.*

BY the first of these terms is meant, a varicose distension of the veins of the scrotum; which form a tumor of hard knotty inequalities, seldom attended with pain, and only inconvenient from its size.

The cirfocele is a tumor of the same nature, seated in the spermatic vein, and extending from the superior part of the scrotum to the abdominal muscles.

Both these affections are sometimes produced by tumors, the pressure of a truss, or other causes of obstruction to the return of the venous blood:—In such cases the removal of these causes should therefore be the first step towards a cure.

But when a general relaxed state of the veins gives rise to them, and this is the most common cause, remedies to recover their lost tone should be employed. For this purpose, we should direct the use of a suspensory bandage; a horizontal posture; the cold bath; and the application of a solution of alum and other astringents to the parts affected.

By these means every affection of this kind may be prevented from increasing, and so far relieved as to render the harsh modes of cure by the knife, the cautery and ligature, recommended by ancient writers, unnecessary.

By the term spermatocele is meant a morbid distension of the epididymis and vas deferens, produced by a stagnation

tion of semen. This may be occasioned by tumors, stricture, or inflammation about the caput gallinaginis, or in the course of the vas deferens : the last is probably the most frequent cause.

Inflammation is to be removed by the common remedies. In general tumors should be either extirpated or brought to suppuration ; if they are venereal, a mercurial course should be directed. Castration has sometimes been employed as a dernier resort ; but we cannot suppose it ever to be very necessary.

The appellation of pneumatocele has been applied to tumors of the scrotum produced by air. This disease has been described by the ancients as a frequent occurrence ; but it is extremely doubtful whether it ever exists as a local affection : and it is most probable that hernia or hydrocele have been usually mistaken for it. As a part of general disease, it may happen either from a wound of the lungs, or from a putrescent state of the fluids. In the former case, punctures with a lancet will be an effectual mode of cure ; but in the latter, nothing will probably be of any advantage.

C H A P. XII.

Of the Sarcocoele, or Schirrous Testicle.

BY sarcocoele is understood a firm fleshy kind of enlargement of the testicle; much more hard than that occasioned by inflammation.

An unusual degree of hardness, attended with a trifling enlargement, and inconsiderable pain of the testicle, are the usual indications of the commencement of this disease: these symptoms gradually increase for some time; and then often remain stationary for a great length of time. In a very few instances they have been prevented from increasing, or even removed, by a moderate diet, keeping the belly open, a proper suspension of the tumor, and avoiding violent exercise. Such instances are however very rare; and generally in more or less time, the tumor becomes larger; grows ragged and unequal on its surface; and the pain becomes more severe, frequently darting suddenly through the substance of the swelling.

The inequalities on the surface of the tumor increase by degrees:—on some occasions, a considerable quantity of serum is extravasated into the tunica vaginalis, and gives the appearance of a common hydrocele; at other times, partial collections of matter are formed throughout the body of the tumor; which increasing, at length the scrotum bursts, and a thin foetid bloody matter is discharged.

The spermatic cord, after the tumor has acquired a considerable size, becomes hard and enlarged, but seldom before;

fore; and often not till matter has been formed. By degrees it grows very knotty and painful throughout its whole extent.

Although the discharge of matter increases in quantity, the tumor instead of lessening continues to increase; the edges of the sores become hard, livid, and retorted; and fungous excrescences shoot out from different parts of them.

The patient now becomes emaciated and pale; and the disease, which in this stage is a most malignant cancer, constantly increasing, at length carries him off in the greatest misery.

This is the general progress of the complaint, unless it is interrupted by a timely extirpation. But as it assumes a great variety of appearances, it is impossible to convey a clear idea of them in description. In some instances the tumor remains almost indolent for a number of years; while in other cases, it goes through all the stages we have described in the course of a few months.

In the greatest number of cases, the disease begins in the testis; but it now and then makes its appearance first in the epididymis, and sometimes even in the spermatic cord.

Hernia humoralis seldom terminates in sarcocele, but there are indisputable evidences of its ending, in some instances, in that disease.

Schirrous affections of the testicle have been attributed to the water sometimes met with in the tunica vaginalis at the same time; but there can be little doubt but that this collection of fluid is produced by the disease of the testis, and ought not to be considered as the primary affection. The disease formed by this combination has been termed *hydro-sarcocele*; and it is often with difficulty distinguished from simple hydrocele. In some instances there is no possibility of determining the real nature of the
case,

case, but from exposure of the parts by an incision. The previous history of the disease must give the chief light in these doubtful instances.

In forming a prognosis in farcocele, we are to be directed by the age and habit of the patient, the duration of the disease, and its state at the time.

Thus, we may have more hopes of success in young healthy subjects, particularly if extirpation is to be advised, than in those of an advanced age and infirm habit; and indeed when the system is otherwise much diseased, there can be little or no advantage expected from any thing.

If the complaint has proceeded very slowly, there is reason to think that it is of a mild nature, and that the habit is not so much affected as if its progress has been very rapid.

And, as long as the testicle is only somewhat hard and enlarged, without the formation of matter, and without any disease of the cord, if the constitution is otherwise healthy, there is a probability of success from any operation that ought to take place; but when the opposites of these circumstances occur, and particularly if there is an ulceration of the testis, there will be little reason to expect a favourable event.

With respect to the spermatic cord, whenever this is merely enlarged by the weight of the testicle producing a varicose state of its vessels, or a watery deposition in its cellular substance, and is not painful in itself, the extirpation of the testicle may be admitted, if no circumstance of general disease forbids it; but if the cord has become enlarged, hard, knotty, painful to the touch, adherent to the neighbouring parts, and ulcerated, and the affection extends quite up to the abdominal muscles, castration should always be forbid.

No remedy but extirpation can be depended on for the
removal

removal of sarcocele. The most important circumstance to be determined then, is the period at which the operation is most advisable.

Although this disease, in some instances, remains stationary for a long time, or proceeds very slowly, yet in the greater number of cases, its progress is very rapid. When therefore, bleeding, laxatives, a suspensory bandage, or mercury, when it has probably originated from a venereal source and other occasional remedies, have been ineffectual, and the tumor daily increases in size, and becomes more painful, the operation should be instituted without delay; but while the disease remains stationary and indolent, it can never be considered as absolutely necessary.

The method of performing castration is as follows:—The patient must be placed horizontally on a table of convenient height, with his legs hanging down, to be secured by an assistant on each side. The parts being previously shaved, an assistant must hold the tumor, if very large, if it is not, the surgeon should manage it himself. Grasping it firmly with one hand, he should make an incision with a scalpel in the other, along the whole extent of it, beginning at least an inch above the part where the cord is to be cut, and carrying it through the skin and cellular substance quite down to the end of the scrotum, by one cut of the knife.

The vas deferens should then be separated from the blood-vessels; and a firm waxed ligature being carried around the artery and vein, avoiding the nerve, by means of the curved blunt needle, (plate vii. fig. 2.) a running knot should be made on them, a quarter of an inch above where the cord is to be divided.

The cord being here cut across, the lower part of it and the testicle, are then to be dissected out with the scalpel. When this is effected, the ligature is to be untied, and the artery and vein, if possible, separated from the nerve by the
 tenaculum,

tenaculum, and secured. The ligature above may be left loose, and is to serve as a security against hemorrhagy.

When it is necessary to divide the cord near to the opening in the abdominal muscle, it will be proper to leave the ligatures a few inches long, lest a retraction of the cord within the abdomen, which sometimes happens when it has been much separated from the parts beneath, should take place. If the scrotal artery should be divided during the operation, it should be immediately tied.

The wound is now to be dressed with soft lint, secured by a compress, and the T bandage, or a suspensory bag.

The patient being then laid to rest, and an opiate administered, the fore should not be dressed till a free suppuration takes place; which will generally happen about the fifth or sixth day; and the dressings may afterwards be renewed once in two days, or oftener, according to circumstances.

Sometimes, after this operation the patient complains of much pain in the fore, and of tension and uneasiness over the abdomen: in these cases, warm fomentations should be applied to the abdomen, and an emollient poultice to the fore.

In performing castration, no portion of the skin should be removed, unless from the size of the tumor it has become very thin, or it is inflamed or ulcerated; in which cases, after making the first incision to the extremity of the spermatic cord, two semilunar incisions should be continued to the end of the scrotum, so as to include all the diseased skin; and this is to be afterwards dissected off *with* the testicle.

C H A P. XIII.

Of the Diseases of the Penis.

S E C T. I.

Of the Phymosis.

THE disease called phymosis is formed when the prepuce has got forward over the glans penis, and cannot be drawn back.

It is produced by whatever tends to swell the glans, or to excite inflammation and stricture of the preputium: and in some people, the prepuce is so tight, as to render them liable to this disease from very trifling causes. It originates frequently from allowing a collection of the mucus behind the glans to take place, and continue till it becomes acrid; but the most frequent cause of it is the application of the venereal virus to these parts.

In slight and recent cases, warm emollient fomentations and poultices are commonly effectual remedies. At the same time it will be proper to inject part of the fomentation between the prepuce and glans frequently, in order to remove any matter that may be there accumulated from chancres or other causes.

When the inflammation is very considerable, blood-letting may be necessary; and this will be more effectual if the blood can be taken from the penis by the lancet; if this cannot be accomplished, it may be drawn from the arm. Topical bleeding by leeches might be very useful;

but when the disease originates from a venereal cause, the wounds thus caused are apt to terminate in troublesome sores. Laxatives, rest, and low diet, should also be directed.

When all these remedies fail, and especially if chancres are confined under the prepuce, the discharge from which might injure the prepuce and glans, it will be necessary to remove the stricture by cutting through the prepuce its whole length. This will be most easily and effectually accomplished by a very small bistouri, concealed in the groove of a director, and somewhat curved at its extremity. These being introduced between the glans and prepuce, to the upper part of the latter, the operator is to keep the director firm with one hand, and with the other is to push the point of the knife through the membrane; the director being then withdrawn, the bistouri is to be drawn forward so as to divide the prepuce entirely.

The operation should be performed on the side of the penis, in order more effectually to avoid the large veins.

The parts beneath should now be cleaned with warm water; and the fore being covered by lint, and a compress of linen laid over it, the whole may be secured by a small linen bag connected to a circular band around the body.

In the subsequent treatment, care should be taken to insert a piece of lint between the divided prepuce and glans, otherwise troublesome adhesions may take place; and if the venereal disease exists in the habit, a mercurial course will be absolutely necessary to the healing of the fore.

In cases where the prepuce is found excessively long, instead of dividing it longitudinally, it will be better to take off a part of its whole circumference*.

SECT.

* This will be most easily and effectually performed by making lateral incisions first.

S E C T. II.

Of the Paraphymosis.

By the term paraphymosis is meant a morbid retraction of the preputium, producing a stricture behind the glans penis. This disease is produced most frequently by a venereal taint; but it may originate from whatever tends to occasion a preternatural fulness of the glans, or a constriction of the prepuce, or both.

In the commencement of this complaint, the prepuce may be sometimes brought over the glans by pushing the nut gently back with the thumbs, while the fingers are employed in moving the prepuce forward; but this should never be attempted in an advanced stage, as it is then not only unsuccessful, but often injurious.

As paraphymosis usually arises from an enlargement of the glans, warm fomentations instead of proving serviceable often do mischief. Nothing answers so well as saturnine applications; and immersing the swelling frequently in a cold solution of saccharum saturni, will often remove it when all other remedies fail. When the penis is much swelled and inflamed, the patient should be kept cool, and on a low diet, gentle laxatives should be exhibited, and some blood may be discharged from a vein of the penis.

These remedies will often succeed; but when they are ineffectual, the swelling and stricture increasing, an œdematous swelling appears in the prepuce, and often acquires a considerable size; and unless the stricture is removed, a mortification of the glans will be very apt to occur.

When therefore, the means above advised do not remove the complaint, and the symptoms just mentioned begin to come on, the stricture should be removed by making a deep
 scarification

scarification on each side of the penis, directly behind the glans, about half an inch in length, and of such a depth as to divide the prepuce just at its termination.

As soon as the hemorrhagy stops, the wound should be dressed with lint, and a plaster of cerate, and a soft poultice should be applied over the whole tumor. The parts should afterwards be dressed in the ordinary way. If the stricture should not have been completely relieved by the first incision, a second should be made.

Mercury will be necessary, if the cause of the disease has been venereal.

S E C T. III.

Of Amputation of the Penis, &c.

A NECESSITY for amputation of the penis is most commonly induced by gangrene from paraphymosis and other causes, and by cancerous fores affecting it.

In performing this operation, a circular incision is to be first made through the sound skin on the verge of the sore, and the skin being then drawn back, all the diseased parts are to be removed by one stroke of the knife. All the arteries that bleed freely, which are generally two or three in number, ought then to be secured by ligature; and the oozing of blood, that afterwards occurs from the surface of the wound, may sometimes be commanded by sprinkling the sore with starch, or finely powdered gum arabic: but when these do not succeed, a small silver canula being introduced into the urethra, and there secured by bandage, the discharge may be restrained by passing a narrow roller, moderately tight, upon the remaining parts.

It has been recommended by some, in order to avoid hemorrhagy, to remove the penis by making a ligature
around

around it; but it is taken off with much more ease and certainty by the scalpel. Others are so little apprehensive of hemorrhagy, that they advise us to trust entirely to compression for restraining it. I once saw a patient lose his life by following this plan*.

The wound should be dressed with lint, covered with starch, or powdered gum arabic, and a compress of linen, with a hole in it large enough to pass over the canula, being applied, the whole should be secured by the T bandage. The subsequent treatment must be similar to that of wounds in other parts.

Before proceeding to this operation, it should be known with certainty, whether the glans penis is really diseased; and when there is any doubt, the prepuce should be taken off to ascertain it.

When the frenum of the penis is so short as to produce uneasiness or pain on erection, it may with the utmost safety be divided by a pair of scissors; and after this is done, a piece of lint should be inserted between the lips of the wound to prevent their re-union.

It sometimes happens, that the urethra in male children terminates before it reaches the end of the penis. Sometimes there is no external opening; at other times, there is a small orifice at some distance from the extremity of the yard.

When there is no opening externally, if the urine is found to stop at a particular part, the introduction of a small trocar from the point of the yard, along the course that the urethra ought to take, until it meets with the urine, will always afford immediate relief; and by the use of small bougies the sides of the passage may be rendered callos, and an opening thus preserved. But when any open-
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* In two cases of amputation of the penis in the Pennsylvania hospital, a very trifling hemorrhage was easily restrained by dry lint, and moderate compression.

ing is discovered, whatever be its situation, if it affords a passage to the urine, the operation had better be delayed to a more advanced age, when a piece of flexible catheter can be introduced to preserve the opening made by the trocar.

C H A P. XIV.

Of the Stone.



S E C T. I.

General Remarks on urinary Calculi.

PARTICLES of stone have been formed in almost every cavity of the body, but they are most frequently met with in the urinary organs. A variety of causes may concur in producing this deposition of earthy matter from the blood or secretions.

1. If a greater quantity of earthy substance be taken into the circulating fluids than can be suspended by them, the superabundance must necessarily be separated; and the deposition will most readily take place in the bladder and kidneys, from the urine containing a greater proportion of earth than any of the other secretions.

2. There is reason to suppose that a long continued use of water, or of wines which contain a great quantity of earth, has a tendency to overcharge the circulating fluids with earthy matter.

3. A

3. A constant use of a great proportion of solid food seems to have a considerable effect in producing an accumulation of earthy matter in the fluids; and hence, in such cases, probably arises the benefit from directing a large use of diluting drinks.

4. A superabundance of earthy matter being once produced in the blood, various circumstances may concur to form depositions of it in the different cavities; of these, a sedentary life is one of the principal; and hence those who use least bodily exertion are most subject to calculous complaints. When they occur in poor labouring people, as they frequently do, they may with probability be attributed to their diet; the effects of which are too powerful to be obviated by exercise.

5. Whatever effects predisposition may have in occasioning calculi, the introduction of any substance that can serve as a nucleus, will almost certainly produce a stone, in whatever cavity it is lodged. Thus, a particle of sand, of blood or coagulable lymph, may, in consequence of spasm or inflammation, be confined in the pelvis of the kidney or bladder, and there acquire such a size, from the constant deposition of earthy matter, that it cannot be carried off by the urine; and afterwards, in a longer or shorter time, acquire a considerable size, according to the quantity of earth with which the urine is impregnated.

It is very doubtful, whether a stone is ever formed in the urinary passages without the intervention of a nucleus. Nuclei of various kinds, such as hairs, needles, musket and pistol bullets, pieces of bougies, and a variety of other articles, have been met with in the centre of urinary calculi; but particles of blood, or coagulable lymph, most frequently produce them.

By a difference of food at different periods of the disease; by the stone being formed slowly or more quickly; and perhaps by other causes not known, or not easily explainable

cable when known, it commonly happens that the different lamellæ of which calculi are composed vary considerably in colour and consistence; thus the external layer is frequently soft and friable, the next hard as marble, and the internal lamella as soft as dough.

Calculi that are hard, covered with spiculæ, or large, are usually productive of more bad symptoms than those that are soft, smooth, or small.

One of the first symptoms of urinary calculus, is an uneasy sensation at the end of the urethra, which, for some time, is only discovered on taking violent exercise, or immediately after voiding urine. This becomes by degrees more severe and frequent. There is a strong propensity to make urine frequently; and it is commonly voided in small quantities, perhaps drop by drop. When flowing in a full stream, it often stops suddenly, and particularly when there is much collected. Nor do the efforts of the patient answer any good purpose, unless he changes his posture: For as the obstruction proceeds from the stone bearing against the neck of the bladder and orifice of the urethra, nothing else but its removal from that situation will afford relief; and this is best effected by elevating the pelvis.

The urine is sometimes clear; but it is usually thick, and deposits a mucous sediment; and when the disease is in violent degree, it is sometimes tinged with blood. When the stone is large, a dull uneasy sensation is always experienced about the neck of the bladder; and the irritation produced by it frequently induces a very troublesome tenesmus.

All these symptoms are uniformly increased by exercise, particularly by riding on horseback:—from a long continuance of pain, and the want of rest which constantly is induced, the patient's general health becomes much impaired; and unless the cause of the disease is now removed, his misery is, in general, only terminated by death.

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The existence of calculus can only be rendered certain by the patient's passing small stones or fragments of stones with the urine, or by feeling the stone in the bladder by the intervention of a sound: because all the abovementioned symptoms may originate from a tumor or ulcer in the bladder, or from tumors pressing on the neck of the bladder. However there will, in general, be great reason to suppose it when all or most of the phenomena described occur.

The sound also affords us, in many instances, the only means of determining whether the calculus be seated in the bladder, ureter, or kidney. For although a stone in the pelvis renis usually produces symptoms which do not in common attend vesical calculus, such as pain in the back, frequent nausea, retching and vomiting, yet these are not such invariable concomitants as to afford any certain characteristic.

S E C T. II.

Of sounding or searching for the Stone.*

THE operation of sounding is thus to be performed:—the patient being laid upon a bed, with his thighs somewhat elevated, the surgeon is to grasp the penis with the left hand, and then introducing the sound (pl. iii. fig. 3). previously warmed and oiled, into the urethra, with the concave side towards the abdomen, he must push it gently forward with his right hand, while he draws the penis on the instrument with his left.

When the sound is carried a sufficient length, it will commonly slip easily into the bladder; but now and then

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* The instrument termed a catheter, and by means of which it is sometimes necessary to evacuate the urine, is used exactly in the mode here directed for the introduction of the sound.

some difficulty is experienced in passing through that part of the urethra which is surrounded by the prostate gland; when the instrument stops here, we should not attempt to force it forward, as it may thus be made to penetrate thro' the urethra; but the fore finger of the left hand, well oiled, should be introduced into the rectum, which by elevating the staff at the same time that it is gently pushed onward, will commonly procure its easy entrance into the bladder. Depressing the handle of the sound will sometimes answer the purpose, but the above described mode is usually more effectual.

This is sometimes a difficult operation, and it requires frequent performance to execute it with dexterity: an expert surgeon however will seldom fail in it, if the parts are not much affected with inflammation, swelling, or ulceration.

The staff, when entered into the bladder, is to be gently moved about with one hand, in order to make it touch the stone. When the calculus is small, it may lie near the neck of the bladder in such a manner as to suffer the sound to pass over it; when this is suspected, a finger should be introduced into the rectum to alter its situation. If this should not succeed, the patient should be put into a variety of postures until the stone can be felt. The best position, in general, is to have the pelvis elevated above the trunk and head: by this, if the stone is not contained in a cyst, which rarely happens, it may commonly be moved to the fundus vesicæ.

The operation should be repeated several times when there is room to suspect a calculus, and it is not discovered by the first attempt.

The sensation communicated to the operator when a stone strikes the staff is so peculiar, that an attentive and experienced surgeon can never be deceived in it; but, in some instances,

instances, a hardened state of the bladder has unfortunately been mistaken for a stone.

S E C T. III.

General Remarks on the Operation of Lithotomy.

THE presence of a stone in the bladder being ascertained, the means to be employed for the patient's relief is the next object of consideration.

Although lime-water, diluted caustic alkali, and some other articles have, in particular instances, mitigated the pain, and lessened the frequency of paroxysms; yet there has not been one case well authenticated, in which the stone in the bladder has been dissolved by the use of any remedy whatever.

As all lithontriptics are liable to material changes in their passage from the stomach to the bladder, it has been proposed to inject such substances into the bladder, and thus bring them into immediate contact with the stone. But it has been found by various experiments, that no substance powerful enough to have any effect upon a stone, can be thus injected, without the greatest hazard of injuring the bladder very materially.

From what has been said, it appears that no hopes can be reasonably entertained of the removal of a calculus, but by a surgical operation.

Although a great proportion of those who are cut for the stone recover, yet a considerable degree of danger always attends the operation. Children appear to recover more readily from its effects than adults; and it is likewise observed, that old people from the fifty-fifth to the seventieth year, whose constitutions have not been much broken, run less risk than men in the full vigour of life.

This

This seems to arise from inflammatory symptoms being then less apt to supervene; for from these the chief danger of the operation is produced. But at whatever period of life the patient may be, the event will be favourable or otherwise according to the general health, and degree or continuance of the topical affection.

If the bladder has even become ulcerated, and the patient is young, and his general health is so good that we need not be apprehensive of the effects of the hemorrhagy, the operation may be tried; but if, on the contrary, together with an ulcer in the bladder, the patient is advanced in life and infirm, we should advise the palliatives, a free use of mucilaginous drinks, the warm-bath and opium, and avoid the operation; as it would most probably, in such circumstances, be fatal.

There have been various modes of performing the operation of lithotomy used at different times, and in different places. In performing it by the *lesser apparatus*, or cutting on the *gripe*, the finger is introduced into the rectum, and the stone pushed by it towards the perinæum; an incision is then made immediately on the tumor formed by it into the bladder, and the stone removed. This was the only mode in use from the time of Hippocrates to the beginning of the fifteenth century; when Johannes de Romanis proposed the operation by *the greater apparatus*, which was performed nearly in the manner of the lateral operation, except that a blunt gorget, or some other instrument was used, by which the parts were directed to be dilated for the passage of the stone; but it always happened that they were much torn. The inconveniences that were found to attend this method, suggested the idea of cutting into the bladder immediately above the os pubis. This was first practised by Franco, a French surgeon, who published an account of it in 1561. It has been termed the

the *high operation*; and was much used in many parts of Europe till near 1730.

As all these methods of operation have been by experience found much more objectionable than the *lateral operation*, they have for many years past given place to it almost universally*.

S E C T. IV.

Of the Lateral Operation.

THIS operation was invented by Frere Jaques, a French ecclesiastic, about the year 1697. Since that time it has undergone various alterations.—We shall describe it in its most improved form.

In order to prevent the patient from going to stool soon after the operation, the bowels ought to be well emptied by a laxative given the preceding day; and a clyster should be exhibited a few hours before the operation, with a view to evacuate entirely the contents of the rectum.—As the bladder, when in a collapsed state, is liable to be cut in different places, the patient ought to drink plentifully of some diluting liquor, and to retain his urine for some hours before he is laid upon the table; and when the urine cannot be retained voluntarily, it will be proper to use a slight compression on the penis.

The perinæum and parts about the anus being shaved, the patient is now to be laid upon a table of convenient height firmly fixed, and there well secured in the following manner: Let a noose be formed in the double of a piece of broad strong tape about three feet in length; the patient's wrist being introduced at this noose, he

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* For this reason, it is thought unnecessary to enter into a particular detail respecting them in this work.

ought then to take a firm hold of the outside of the ankle of the same side, when, by different turns of the tape around the hand, ankle and foot, they are to be well secured together; and the hand and foot of the other side are afterwards to be tied in the same manner.

The operator must now introduce a grooved staff, (plate iii. fig. 2.) of a proper size; and the stone being again distinctly felt, not only by the surgeon, but by the assistants also, the patient must then be put into the posture in which he is to be kept during the remainder of the operation. A pillow, for convenience, may be placed under his head; and in order to elevate the pelvis considerably above the abdomen, two pillows at least, should be laid under the buttocks, which ought to project an inch or two over the end of the table. By observing this direction, we give less chance of injuring the bladder in several places, and more particularly if it should not be distended during the operation.

There should be an assistant on each side, to secure the arms and legs of the patient; one must prevent him from moving the upper part of his body, another must manage the staff, and a fifth will be necessary to hand the instruments to the operator.

The surgeon, after having again felt the stone with the staff, is now to make the handle of it pass over the right groin of the patient, so that the instrument may be felt on the left side of the perinæum; and in this position it ought to be preserved by the assistant, who with his right hand should hold the handle of the staff, while with his left he elevates and supports the scrotum.

The thighs of the patient being sufficiently separated by the assistants; and the surgeon being seated between the patient and the window, in such a manner as to make the light fall directly upon the parts to be cut, an incision is now to be made through the skin and cellular substance,

stance, at least four inches in length in a full grown person, and proportionably less in smaller people; beginning a little to the left side of the rapha, about an inch from the termination of the scrotum, and proceeding in an oblique direction along the perinæum, between the tuberosity of the ischium and the anus, until it is extended at least an inch beyond the latter. This should be done by one stroke of the scalpel: by a continuation of the incision, the erector penis, accelerator urinæ, the transversalis perinæi, and levator ani, are also to be divided. If in making this incision any considerable vessel should be cut, and especially if the patient is much weakened, it should be immediately tied.

It is to be particularly observed, that the easy extraction of the stone, and tying of arteries that may be cut, depends very much on these incisions being very freely made.

The operator is now to search for the staff with the fore-finger of the left hand; and having found it, he is to push his finger along the course of it till he passes the bulb of the urethra, when, with the edge of his knife turned towards the groove of the staff, he is to divide the membranous part in its whole course, from the bulb to the prostate gland, by one cut of the scalpel; and as the finger is made use of as a director, and kept between the rectum and the knife, the gut is thus preserved from injury, and the incision made with perfect safety. A division of the bulb of the urethra, as commonly directed, is never necessary, and is almost always succeeded by considerable hemorrhagy, and the formation of sinuses.

The prostate gland, which may be evidently discovered by the finger, is next to be divided. This may be done by an expert surgeon with a lateral stroke of the scalpel; but as in the hands of common operators, the rectum might be frequently wounded by the knife, it will be best to employ the cutting gorget (pl. iv. fig. 3.) as commonly directed

directed, or what I consider as superior to this, a *cutting director**, (pl. v. fig. 4, 5.) In using these, the nail of the index of the left hand ought to serve as a conductor to the beak of the gorget or director; which being introduced into the groove of the staff, the surgeon is now to rise from his seat, take that instrument from the assistant; and having raised it so as to form nearly a right angle with the body of the patient, he must, with his left hand, hold it firm in this situation; while, with his right, he pushes on the director, taking great care that the point be kept in the groove of the staff, till it has passed freely into the bladder; a circumstance which is evidenced by the urine rushing freely out at the wound.

The staff is now to be withdrawn, and the finger to be introduced, in order, if possible, to discover the situation of the stone; a pair of forceps (pl. iv. fig. 1, 4.) is then to be carried along the gorget or director into the bladder, and the latter is then to be taken out slowly, and in the same direction in which it was entered, lest any part might be cut unnecessarily.

If the stone has been previously discovered by the finger, it is commonly easily laid hold of with the forceps; but when its situation is not known, it is often difficult to meet with it. The forceps must necessarily be introduced shut; but as soon as they have entered the bladder, they should

* Mr. Bell says, that his *cutting director*, from expanding more in the cutting part, divides the prostate gland, &c. much better and more freely than the gorget; and from being more contracted in the blunt part, gives less chance of injuring the urethra, by bruising or lacerating it—But the contusion or laceration of the urethra or bladder is not occasioned by the blunt part of the gorget, but by the extraction of the stone, particularly when it is large; in which case, an enlargement of the wound with the scalpel, upon the stone, is perhaps preferable to breaking it with the forceps. Mr. Bell's cutting director does not appear to possess as much certainty in its direction and management as Mr. Hawkin's cutting gorget; and still wants the test of more general experience to recommend it.

should be gradually opened, and there moved about in various directions, until the stone can be laid hold of. When the calculus is small and difficult to find, it is most frequently concealed in the lower part of the bladder near its neck; in this case it may be brought within reach of the forceps by introducing the finger into the rectum, and thus elevating this part of the bladder.*

When the stone is got within the forceps, the operator should introduce his finger, to discover whether it is properly fixed; and if he finds that a stone of any considerable length is laid hold of in such a manner as to make its longest diameter press transversely with respect to the opening in the bladder, it should be turned with the finger; or if this cannot be done, it should be suffered to slip out of the instrument, and again be laid hold of, if possible, in a more favourable position. The surgeon should then gradually extract it; having his right hand firmly fixed on the extremity of the handles of the forceps, and the

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* Mr. Bell tells us that when much difficulty occurs in discovering a stone, it has been alledged that it is often contained in a cyst;—he acknowledges that the stone is often covered with coagulable lymph, which gives the appearance of a cyst or bag, but says we are unacquainted with any process by which an adhesion can be produced between the stone and bladder; and that dissection has never discovered one well authenticated instance of this kind. But the following case would seem to render this opinion somewhat doubtful.

A boy about sixteen years of age had suffered the severest symptoms of the stone for several years, has been frequently sounded by many gentlemen of the profession, but no stone could be felt; at length it was slightly touched by one of them. The operation was then determined on, and when the operator had introduced his forceps into the bladder, no stone could be found; upon which he introduced the fore-finger of his left hand into the bladder, and was enabled to feel a small portion of the stone thro' an orifice of an apparent cyst in which it was contained; then carrying the cutting gorget upon his finger as a director, introduced the beak into the orifice, dilated the cyst, and turned the stone into the common cavity of the bladder, when it was readily laid hold of, and extracted.

left near to the common axis, and making the pressure almost downwards, in the course of the wound, because he will thus meet with less resistance, and do less injury, than by pressing in all directions as we are commonly advised.

When there is considerable resistance to the passage of the stone, the state of the divided parts should be examined; and if any part of the muscles which should have been cut are still found entire, they should be immediately laid open with the scalpel, while the forceps is held firmly in the left hand.

As the risk of this operation is in a great measure proportioned to the size of the stone, it would perhaps be advisable, whenever this is so great as to endanger much injury to the parts through which it is to be extracted, to endeavour to break it with the forceps already introduced, or with a pair with very large teeth and a screw. When this is done, all the fragments must be carefully removed by the forceps or scoop, or by injecting large quantities of warm water.

When a stone is extracted with a smooth polished surface, it is commonly supposed that there are others remaining in the bladder, and *é contra*; but no dependance can be placed on this; and therefore, as soon as one stone is extracted, the operator ought to search first with his finger, and afterwards with the forceps, or what is better, the searcher,* as long as any stones are to be discovered.

The hemorrhagy from the urethra and bladder should not, in general, be restrained, until the stones are all extracted, as it tends to prevent inflammatory symptoms; when this is accomplished, ligatures may commonly be made on the arteries, but if this cannot be accomplished, a large canula, (pl. v. fig. 2.) covered with linen, will usually answer to compress them. But sometimes it happens,
that

* An instrument in the form of a sound, except that it is made gradually somewhat larger from the beginning of the curvature to the end.

that notwithstanding every precaution, some of the deeper seated vessels will continue to pour out blood, which collects in the bladder in great quantities. In these cases, as much as possible should be taken out with a scoop, (pl. iv. fig. 2.) and warm water then injected to remove the remainder. In some instances, when this has not been done, the bladder has by degrees become filled by a bloody coagulum, which has prevented the secretion of urine, and at length occasioned death. In order to prevent such an unfortunate occurrence as much as possible, the patient should, immediately after the operation, be placed with the pelvis low, so as to keep the wound in a depending situation.

As soon as the hemorrhagy has ceased, the patient should be untied, and a piece of soft lint being inserted between the lips of the wound, the thighs should be laid together, and the patient carried to bed; when a large dose of opium should be given to him.

When the stone has been easily extracted, the patient remains tolerably free from pain, and frequently procures some sleep during the first three or four hours after the operation; but when the stone has been large, and with difficulty extracted, a severe pain in the lower part of the abdomen often supervenes in an hour or two. This is sometimes easily removed by fomentations and anodyne clysters: but, in other cases, it increases constantly, and when with this, a hardness and swelling of the abdomen occur, fulness and quickness of pulse, which go on to be augmented, much danger is to be apprehended. As these symptoms originate from inflammation, bleeding, clysters, warm flannels or bladders of warm water to the abdomen, should be used freely, according to circumstances; and particular benefit is often derived from the *femicupium*.

These remedies, together with opiates, low diet, and diluent drinks, will frequently remove very alarming symptoms: but in some instances, notwithstanding every thing that

that is used, the pain and tension of the abdomen increase; the wound has an unfavourable appearance; the feverish symptoms augment; and death at length closes the scene.

When the case terminates happily, the wound by degrees acquires a healthy aspect; the urine in some instances passes by the urethra from the beginning; but in most cases, it comes away by the wound for the first two or three weeks; the pain in the abdomen gradually abates; and the feverish appearances are in a short time entirely removed.

The cure is perfected in a longer or shorter period according to the circumstances of the patient's health. In a few cases of young healthy boys, I have known the wound cicatrised in less than three weeks; but in others, this is not accomplished till the sixth, seventh, or eighth week. In some instances again, although a great part of the wound is healed readily enough, yet a small opening is left, at which the urine continues to be discharged, and which at length becomes fistulous; this cannot be relieved but by another operation. The prevention of such an occurrence depends very much on a proper dressing of the wound. The dressings should be light, and care should be taken that the sore heals properly from the bottom.

In order to prevent a troublesome excoriation of the buttocks,* which is apt to be occasioned by the constant passage of the urine over them, they should be frequently washed with brandy, or with lime-water.

In patients of a weak habit, an incontinence of urine is apt to succeed to this operation; this commonly goes off upon a recovery of the former strength; which will be much aided by a use of the cold bath, of Peruvian bark, and of a nourishing diet. As palliatives for incontinence of urine, a jugum for compressing the urethra, and a receptacle for the

* This will be effectually prevented by cleansing the parts with a soft sponge dipped in milk and water, and anointing them with cream two or three times a day, changing the under sheet at every dressing.

the urine, properly fitted to the penis, and constantly worn, will be found very useful.

Women, from the shortness of the urethra in them, are much less liable to the stone than men, and when it does occur, and an operation becomes necessary, it is much more easily performed. From the peculiar conformation of the female, it cannot be executed in the manner we have directed for males.

The best mode of performing lithotomy in women is as follows:—the patient being placed on a table, and secured in the manner already directed, a female grooved staff is to be passed through the urethra into the bladder; and the operator keeping it firm with his left hand, is with his right to introduce the beak of the cutting director or gorget into the groove, and to run it carefully along till it has entered the bladder. He should now introduce his finger upon the director; and having discovered the stone, he should proceed to extract it in the manner we have already recommended.

Instead of cutting, it was formerly the practice to attempt a dilatation of the urethra; but by the instruments used, and by the passage of the calculus, the parts were so lacerated, that an enuresis was commonly consequent to the operation. It has also been proposed to cut into the bladder from the vagina; but in this mode parts are injured which by the other method may be avoided; the stone is in many cases with difficulty discovered, and is not easily extracted: fistulous fores are very apt to be produced; and a cicatrix is occasioned which might be productive of pain, obstruction, and perhaps laceration in delivery, should the patient afterwards become pregnant. Most of these inconveniences are entirely avoided by the method above advised.

Although the lateral operation is in general to be preferred to any other mode hitherto proposed, yet in cases where
the

the stone is known to be of a very large size,* I should undoubtedly advise the *high* operation, provided the patient was of a proper age, i. e. below thirty; for it has universally happened that those above this age have died, when the lateral method has been employed. This preference arises solely from the greater ease in extracting the stone; which is a circumstance of the utmost consequence; for it appears from observation, that when the stone is very large, e. g. above 8 oz. in weight, the proportion of deaths from the lateral operation, is about 1 to 10; whereas when the stone is small, not above 1 in 20 die from its effects.

Monf. Louis proposes as an improvement on the common method of performing the lateral operation, to cut the bladder itself, with an instrument adapted to the purpose, after the external incision, and avoid opening the urethra, or prostate gland. This is said to prevent incontinence of urine, and other troublesome consequences which often ensue from the operation executed in the common way. But it is evident, that this method must frequently produce troublesome fistulous sores in the contiguous parts, on account of the opening in the bladder receding from that of the external parts, and thus permitting the insinuation of the urine among them.

Frere Cosme advises the substitution of an instrument of his own invention (pl. v. fig. 1). to the gorget, for the division of the internal parts. In using it, after the staff is laid bare in the usual manner, the beak of the instrument, or lithotome caché, as he terms it, is to be introduced into the groove, and being pushed forward till it reaches the bladder, the spring is then to be pressed down, so as to raise the knife from its sheath, when the operation is to be finished by withdrawing the instrument in such a direction,

* Which may be determined by, or at least inferred from, the long continuance of the disease; the sense of weight about the neck of the bladder; and particularly from the touch of the finger in ano. B.

rection, as may divide the neck of the bladder and prostate gland, in the same manner as by the gorget: after this the operation is to be finished in the usual way, by the introduction of the forceps, &c.

The most material objection to this instrument is, that by it more of the bladder may be injured than ought to be cut: for as it must be introduced far into that organ before it is expanded, we will be very apt to wound the side, or even the fundus of it. And we can never with any certainty determine the extent of the incision that will be made; and thus if in withdrawing it, it is made to press in any degree more to one side than the other, very different parts may be cut in different cases.*

S E C T. V.

Of Nephrotomy.

CALCULI in the kidneys always produce such a train of distressing symptoms, not to be removed by internal remedies, that some surgeons have proposed making an incision down to them, in order to effect their removal. But the impossibility of ascertaining the presence of stones in these parts, and the danger and difficulty of the operation, ought to deter us from ever attempting it. It is only in cases where the calculus has produced an inflammation terminating in abscess which points externally, that an incision can be made with propriety: in such instances, the tumor may be safely opened as soon as a fluctuation is perceptible, and the stone extracted, if it is not then discharged with the pus and urine. The ulcer is afterwards to be treated
in

* The same objection appears to be applicable to Mr. Bell's cutting director, and will continue unless that instrument acquires a sanction by future experience.

in the usual way—it is apt in some instances to become fistulous.

S E C T. VI.

Of Stones in the Urethra.

IN calculous complaints stones are often passed with the urine; and when they are pretty large and rough, they frequently lodge in the urethra, and produce pain, inflammation and swelling of the parts, and always a partial, and often a total suppression of urine. In some instances, when the disease is long neglected, this suppression and consequent tumor, terminate in a rupture of the urethra; to which succeeds a diffusion of the urine into the cellular substance of the penis, scrotum, and perinæum.

When the symptoms are not very violent indeed, blood-letting, general or topical, according to circumstances should be used; warm oil should be injected frequently into the urethra; the patient should be immersed in a warm bath; a full dose of laudanum should be given to him, in order to remove the spasmodic contractions of the urethra, which often very much impede the passage of the stone: And the patient should carefully avoid taking any thing which will increase the quantity of the urine; as this will probably in most cases augment all the symptoms.

As soon as by the use of the above remedies there is reason to suppose a relaxation is produced, the surgeon should endeavour, by gentle pressure, to push the stone forward along the course of the urethra: But no instruments should be used to extract it; for these often do injury by irritating the membrane of the urethra.

When

When a suppression of urine is induced, it becomes necessary to have recourse to an operation, as soon as the means above recommended are found ineffectual. If the discharge of urine is practicable, from the urethra not being entirely filled by the stone, the patient is sometimes induced to let it remain from dread of the operation. In such cases, the calculus often acquires, in a short time, a great increase of size by the deposition of earth from the urine.

When calculi in the urethra are to be removed by an operation, this is performed by cutting directly upon them, and taking them out with a scoop, or forceps; but the method of doing this must vary according to the situation of the stone.

If the stone is fixed in the canal near the bladder, it has been advised to push it back into the bladder by a staff; but as it might there acquire a larger size, and render lithotomy afterwards necessary, it is much more eligible to extract it. In doing this, the patient should be secured on a table in the manner directed for lithotomy; and an assistant suspending the scrotum and penis, the surgeon, after oiling the first and second fingers of his left hand, should introduce them into the anus, and with them press firmly on the parts immediately behind the stone; an incision is then to be made through the teguments and urethra down to the stone, which should be removed by the pressure of the fingers behind it, or by the forceps or scoop. The after treatment must be similar to that of lithotomy.

When a stone is fixed farther forward in the urethra, the skin should be drawn as much as possible past it, either backward or forward; and the stone being then secured by pressure, a longitudinal incision should be made upon it through the urethra, sufficiently large to admit of its easy extraction by the forceps or scoop. The edges of the wound are afterwards to be entirely cleared of fabulous

matter, and the skin allowed to regain its former situation; by this means the wound in the urethra will be entirely covered by skin that has not been injured, and it will usually heal by the first intention. If, however, any urine should escape into the cellular substance through the fore, it must be let out by an incision.

When the stone is so near the end of the penis as to be seen, it may often be removed by a small pair of forceps; and this may be facilitated, when necessary, by dilatation of the urethra from its extremity. But when this fails, an incision must be made, as before directed. Soft dressings should be used; and when the wound is nearly healed, a hollow bougie, a short silver tube, or a small catheter of elastic gum, should be introduced into the urethra, in order to preserve its proper size.

The most unfavourable situation in the urethra for a calculus is just below the scrotum; for if it makes its way into the scrotum, or it is necessary to make an incision upon it, large and troublesome collections of urine are very apt to be produced: as soon, therefore, as it is discovered in this situation, it should, if possible, be pushed farther forward or backward: but if these should both be impracticable, we ought to begin the incision at the under part of the scrotum, immediately on one side of the septum, and continue it upwards till the stone is distinctly felt, when it is to be laid bare, and extracted in the manner already directed. This manner of making the incision gives a free passage to the urine that escapes from the urethra, and renders the extraction of the calculus easy. During the operation an assistant should keep the testis out of the way; and care should be afterwards taken that the wound heals from the bottom.

When urine continues to be discharged by a preternatural opening of the urethra, for any length of time, if the calculous diathesis remains, stones of a large size will frequently

quently form in the cellular substance contiguous to the opening; they should be removed by incision, the forceps, and scoop, and the wound then carefully healed from the bottom.

In females, stones seldom become fixed in the urethra; when they do, they are commonly easily removed by insinuating the end of a blunt probe behind them, and then pulling it forward; or when this does not succeed, it may be effected with safety by cutting open the extremity of the urethra, so as to admit a pair of forceps to extract the stone.

C H A P. XV.

*Of Incontinence of Urine.**

THE usual causes of this disease may be reduced to the following heads.

1. Irritation about the neck of the bladder, produced by the friction of stones contained in it. Hence it is frequently a symptom of calculus; and is entirely relieved by lithotomy. When this is not to be employed, it is often considerably alleviated by remedies which diminish the irritability of the bladder; particularly by a free use of mucilaginous drinks, and of opiates.

2. Paralytic affections. In these cases it is often only a part of general disease; the sphincter appearing to lose

* Enuresis.

lose its power of contraction entirely, while the detrusor urinæ or muscular coat of the bladder retains its full vigour. The remedies to be here employed are tonics, particularly peruvian bark, chalybeates, and the cold bath.—But the application of cold, by dashing water on the perinæum and anus, is the most effectual remedy. Cloths wet with vinegar and water, or solution of sacch. saturni, have also been of use.

3. Laceration in the operation of lithotomy, and in delivery. In these cases the same remedies as were directed where the disease is the consequence of palsy, are to be employed, and frequently remove the complaint.

But, in many instances, in all the varieties of incontinence of urine, it happens that no cure can be obtained. In such, all we can do is, to prevent the urine from incommoding the patient as much as possible.

When the disease originates from palsy or laceration, compression of the urethra by the jugum or yoke, (pl. xi. fig. 2.) answers this purpose very effectually. For women, pessaries of sponge may be employed; but if the irritability of the parts do not admit of these, pessaries of ivory or any solid wood, made very smooth and oiled, should be placed across in the vagina.

When the incontinence proceeds from irritation about the neck of the bladder, these instruments cannot be used: In such cases, all that can be done is to fit a convenient reservoir for the urine to the penis in men, (such as in pl. xi. fig. 1.) and to apply sponge and soft linen, to absorb it in women.

C H A P. XVI.

*Of a Suppression of Urine.**

AN impediment to the evacuation of urine from the bladder, constitutes a very alarming, and generally very painful disease. It may originate;

1. In paralysis, and particularly paraplegia, from the body of the bladder losing its power of contraction, while that of the sphincter is retained. It is also thus frequently induced from a too long continued and voluntary retention of the urine. In these cases, the introduction of the catheter, (pl. v. fig. 3.) which is similar to the operation of sounding†, proves commonly a certain remedy; and when the complaint is produced in the manner last described, it will contribute much to a permanent cure to use the catheter constantly, as soon as an inclination is felt to discharge the water collected.

2. From the uterus, in the last months of pregnancy, pressing upon the neck of the bladder. In such cases, as the catheter is very easily introduced in females, in order to prevent an over-distension of its coats or a rupture of them, it will be proper to use it constantly when any difficulty in voiding urine occurs.

Tumors in the vagina and neighbouring parts, when large often compress the urethra likewise in such a manner as to induce a suppression of urine; it is also a frequent consequence of prolapsus uteri. Until the removal of these
causes;

* Ischuria.

† Chap. XIV. Sect. II.

causes, the catheter should be employed occasionally as a palliative. When it is advisable to let a catheter remain in the urethra constantly, as those of silver give a great deal of irritation, we should always employ the catheters made of the *elastic resin or gum*.

3. From schirrosities of the prostate gland, obstructions in the urethra from gonorrhœa, and stones impacted in the urethra. The latter cases have been already treated of, and the former will be the subjects of a chapter hereafter.

4. From inflammation about the neck of the bladder. When this arrives to such a degree as to prevent the introduction of the catheter, it constitutes the most alarming variety of this complaint.

This species often arises from a communication of inflammation from the urethra, in cases of gonorrhœa, produced by the improper use of astringent injections in that disease. It may also originate from the general causes of inflammation.

The treatment should consist in general bleeding; the application of leeches to the perinæum; the large use of opiates; the frequent employment of clysters of warm milk or water; and the general use of the warm-bath.

When all these remedies fail, and the introduction of the catheter is impossible, we have no means of relief left but puncturing the bladder.

There have been several modes of effecting this proposed. Mr. Sharpe, and others, advise the bladder to be perforated above the os pubis; this may be done with a common trocar, and with most propriety about an inch or an inch and a half above the symphysis pubis. As soon as the stillette has entered the bladder, it should be withdrawn and the canula should be suffered to remain in the opening, and be there secured by a ribband or tape carried around the body.

dy. It must be stopped by a piece of cork, that the urine may be evacuated only at proper intervals.

The length of the canula should be particularly attended to, lest it should injure some of the contents of the pelvis; in fat people it may be two inches long; but in others not more than an inch and an half.

The bladder is more easily punctured from the perinæum than above the pubes; the urine is more readily evacuated; and there is less danger of the canula slipping out of it and injuring the parts adjacent: and hence I am perfectly of opinion that this mode should be preferred.

In performing this operation, the patient should be laid upon his back, and his thighs being properly separated and secured by assistants, an incision of an inch and an half in length, beginning at the commencement of the membranous part of the urethra, and continued towards the anus, parallel to the raphe, and half an inch from it, should be made through the skin and cellular substance. The trocar should then be pushed into the bladder, a little above and to the left of the prostate gland, and if the point of the instrument is somewhat raised, there will be no danger of wounding the uterus or vasa deferentia. In order to know when the trocar has reached the bladder, there should be a groove in the stillette to admit of an immediate discharge of urine.

As soon as the urine is evacuated, the canula should be secured in the wound by tapes, or a ribband connected with it, and a bandage passed around the body.

Whether the puncture is made above the pubes, or in the perinæum, it will be proper to withdraw the canula once in two or three days, in order to clean off the fabulous matter that will collect on it, and which might, if it was suffered to be deposited in considerable quantity, pre-

vent the canula from being easily removed. The canula should remain till the urine can be evacuated by the urethra.

It has been advised lately, to puncture the bladder through the rectum; but as this would give considerable risk of wounding the ureters, vasa deferentia, or vesiculae feminales, and might afford a passage of faeces into the bladder, it should certainly never be employed.

When it becomes necessary to puncture the bladder in women, it can be performed always with most ease and certainty from the vagina. In doing it, the fore-finger of the left hand should serve as a director to the trocar, and the perforation should be made in the part first felt, in order to avoid the ureters. The canula is to be left in the wound as long as the cause of the suppression exists, and should be long enough to pass out of the vagina, to be there secured by tapes connected to the T bandage.

C H A P. XVII.

Of Obstructions in the Urethra.

OBSTRUCTIONS in the urethra are most frequently the consequence of gonorrhœa, and consist;

1. In caruncles or fleshy excrescences from the membrane lining the urethra. These, according to my observation, are similar to those warty excrescences which so often appear on the glans and prepuce as a consequence of gonorrhœa and generally accompany them.—I have never found them farther up the canal than half an inch from

from its extremity : Mr. Daran says he has often seen them in every part of the urethra ; but it is evident that he confounds them with the other causes of obstruction.

2. In ulcers and cicatrices from ulcers. Ulcers are certainly produced in the urethra in some cases of gonorrhæa. These originate, in many instances, from inflammation ; but in others merely from the mechanical effects of the poison. I have seldom found them more than an inch or two from the end of the penis.

3. In a contracted state of the urethra. Although this may usually be the consequence of ulceration, yet there is every probability that it may be produced solely from inflammation thickening the parts it affects. Astringent injections, improperly used, may sometimes be considered as the cause of this species of stricture.

4. In a total or partial obliteration of the canal, from the pressure of tumors formed either in the cellular substance of the urethra, or in the glands connected with it. This may be the consequence of inflammation from any cause ; and when inflammation terminates in suppuration, the obstruction is usually removed by the discharge of matter ; but when this does not take place, and the swelling is of long continuance, the opposite sides of the urethra become connected, and produce a total suppression of urine, unless, which indeed commonly happens, preternatural openings are formed by the force of the urine.

5. In an enlargement of the corpus spongiosum urethræ. This fulness or thickening is perhaps the most frequent cause of obstruction, and it has proceeded to such a degree, in some cases, as entirely to prevent the passage of the urine. It sometimes is confined to a particular spot ; in other instances it extends a considerable distance ; and in some others it attacks different parts of the canal.

When obstructions of the urethra arise from causes enumerated under the fourth head, the treatment must be

directed by the particular nature of the tumor or tumors. When they are indolent or schirrous, and do not penetrate deep, they may be extirpated; but when the prostate gland, or any of the parts about the neck of the bladder are affected with schirrus or ulceration, we can only attempt a cure by internal remedies. Of these, cicuta has been much used, but seldom with advantage.

In cases of ulceration, uva ursi has been found to give relief; but a long continued and gentle course of mercury gives the greatest prospect of benefit. In the mean time, mucilaginous drinks and opiates must be freely used as palliatives. When the tumors are inflammatory, if they cannot be dissolved, they should be brought to suppuration as speedily as possible, and as soon as a fluctuation of fluid is perceived in them, they should be opened.

If on discharging the matter, the obstruction is not entirely removed, a bougie or flexible catheter should be introduced, and allowed to remain several hours every day until the passage is entirely cleared.

When the urine, from its obstructed flow by the urethra, forms openings from it through the perinæum and other contiguous parts, it produces a very distressing complaint. This will be considered in the next chapter.

In all the other cases of stricture we have enumerated, if the venereal disease subsists in the habit, it must be removed by mercury, at the same time that we pay attention to the topical affection. As all of them operate by inducing a diminished capacity or contracted state of the urethra, bougies, which by their pressure tend to remove this, are our principal remedies. Independent of their mechanical power, it is supposed by many that the good effects of these are, in a great measure, to be attributed to a suppuration excited by their irritation on the diseased parts; and hence they have been often composed of stimulating ingredients. But I am of opinion that this is not the case; because

because caruncles, which are supposed to exist commonly when bougies are found serviceable, do not in fact occur in more than once in ten such cases, and when they do exist, they are commonly of a warty nature, and consequently not likely to be removed by suppuration; and because their effects may readily be accounted for from their pressure only.

It must be evident that in general medicated bougies should therefore be discarded from use; because the irritating ingredients of which they are composed, must probably often do injury to the urethra.

Bougies should be formed of mild ingredients, and made very smooth; and great care should be taken to have them of a proper consistence. If made too hard they are apt to crack, and cannot be introduced or retained with ease; and if too soft they do not give a sufficient degree of pressure.

The best composition for bougies, that I know of, is as follows :

R. Emplast. Diachyl. Simpl.	ʒiv.
Ceræ puriss.	ʒifs.
Ol. Olivar. opt.	ʒiii.

The diachylon should be slowly melted, and the wax being melted in the oil in a different vessel, they should then be mixed; and while the mixture is tolerably warm, let pieces of fine old linen be dipt in it; care being taken, by means of a spatula, to cover the whole linen equally, and to make the plaster as smooth as possible.

As soon as the cloth is sufficiently cold, it may be cut with a sharp pointed knife directed by a ruler, into pieces from nine to eleven inches in length, and somewhat wider at one end than the other, for the formation of the bougies. They should be made of different widths; the middle-sized bougies will be formed by slips of about five-eighths of an inch broad at the largest end. On account of the facility of introduction it will be necessary to make them taper

taper more or less, from about two or three inches from the smaller extremity.

The strips of linen are to be rolled up as firmly and neatly as possible by the fingers; and in order to give them a smooth polished surface, they should be rolled for some time between a piece of smooth hard wood, and a plate of finely polished marble, and the points being rounded, they are then fit for use.

In the application of the bougie, one adapted to the size of the passage being selected, it should be well oiled, and the penis being firmly grasped and extended with one hand, the point is to be inserted into the urethra with the other, and pushed forward with caution until it meets with the obstruction; the bougie should be pressed beyond this, if a moderate force will accomplish it; if not, it should be withdrawn, and one with a smaller point used the following day.

By repeated cautious trials, bougies may perhaps, in every instance, be passed; but in using them, whenever the points yield in any degree, they should be immediately withdrawn, as they will not then go forward, and their extraction may be rendered painful if they become twisted.

Catgut alone, smoothed by rubbing on marble, or with the composition abovementioned, forms bougies of a sufficient degree of firmness for common purposes.

In order to prevent bougies from slipping into the urethra, or bladder, they should be tied by a piece of soft thread or tape to the penis, or to a bandage passed around the body.

The length of time they should be suffered to remain in the urethra, must be entirely regulated by the degree of pain or uneasiness they occasion; when this is considerable, they should not be allowed to remain long, nor be employed oftener perhaps than once in two or three days; in this case they ought not to be used but when the patient

can confine himself to his bed, or at least to his apartment: but when they give little or no pain, they should be worn as constantly as possible. The bougie should be gradually increased in size until it fills the whole urethra; and they should be used for a considerable time after the difficulty in passing water goes off entirely. Great care should be taken that they never pass into the bladder, as a part of them might fall off, and form the basis of a stone. When the obstruction is seated very near to the bladder, a catheter should always be made use of instead of a bougie.

Various forms of flexible catheters to remain in the urethra have been employed; the most convenient that I have seen consists in a tube formed of flexible silver wire, wrapped spirally round a steel probe; and this being covered with a piece of bougie plaster, and the probe being then withdrawn, the instrument is thus completed. These catheters are not so serviceable, however, as has been expected: and they should never be suffered to remain long in the bladder, on account of the plaster on them. Whenever it is necessary to leave a flexible catheter in the bladder, those composed of the elastic resin or gum, should be employed in preference to them.

Although in general the bougies, composed as above directed, are to be made use of; yet when there is reason to suppose there is a venereal ulcer in the urethra, about two ounces of quicksilver, extinguished by honey, should be added to every six ounces of the plaster when melted.

In women, bougies should always be employed for the same purposes as in men; but it often happens that tumors of such a size form in the urethræ of females, that it is necessary to employ a ligature, or the scalpel, to remove them. By these, even tumors that are connected with the bladder, may be taken off. In such cases, the urethra should be laid open on one side, and the vagina need not be at all injured. But they should not be meddled with, unless

unless they give a great deal of uneasiness, or obstruct the passage of the urine very much.

Instruments for the application of caustic to carnosities in the urethra, have been invented and used; but it is evident, that there must be great risk of injuring the sound parts from this practice.

C H A P. XVIII.

Of the Fistula in the Perinæum.

BY the term fistula in perinæo is understood a sinuous ulcer in this part, extending most frequently to the urethra, sometimes to the bladder, and in other instances terminating in the scrotum or penis.

In some cases there is but a single opening, and the contiguous parts remain nearly in their natural state: but in others, together with one or more external openings, there is a hardness, enlargement, or inflammation of the parts adjacent, extending, in some instances, from the anus to the scrotum and fore-part of the penis. And as the urine is more or less evacuated at the orifices in most instances, they are often productive of much distress.

The causes of fistula in perinæo are;

1. Wounds and other injuries of the urethra and bladder from external violence. Thus it is now and then the consequence of lithotomy, or of cutting into the urethra for the extraction of stones.

2. In-

2. Inflammation in the urethra terminating in suppuration, and discharge of matter through the perinæum. This is most frequently the consequence of gonorrhœa. Abscesses formed in the soft parts about the anus, and extending to the urethra, also occasion perinæal fistulæ.

3. The several circumstances productive of obstruction in the urethra, and enumerated in the last chapter. These by impeding the flow of urine through its natural channel, frequently induce this complaint.

All these causes tend to produce fistula; 1. By the formation of a passage directly into the urethra or bladder, by external violence, or ulcers and abscesses seated internally; which may occur independent of any obstruction to the passage of the urine.

2. By the sole influence of obstructions in the urethra; in consequence of which the urine occasions a rupture of the urethra.

In the treatment of the disease, it is of the utmost consequence that we attend to the mode of its production as thus explained; and as it is sometimes connected with syphilis, scrophula, or scurvy, it is evident that in such cases general remedies must be conjoined with the topical applications.

When the disease is local, and proceeds from obstructions in the urethra, and the parts through which the opening runs are not much affected, the bougie, applied in the manner directed in the preceding chapter, is almost the only remedy necessary, and it is commonly effectual. When the obstruction is removed, which may be known by the instrument passing in without impediment, and by the urine flowing in a full stream when the orifice at the fore is compressed; if the ulcer does not soon heal, it will generally be found owing to the edges having become callous. These must therefore be removed in the following manner. The patient must be laid upon a table, near-

ly in the posture recommended in lithotomy, and a staff being introduced into the urethra, so as to pass the opening, it is to be held firmly by an assistant, while the surgeon introducing a small probe at the external orifice of the fores, and cutting upon it in the direction of the sinus, is thus to lay it open its whole length, even if it extends to the bladder. All the sinuses, in whatever direction they run, must be treated in the same way.

When any of the parts through which the sinuses run, have become extensively hard, a small portion of those that lie most contiguous to the fores may be removed, and the remainder will commonly be taken off by the subsequent suppuration. The staff should be now withdrawn, and the divided parts gently separated by the introduction of lint, spread with some emollient ointment; a pledget of ointment is then to be placed over the fores, and secured by compresses and the T bandage.

About twenty-four hours after the operation, an emollient poultice should be applied over the dressings; and as soon as a free suppuration comes on, the whole is to be removed, and light easy dressings should be continued till the fores are healed from the bottom. The success of the operation chiefly depends on a regular and careful application of dressings.

It has usually been the practice to keep a bougie or catheter in the urethra as constantly as possible after this operation, in order to prevent, it is said, an improper contraction of the urethra, and the passage of the urine out at the wound. But, from much experience, I can pronounce that the wounds heal perfectly well without them; and that when they are employed, they keep the urethra so much distended, that they prevent the ready healing of the fores; are not effectual in hindering the urine from passing off by the orifices, if not passed to the bladder, and if they are
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passed so far, almost constantly excite pain, inflammation, and swelling about its neck.

The passage of the urine seems to be a very trifling impediment to the healing of the fores; after the operation of lithotomy, it always passes off by the wound; a cure is then in common soon obtained, and the use of a catheter is never thought of. When indeed some stricture occurs in the urethra after lithotomy, or the cutting the fistulæ, it will be useful to employ bougies, as in other cases, but never otherwise.

When the parts in the perinæum have become much hardened and otherwise diseased, before the operation is put in practice, we are commonly directed to use poultices, mercurial frictions, and gum plasters; but I have never seen any material advantage derived from their employment.

If the hardened parts are very extensive, and the above-mentioned discutients are ineffectual, we are usually advised to cut them entirely away: but although it will be proper to remove the callous edges of fores here, yet such a painful operation as that must be can rarely, if ever, be advisable.

When an opening is formed in the urethra by abscesses seated internally or externally, or by external violence, inflammation must be moderated, or suppuration promoted, &c. according to circumstances; and if the wounds do not readily heal, the operation above described must be instituted.

By the treatment recommended, most of the affections we have just described may be removed; but where the disease is very extensive, and there is some general complaint joined with the topical affection, we are in some instances baffled in all our attempts for a cure.

C H A P. XIX.

Of the Hemorrhoids, or Piles.

THE term hemorrhoids or piles is applied to tumors in the rectum or its vicinity, produced either by a distention of the veins, or of the cellular substance, or both.

When these tumors do not discharge any matter, they receive the appellation of the hemorrhoides cæcæ or blind piles; but when a discharge of blood or serous matter takes place from them, they are termed the apertæ, open or bleeding piles.

Hemorrhoidal tumors that discharge freely are usually small; but when they do not bleed much, or at all, they have arrived sometimes to the size of a pullet's egg. In the first case they give little uneasiness, but in the latter they produce a great deal of pain and irritation, and frequent tenesmus.

These swellings have generally a dark livid appearance; are at first soft, and can usually be much diminished by pressure; when they become open, they acquire a firm consistence, and their size is not lessened by pressure or by the discharge from them. When blind they are generally most painful.

While the tumors are small and compressible, it is probable they depend entirely on an enlargement of the veins; but when they become large, and of a firm fleshy consistence, they are probably chiefly occasioned by the effusion of blood into the cellular substance.

The piles are usually induced by a compression on the hemorrhoidal veins. This compression is most frequently occasioned by hardened fæces in the rectum; by the gravid uterus; and by tumors of the rectum, bladder, mesenteric glands, &c.

In the cure, tumors must, if possible, be removed:—A frequent recumbent posture must be advised during pregnancy; and to obviate or remove costiveness gentle laxatives, as cream of tartar, and castor oil, should be occasionally advised. If there is much fever, blood must be taken, and particularly by leeches applied to the tumid veins—The swelled parts should be bathed with a solution of saccharum saturni; and the patient should be kept upon a low, cooling regimen. An ointment of equal parts of powdered galls and lard or butter, is a very useful application; and an infusion of galls injected in internal piles is very serviceable. Balsam capivi is also very beneficial as a laxative and anodyne.

When the discharge of blood in hemorrhoids is so great as to debilitate the system much, and the above means do not restrain it, it becomes necessary either to compress the bleeding vessel or vessels, or to tie them. In slight cases, compression may be made by introducing a silver tube, wrapped round with soft linen; or perhaps better, by introducing a piece of sheep's gut, tied at one end, into the anus, filling this by the other extremity with water or some other fluid, and then tying the lower end.

If the vessels are so large as not to admit of effectual compression, and are within reach of the tenaculum, they should be tied.

When hemorrhoidal tumors become so large as to obstruct the passage of the fæces, but never before, they should be removed. If they are seated externally, or not much more than an inch from the end of the rectum,
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when they can be brought sufficiently low, by bearing down, they may be easily taken off.

If the swelling is small, and there is no reason to fear hemorrhagy, it should always be removed by the scalpel; but when it is large, and we are apprehensive of a considerable discharge of blood, ligatures should always be preferred to the knife.

Tumors with a broad basis may be safely and easily removed in the following manner: a needle, armed with two firm waxed threads, being introduced through the middle of the basis of the tumor, the ends of one of the threads are to be firmly tied round one half of the swelling, and the other is then to be secured in the same manner by the other ligature. The tumor sometimes drops off in eight and forty hours, but not commonly in less than three days. When the scalpel is used, the wound is to be dressed with lint and soft ointment.

C H A P. XX.

Of Condylomata, and other similar Excrescences about the Anus.

THE parts about the anus are liable to be affected by tumors which have received the various names of condylomata, fici, cristæ, &c. These are all of the same nature, and require similar remedies.

They are sometimes met with in the cavity of the rectum, but they most frequently affect the external parts. They

They are of various degrees of hardness, being sometimes quite soft, and at other times as firm as a schirrus. They are differently coloured; some being white, and others of different shades of red. Sometimes there is but a single excrescence or two; but most frequently all the parts about the anus are at last covered by them. They are often not larger than warts; in many instances, however, they are about the shape and size of split garden beans. They seem at first to be mere productions of the cuticle; but by long continuance they extend to the cutis, or even to the muscles.

Tumors of this kind should not be touched unless they become troublesome. When they are to be removed, the softer kinds will often yield to friction with sal ammoniac, or washing with a solution of it, or to the use of finely powdered safin. But when the excrescences are hard, the scalpel, or lunar caustic, must be employed. The former is to be preferred; and after the operation, the wounds should be treated with lint, &c. as in other cases. When we employ caustic, great care must be taken that it does not spread to the rectum.

C H A P. XXI.

Of a Prolapsus Ani.

A Protrusion of any part of the intestinum rectum beyond its usual limits, is termed a prolapsus ani. This varies very much in degree in different cases.

Whatever tends to debilitate the sphincter ani and adjacent parts, will probably contribute to the production of this disease; but its most common cause is frequent and violent exertions excited in the rectum itself, by a frequent use of aloetics; by ascarides; by habitual costiveness; hemorrhoidal swellings, &c.

The rectum has often remained in a prolapsed state for a considerable time without injury; but it should always be reduced as early as possible. This is best effected by the fingers, in the following manner: The patient being put into bed, on his face, with his buttocks somewhat elevated, the surgeon should press firmly and equally upon the protruded part. When this method fails, which is seldom the case, a proper application of the fingers of one hand to the superior part, while the palm of the other hand supports the lower part, will always succeed.

We are to observe that this operation is only to be employed when there is no inflammation and swelling of the gut; for when these occur, which happens sometimes, bleeding, and bathing the part with solution of saccharum saturni a little warmed to remove them, should be previously used.

In order to retain the rectum in its situation after reduction, it will be commonly necessary to employ a thick compress and the T bandage, or Mr. Gooch's truss. The patient should always reduce the gut immediately after going to stool, and apply his bandage: And to remove the debility of the parts affected, he must be directed to the use of steel, bark, and the cold bath: throwing water on the buttocks and under part of the back, is particularly serviceable. Injections of strong astringents, as galls, oak-bark, &c. have also been useful: and opium may be advantageously added to remove irritability of the rectum. I have used alum and sacch. saturni with benefit; but in general all salines should be avoided.

C H A P. XXII.

Of an Imperforated Anus.

IN some cases of this nature, the rectum is found to be somewhat prominent at the usual situation of the anus, and covered merely by the common integuments; but in others no vestige of the gut can be perceived. In some of these instances, it has been found to terminate within an inch of the usual seat of the anus; in others it has reached no farther than the top of the sacrum: in some it has been known to end in the bladder; and in others in the vagina.

As death will in all probability soon be the consequence, unless an operation is performed to relieve the patient, no time should be lost. If the end of the rectum is covered
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only by skin, an incision through this is all that is necessary. But when the gut lies deep, the child should be properly secured, and an incision of an inch in length made on the part where the anus ought to be; this should be cautiously continued along the coccyx, the finger serving as a director, till the operator meets with the fæces, or till the incision is of the length of the finger; a long trocar should then be pushed forward, in the probable direction of the rectum, upon the finger.

When the gut is found to terminate in the bladder or vagina, this operation should also be performed. If in any case it should fail of success, would it not be advisable to attempt an opening above the pubes, or perhaps on the right side, so as to reach the caput coli, and thus form an artificial anus?

When the incision is carried deep, it is often a matter of difficulty to preserve the passage sufficiently open to admit of the discharge of fæces. Dossils of lint, moistened in oil, and rolls of bougie plaster, I have found to be the easiest and best applications; for this purpose, gentian, sponge tent, and other similar substances, have been employed; but they always give too much irritation. When the passage has at any time become too strait, the introduction of a sheep's gut distended by water, as recommended in Chap. XIX. is the best remedy. Much attention is requisite in these cases; and they often give a great deal of trouble and perplexity for a long time.

When nothing but the skin is cut, dossils of lint, for a few days, are the only necessary applications.

C H A P. XXIII.

Of the Fistula in Ano.

EVERY sinuous ulcer in the neighbourhood of the rectum is termed a fistula in ano. When the fore has no communication with the rectum, it is said to form an incomplete fistula; when the ulcer has two openings, one into the rectum, and another externally, it is called complete: and when the fore opens into the gut only, it is termed an internal or occult fistula.

This disease has also been distinguished into simple and compound. In the simple fistula there is one or more sinuses connected merely with the internal ulcer, and the adjacent parts are all sound: but in the complicated or compound, the parts through which the sinus runs are hard and swelled; or there is a communication with the bladder, vagina, os sacrum, and other parts.

In the beginning of the disease the contiguous parts are usually sound; but after a long continuance of it, and the disease has spread not only over the parts about the anus, but even to the perinæum and buttocks, these become hard and much swelled.

When the matter in the sinuses acquires a considerable degree of acrimony, instances have occurred in which the sacrum has become carious, and the vagina and bladder have been corroded and had the contents of the rectum emptied into them; but such terrible cases are very seldom met with.

Whatever tends to produce the formation of matter about the anus, may occasion this disease; such as the piles; condylomatous tumors; hardened fæces in the rectum; and fevers.

On account of the languid circulation in these parts, inflammatory swellings are very apt to terminate in suppuration; and sores thus induced heal with difficulty.

As soon as suppuration appears to be coming on, therefore, we should employ every means to hasten the formation of matter; such as warm poultices, fomentations, and the steams of water; and as soon as pus is produced, it should be evacuated by a very free incision.

The wound should be very lightly dressed with some emollient ointment spread upon lint, and a soft poultice ought to be applied constantly over the whole. By this means the hardness will be removed, and a cure will often be easily accomplished.

A surgeon is, however, seldom called until a fistula is fully formed; his first object should then be, to ascertain the course of the sinus or sinuses. When the sores are external, this can easily be done by the probe alone; but when they run up by the rectum, the finger should be oiled and introduced into the gut, at the same time that the probe is passed in at the ulcer, in order to determine whether it communicates with the intestine, which is a point of consequence. When this will not ascertain it, the passing of the fæces or air at the sore, or water injected at the sore coming out by the intestine, will sometimes direct us.

Astringent injections, pastes and ointments, have at different times been used for the cure of fistula in ano; but experience has proved them to be not only useless, but often injurious. The real indication is to excite such a degree of inflammation on the sides of the sinus as will produce a union of them. This in fistulæ of other parts

is accomplished either by the introduction of a cord of cotton or silk, along the course of the fore, or by laying the whole sinus open, so as to reduce it as nearly as possible to the state of a recent wound: but as the seton here gives too much irritation, the latter mode is to be preferred.

The day before the operation, the bowels should be well emptied by a laxative, and the rectum should be cleared by a clyster given a few hours previous to it.

The patient may be either allowed to stand up with his back exposed to the light of a window, and leaning forward on a chair, table, or bed; or he may be laid on a table in the posture directed for lithotomy. Which ever is chosen, the patient must be firmly held in it; and the surgeon, after dipping the fore-finger of his left hand in oil, must introduce it as far as possible into the rectum, and with his right hand must then enter the probe pointed bistouri, and carry it forward until he feels the point of it through the opening in the gut, for we suppose this to be a complete fistula; he is then to bring the point, guarded and supported by the finger, out of the rectum, by which means the sinus will be entirely laid open. If there are more sinuses than one, they should all be opened. It seldom happens that more than one communicate with the rectum, but they generally communicate with each other.

When the fistula is incomplete, the only difference between the operation for it and the one just described, is that the bistouri must be pushed through the rectum at the superior part of the sinus.

When the sinus extends very far up the rectum, all that can be safely done is to divide the sinus as high as the finger will reach.

The hemorrhage from this operation is very trifling; and therefore the method of cure by introducing a flexible piece of lead or silver at the orifice, bringing it back by
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the gut, and then twisting it, is totally unnecessary on account of the discharge of blood. The pain attending this mode by ligature, and its tediousness will probably prevent it from being received into general use.

The wound being cleaned, a piece of soft lint or linen, covered with a liniment of wax and oil, should be insinuated between its edges, but not so far as to give uneasiness. A compress and the T bandage being then applied, the patient should be carried to bed; and the dressings being renewed after every stool, or about once in twenty-four hours, the sores will generally heal very well.

By this method, diarrhæa and tenesmus, which often prove very troublesome when dressings at all irritating, even dry lint, are employed, are entirely prevented.

Injections are often advised to clean the sores, but they always do injury. Nothing more is in general necessary than to remove any fæces which may lodge in the wound.

In some instances, instead of a favourable appearance, the sore acquires a soft unhealthy aspect, and the matter discharged from it is thin, fœtid, and perhaps mixed with blood. A hitherto undiscovered sinus is in these cases sometimes found upon examination; this should be immediately laid open: but it more frequently happens that this state of the sore depends upon some general affection, which till then had not manifested itself. In this case, remedies adapted to the disease should be employed. It may, in some instances, be the consequence of mere debility from fever or discharge of matter. Tonics, and a generous diet, will then effect a cure.

When the disease has continued long, experience has taught me the propriety, and indeed necessity, of forming an issue; making it discharge freely for some time previous to the operation.

By these several means, the disease, when confined to the vicinity of the rectum, may almost always be removed.

In an advanced stage, the matter sometimes not only separates the skin from the muscles in all the parts adjacent to the rectum, but even detaches the rectum itself from the cellular substance, with which in health it is so firmly connected. In such instances, all that should be done, is to lay open the intestine as far as it is separated; and if this is not sufficient to make it apply equally to the surrounding parts, another incision should be made on the opposite side of it: by this means, if the constitution is pretty good, an adhesion will take place between the gut and the parts contiguous, and a complete cure will be obtained. Sinuses seated externally should be treated in the same way. The dressings in both should be mild, and applied over the fores only, and not insinuated between their edges.

The occult fistula, or that in which there is no external opening, is to be distinguished by a discharge of matter unmixed with the fæces; by some degree of hardness, swelling or discolouration in the vicinity of the fundament; and by pain from pressure on it.

In this species, a scalpel or lancet is to be plunged into the part where we have reason to suppose the abscess seated; and the disease being then reduced to the state of a simple, complete fistula, the operation is to be finished as was directed for that variety of the disease. The subsequent treatment must be similar to that used in other cases of fistula.

We have hitherto supposed the parts affected to be no otherwise diseased than by having an abscess seated in them, and sinuses connected with it; but when by neglect or improper treatment the matter collected does not find a free vent, the parts contiguous to it become inflamed and painful, and gradually acquire a considerable and distressing hardness or callosity. In such circumstances, experience has taught us that poultices, mercurials, &c. as advised by some, are perfectly inadequate to the discussion
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of any such callosities as are considerable and of long duration; and that it is entirely unnecessary to destroy them by caustic, or extirpate them with the knife, except they cannot be preserved but at the hazard of the patient's life.

In instances where these callosities occur, the sinuses should not only be laid open as directed in simple fistulæ, but incisions should be made along the whole extent of the hardness; and if a free suppuration does not spontaneously succeed to the inflammation which is commonly produced, it should be encouraged by warm poultices, and supported till the greater part of the callosity is removed; which will commonly happen after some time, if the habit is healthy. When suppuration cannot be readily induced, and the edges of the fores become inflamed and painful, and a foetid thin matter is discharged, some general disease may be suspected.

If the edges of the fores are very hard and reversed, it may be useful to take off a part of them; and if the calous parts are so separated from those beneath, that they will probably never adhere to them again, they must be removed; but in no other circumstances can extirpation, in any degree, be with propriety advised.

It sometimes happens that the matter collected in fistula in ano penetrates to the bones; but it oftener happens that the bones are the parts primarily affected. Thus the matter may be formed in consequence of caries of the lumbar vertebræ, os sacrum or coccyx, and find its way down to the vicinity of the anus.

But the most distressing symptom attendant on fistulæ in ano, is the formation of a passage between the rectum and bladder. This is known most certainly by an offensive dark sediment in the urine, obstructions to the passage of the water, and the discharge of air by the urethra either before or after making water. In such cases the patient
lingers

lingers for some time, and at length falls a victim to the disease.

When the bones have become carious from the matter penetrating to them in this disease, all that art can do is to preserve a free vent to the matter; to keep the parts clean; to extract pieces of loose bone; and to strengthen and support the constitution during the long continued discharge which will probably ensue, by tonics and nutritious diet. Some few have recovered by this management; but all that can in general be expected, is a mere palliation of the most distressing symptoms.

C H A P. XXIV.

Of the Paracentesis of the Abdomen.

THE operation of paracentesis or tapping is instituted for the removal of collections of fluid in the abdomen.

Afcites, or a collection of watery fluid in the cavity of the abdomen, is often a symptom of anasarca or general dropsy; but it is also frequently a local disease, and originates from compression of the lymphatics, by schirrous viscera, and particularly the liver.

This disease is known by swelling and tenseness of the abdomen; difficulty of breathing, particularly in a horizontal posture; and by a sense of fluctuation communicated to the fingers placed on one side of the abdomen, when
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the swelling is forcibly struck on the other. With these symptoms there are also usually joined great thirst, paucity of urine, dry skin, and other signs of dropsy.

When the swelling extends equally over the abdomen, the water is commonly diffused among the different viscera, and is contained in the peritonæum only. But it sometimes happens that it is collected in different cysts, or in one of the ovaria, when the tumor is not usually so equal, nor is the fluctuation so distinctly perceived. The fluctuation depends also on the consistence of the fluid; in some cases this is thick and gelatinous, though commonly thin and serous. A great number of small hydatids are also often found swimming in the water of ascitical swellings.

As diuretics and other evacuants are seldom found useful in local dropsies, and as the viscera may receive injury by being long surrounded by a fluid in ascites, tapping should always be advised as soon as a fluctuation is to be perceived. It is attended with very little pain, and the danger arising from it in some cases, is to be attributed to the state of the constitution at the usual time of its performance, rather than to the nature of the operation.

In all large collections of fluid, and particularly in the abdomen, it has been found dangerous to evacuate their contents suddenly, without substituting pressure during the discharge, and for some time afterwards, to the support these have given to the circulating system—hence the utility of applying a proper bandage to the whole belly.

The instrument now universally employed for tapping is the trocar. The flat trocar, with a lancet point, (pl. vii. fig. 3. 4.) enters the abdomen with more ease, and gives less pain than the common round trocar with a triangular point, it should therefore be preferred to it. The part of the abdomen which can be perforated with the greatest safety, is the point lying at nearly an equal distance between

tween the umbilicus and the centre of the spine of the ileum.

This point being marked with ink, the bandage delineated for the purpose, (pl. xi. fig. 4.) is to be applied moderately tight, one of the holes being fixed exactly opposite to the mark. The patient is to be placed in a horizontal posture, with the side in which the perforation is to be made lying over the edge of the bed. The surgeon is then to take the trocar in his right hand, and fixing the head of the *stilette* in the palm, immediately below his thumb, and directing the point of it with his fore-finger, he is now to push it into the cavity of the abdomen; this may be known to be effected by the want of farther resistance to the instrument. The *stilette* being then withdrawn, the water is to be discharged; taking care to have the bandage tightened as the water flows—if the patient becomes faintish, the discharge may be stopped now and then for a few minutes.

When the discharge is obstructed or stopped by omentum or intestine pressing on the mouth of the canula, a blunt probe should be inserted into the tube to push them back. When the stoppage proceeds from the consistence of the fluid, a larger trocar should be introduced. Sometimes it originates from the water being collected in cysts; in this case, the canula must be withdrawn, and the wound being covered with a pledget of ointment, the operation may be renewed immediately, or on the succeeding day, in the opposite side of the belly; or if swelling appears in any particular part of the abdomen, the opening should be made in the most depending portion of it.

If after this operation notwithstanding the use of proper remedies, other swellings should follow, it may be repeated whenever they have acquired any considerable size.

The wound is to be dressed lightly as already directed; and the use of the bandage should be continued, as the support it gives may have some effect in preventing a return of the disease.

In tympanites, or collection of air in the abdomen, the swelling is more tense than in ascites, and affords to the touch nearly the same sensation as is received from a bladder filled with air.

In tympanites the air is most frequently contained in the intestines, and probably is hardly ever found between them and the peritonæum but in consequence of a breach in them. Tapping with a small trocar, and with the same precautions as in ascites, should undoubtedly be used for its removal when all the other remedies prescribed fail, as it will give the only chance of relief.

After tapping, both in ascites and tympanites, as soon as the bandage can be removed with safety, i. e. in about two days, it should be taken off for a quarter of an hour daily, and the belly should be well rubbed with some spirituous astringent application, the patient being previously placed in a horizontal posture.

C H A P. XXV.

Of the Paracentesis of the Thorax.

THE operation of tapping the thorax, is indicated whenever the action of the heart or lungs is impeded by fluids collected in the cavity of the chest. The different kinds of fluids met with there, and requiring evacuation by a perforation, are, serum, blood, pus, and air.

S E C T. I.

*Of Serum collected in the Thorax.**

WATERY collections in the chest are frequently met with, and are often combined with dropfy in other parts: They are, however, in many instances, merely local affections; and in these only are we to expect advantage from the paracentesis.

The fluid is contained either in one side of the general cavity of the thorax or both; in the pericardium; or in the mediastinum. It requires much attention to ascertain the existence of water in the chest, and especially its particular situation.

A patient complaining of a sense of weight or oppression in the thorax; of difficult respiration; of more uneasiness

* Hydrothorax.

finess in one side of the chest than the other; of inability to lie on the sound side; of being liable to sudden startings during sleep, from a fear of suffocation; and if with these he has frequent cough; small and irregular pulse; and especially a dry skin, paucity of urine, and other symptoms of dropsy, there can be little doubt of the presence of this disease. A sense of undulation, as of water passing from one side of the chest to the other, is sometimes observed by the patient upon rising suddenly from a horizontal posture; and this contributes also to ascertain the precise seat of the collection. In order to determine this point more clearly, the patient should have his breast uncovered, and one hand being placed upon the ribs near the sternum, we should strike with the other forcibly near to the spine. This will answer when the quantity of fluid is considerable: When it is small, we can ascertain its presence most certainly by standing behind the patient on a chair, and swinging the upper part of his body repeatedly, by sudden jerks, from one side to the other.

In long continued affections of this kind, there is sometimes a degree of swelling in a particular part of the chest, produced by the collected water.

The general symptoms of hydrothorax do not vary much in whatever part of the chest the water is effused. In the hydrops pericardii the patient, it is said, complains chiefly of the middle and left side of the thorax, and there is a firm undulatory motion perceived between the third, fourth, and fifth ribs at every pulsation of the heart.

This disease is produced by the causes of dropsy in general; and when it is ascertained, as no remedy has yet been discovered for its removal, the operation should be always advised as soon as the symptoms appear dangerous, and relief is not found from other means. It is thus to be performed.

The patient should be laid in a horizontal posture, with the side to be operated upon over the edge of the bed: The skin over the part to be perforated is then to be drawn up as much as possible by an assistant, who must keep it so during the operation; and the surgeon is now, with a scalpel, to make an incision of about two inches in length, between the sixth and seventh ribs, in the same direction with them, and at an equal distance between the sternum and spine, taking care to avoid the under edge of the superior rib, on account of the blood-vessels running in its groove. This must be carried through the teguments: the division of the muscles must be no more than about an inch in length. The pleura is to be very cautiously dissected, in order to avoid all risk of wounding the lungs, if they should happen in this place to adhere. If this is not the case, the water will rush out as soon as the membrane is cut through: should there be an adhesion of the lungs to it, the incision may be carried an inch or two nearer the sternum, or it may be made an inch or two higher or lower.

The opening should be small, and a canula introduced into it for the more convenient evacuation of the water, stopping the discharge if the patient should be faintish, and to prevent the ready access of the air to the cavity of the thorax. When the water is not in great quantity it may usually be drawn off at once; but when the collection is large, partial evacuations may be made at longer or shorter intervals according to circumstances. For this purpose the canula should be tied to the body by a ribbon connected with it; and it should be stopped with a piece of cork. A pledget of emollient ointment should be laid over the wound, and the whole being secured by the napkin and scapulary, the patient should be put to rest. After a delay, perhaps of a day or two, an additional quantity may be discharged, and so on till the patient is entirely relieved.

When

When the water is effused into both sides of the chest, it will be necessary to perform two operations to effect its removal. But as the patient might suffer as much from the air which unavoidably gets into the cavities as from the water, if both sides were perforated at once, it will be proper after one operation, to endeavour to expel the air from the side perforated before we undertake a second. The easiest and most convenient way of doing this is to let the patient endeavour, as far as possible, to fill the lungs with air, immediately after the canula is taken out. This will expel a considerable quantity by the orifice; the skin should then be drawn instantly over the fore, and pressed down during inspiration. This must be repeatedly done; and by it most of the air may be expelled: after which the skin should be drawn over the wound, and the dressings applied as already directed.

The air might also be extracted by the application of an exhausted syringe, either of the common kind, or of the elastic gum.

Air in the chest may not only prove hurtful by impeding the motion of the lungs, but also by inducing inflammation on them, and the other parts within the thorax: its admission should, therefore, be guarded against very attentively, as well as its expulsion when it has gained an entrance.

It has been proposed by some to perforate the thorax farther up than we have advised, and by others lower down; and a trocar has been recommended for the perforator—but it must be evident to those who reflect on the subject, that the mode we have pointed out is attended with much less danger and difficulty.

In dropsies of the pericardium, this operation might be employed with some prospect of benefit. It might be performed by making an opening between any two of the ribs, from the third to the eighth, and within six inches of the sternum.

sternum. The incision of the pleura should be about an inch long; and the water would be best discharged by pushing a small trocar into the pericardium. If the quantity is small, it may all be drawn off at once; if considerable, it should certainly be done very gradually.

When water is in the mediastinum, which will be rendered probable by particular pain and oppression above it, a piece of the sternum should be taken out by the trepan, and a perforation should be made into the swelling with a trocar, and the water cautiously evacuated.

S E C T. II.

Of Blood collected in the Thorax.

IN general, the symptoms of blood collected in the thorax are similar to those produced by serum; but they are usually observed to prove more distressing.

Blood may be extravasated into the chest:

1. From wounds of the blood-vessels by sharp instruments.
2. From the splinters of fractured ribs, sternum, or vertebræ entering the vessels.
3. From erosion of the arteries or veins by the matter of abscesses or ulcers.
4. From the rupture of the vessels by violent exertions, and particularly by coughing.

As some of the sanguiferous vessels of the lungs themselves are usually the seat of the disease, relief is commonly more or less obtained by the expectoration of the evacuated blood; but when neither this, nor blood-letting, a cooling regimen, and other remedies, prevent the action of the heart or lungs from being much obstructed, the operation of the paracentesis should undoubtedly be performed. Mr. Sharpe, indeed, is of opinion, that we had better trust to the coagulation of the blood for the removal

val of the hemorrhagy, and to the absorbent vessels for taking away the blood thus deposited; but it is evident that if the vessel is small, little or no additional risk will be incurred by a perforation, as the hemorrhagy will probably cease on the patient's becoming faint; and if the ruptured vessel is large, the patient will probably die, whether the operation is used or not.

In performing this operation, the directions given in the preceding section will generally apply; but it must be observed, that when a fractured bone, or some extraneous body is the cause of the hemorrhagy, the incision should be made as near the affected part as possible, so that it may serve for their extraction, as well as for the evacuation of the blood. And when there is an external wound, this if properly situated, should be enlarged for the discharge of the blood, instead of making another opening.

As the blood is very apt to coagulate in a little time, if we find it impossible to remove it merely by an incision of an inch or so, tepid water should be cautiously injected in small quantities, and suffered to remain some time in order to dissolve it.

S E C T. III.

Of an Empyema, or a Collection of Pus in the Thorax.

AN empyema is probably never met with but as a consequence of pneumonic inflammation. And when a patient, who has for some time had a fixed pain in the chest, attended with fever, cough, and other signs of inflammation, is at last seized with an oppressed respiration; an inclination to sit in an erect posture; with a total inability of lying on the sound side; a constant tickling cough; with frequent shiverings; and especially if there is an accompa-

nying

nying enlargement of the affected side, or a soft œdematous fulness of the part in which the pain was at first seated, we may conclude with certainty that a large collection of matter is formed.

When the pus thus formed is not soon evacuated by the mouth, which frequently happens, the only remedy to be depended on is the paracentesis.

The general rules already given are to be observed in this operation; except that in whatever part of the thorax, whether under the sternum, ribs, or other parts, the seat of the abscess is indicated, either by a long continuance of pain, or by matter distinguished, there the operation should be performed. But if the particular seat of the disease is not pointed out, the perforation must be made in the usual place.

Collections of matter in the thorax are usually formed in the lungs and thence poured into the cavity or cavities; but in many instances, large quantities of pus are found between the pleura and lungs, produced from an inflammation of the pleura alone. In these cases ulcerations are commonly produced, which continue a long time after the perforation is made.

The constant motion of the lungs; the necessity of avoiding the excitement of that degree of inflammation which is necessary for the union of the parts; and our being precluded from the benefit of compression, render the cure of abscesses in the lungs by far more difficult than those seated in any other part of the body. Hence the discharge usually continues for life, or if it ceases for any time by the healing of the sore, it almost constantly bursts out again, or another operation becomes necessary to relieve the dangerous symptoms induced. On this account it will be proper, whenever the opening has much tendency to close, to enlarge it by the introduction of a common bougie, or of a short tube of silver for a few hours.

S E C T. IV.

Of Air Extravasated in the Thorax.

AIR collected in the large cavities of the chest, produces the same symptoms of oppression on the heart and lungs that are consequent to the presence of water, blood, or serum.

This collection of air may be produced;

1. By a gangrene of some part within the thorax. This species of the disease seldom comes under the care of the surgeon; its removal depends entirely on the cure of the mortification, which is seldom accomplished.

2. By a rupture of the investing membrane of the lungs by a violent exertion, as in coughing, crying, or laughing.

3. By an erosion of the surface of the lungs from ulcers and abscesses.

4. By wounds of the lungs from a sharp instrument, pushed obliquely into the thorax.

5. By a wound of the lungs from fractured vertebræ, or ribs. A fractured rib is the most frequent cause.

A collection of air in the chest differs from collections of pus and serum in its symptoms, only in respect to the quickness of their progress; for there are instances of death having been induced by it in a few hours. In most cases the cellular substance of the breast becomes inflated; and if means are not soon employed to prevent it, the air insinuates itself through every part of the body.

The particular symptoms consequent to a wound of the lungs from a fractured rib are as follow; a tightness in the breast; some oppression in breathing; pain in the parts chiefly

chiefly affected; gradual increase of the difficulty of breathing, till at length the patient can breathe only when erect and leaning forward; flushing and swelling of the face; feeble pulse, at length irregular; cold extremities; and if relief is not soon obtained, death.

The emphysematous swelling of the chest and other parts, which sometimes occurs here, is easily distinguished by the crackling noise produced by pressure on it. For the removal of this symptom, scarifications are employed. By making several incisions, half an inch in length, along the course of the swelling, and then pressing the air towards the orifice, a good deal may be evacuated. The place of this will be supplied by air from the thorax, and if the quantity which escapes from the wound in the lungs is not greater than that discharged by the scarifications, the whole may in this manner be soon removed. But the reverse frequently happens; and our only remedy then consists in the paracentesis. This operation affords immediate relief, and is to be performed in the manner already directed.

C H A P. XXVI.

Of Bronchotomy.

THE formation of an opening in the trachea, or the operation of bronchotomy, is necessary whenever respiration becomes so much obstructed from a local affection of the superior part of the wind-pipe, that life is endangered.

This operation is attended with very little danger, and a necessity for its performance may originate;

1. From a spasmodic affection of the muscles of the glottis, produced by acrid mucus in catarrh, and by bread, and other substances getting into the trachea.

2. From a piece of bone, flesh, or any other firm substance lodged in the pharynx, or upper part of the œsophagus, and pressing on the trachea.

3. From polypous excrescences reaching far down into the pharynx. When these tumors are to be extirpated, the operation is much facilitated by previously performing bronchotomy.

4. From tumors, particularly those of the schirrous and fleshy kinds seated externally, as in bronchocele.

5. From swellings of the tongue and glands of the throat arising from inflammation, either when the parts have previously been found, or in a schirrous state. It can never be necessary, however, when these have suppurated, as mere puncture of the swelling will then relieve the patient.

6. From

6. From suspended animation by drowning, when the lungs cannot be inflated by other methods.

In order to perform this operation, the patient should be laid upon a table, with his head drawn back, and limbs secured by assistants. A longitudinal incision should then be made with a scalpel through the skin and cellular substance, an inch in length, on the middle and anterior part of the trachea, beginning at the inferior part of the thyroid cartilage. The sterno-thyroidei muscles are thus exposed, and upon separating these, a considerable part of the thyroid gland appears. The cellular substance should then be divided carefully on the superior part where the lobes of the gland are separated, in order to avoid the blood-vessels. The trachea being then laid bare, an opening may be made into it between any two of the cartilages, by an instrument nearly like a flat trocar, or, if this cannot be had, by a scalpel or lancet. The perforation must be just large enough to receive a small canula; this should be about two inches in length, and as much of it introduced as will give a free passage to the air; the remainder should be passed through slips of linen, under which is a plaster of cerate, which may occasionally be in part removed or increased in number, to accommodate it to the degree of swelling induced. It is better to introduce a smaller canula, previously adapted to the first, within it, in order to prevent any obstruction to the breathing which might occur from removing the tube to clean it, if only one was employed. A piece of crape, or fine muslin, should now be placed over the opening in the canula, to prevent the admission of dust, &c. and the tapes connected with the wings of the tube carried round the neck, and tied.

When extraneous bodies in the trachea cannot be removed from this opening, a covered probe should be introduced to ascertain their situation, and another perforation should then be made. Whatever be the cause of the obstruction

struction for which the operation is instituted, the canula should be continued in the opening until that is removed; and when this is done, the skin should be drawn over the wound, and a sticking plaster applied to retain it.

C H A P. XXVII.

Of Œsophagotomy.

WHEN substances lodged in the œsophagus can be seen, they may commonly be removed by a pair of forceps; but when they are out of sight, we are reduced to the necessity either of allowing them to remain where they are fixed, of pushing them into the stomach, or of extracting them by laying the œsophagus open.

If the substance is of a soft texture, such as bread, cheese, or flesh, the best method is to push it into the stomach by the probang. But when a pin, a piece of sharp bone, or other firm substance is lodged in the passage, we should not attempt to push it down; for if this does not succeed, it may be fixed in the œsophagus. If the pain, and obstruction to breathing are not considerable, and if aliment can still be swallowed, no effort should be made to dislodge it; for it will probably be at length carried down, either from the effects of some degree of dissolution in the substance itself, or of a suppuration in that part of the gullet in which it is fixed. But when the passage of nutriment to the stomach is entirely prevented, or respiration is impeded to

a dangerous degree, an incision into the œsophagus, for the removal of the offending cause, is our only remedy.

Oesophagotomy may be also rendered necessary by tumors and strictures in the superior part of the œsophagus; but in such cases, the relief it gives is in general merely temporary, as the diseases which give occasion to it are usually incurable.

In performing this operation, the patient being secured as directed for bronchotomy, an incision should be made with a scalpel, at least two inches in length, through the skin and cellular substance, on the left side of the neck, keeping close by the side of the trachea, and commencing about half an inch above the part where the obstructing substance is fixed, when this is practicable; and where this is found impossible, on account of the obstruction being within the cavity of the thorax, the incision must begin about an inch and an half above the sternum.

The sterno-thyroidæi, and sterno-hyoidæi muscles, and a part of the thyroid gland being now exposed, an assistant should pull the muscles gently to the left side with a blunt flat hook, while another draws the trachea to the right, so as to admit of the œsophagus being brought into view. If any large blood-vessel should be unavoidably divided it should now be secured. The œsophagus being next opened longitudinally, the substance is to be extracted with a pair of forceps. If the obstructing matter is above the sternum, and its seat can be discovered, the incision should be made immediately upon it, and of a sufficient size for its removal by a pair of small forceps; but when the substance is in the chest, the gullet is to be opened for about two inches, and immediately above the sternum; a blunt probe being then introduced to discover the seat of the complaint, the substance is afterwards to be extracted by a pair of straight forceps, when it is near at hand, or by crooked forceps, if farther down the tube.

When

When the operation is performed on account of some disease, till this can be removed, our principal object is the conveyance of nourishment to the stomach, and the opening should then be preserved; but when it is employed for the purpose of removing a foreign substance fixed in the passage, as soon as this is accomplished, the parts should be reunited as speedily as possible. It will therefore be prudent to recommend total abstinence from solid food for several days, and to convey nourishment by injecting broth by the anus, and allowing very small quantities of milk or soup to be now and then swallowed. The patient should keep his neck quiet, and the wound should be treated as similar cases in other parts.

There is by no means that degree of danger attending œsophagotomy that has been supposed. By proper caution the larger blood-vessels will be easily avoided, and if the thyroideal arteries should be divided, they may in common be readily secured. The recurrent nerve will be in little danger, although it runs close by the œsophagus, if proper care is observed, and even if some of its branches should be divided, the only bad consequence would be a weakness of voice.

The operation has been more than once successfully performed:—and there are many instances of large wounds of the gullet healing very well; and if they should become fistulous and not heal, the patient will have had the only chance of relief, when they are induced by the operation.

C H A P. XXVIII.

Of the Amputation of Cancerous Mammæ.

CANCERS are more frequently met with in the breasts of women than in any other parts; and they are more to be dreaded when seated there than when in any other situation, because they are more liable to be extensive, from which the blood has a greater chance of being affected by absorption.

As schirrous tumors are always liable to degenerate into cancers, they should be extirpated uniformly as early as possible; and the removal of these, as well as of cancers, may always be undertaken where *all* the parts diseased can be extirpated with safety; but never otherwise.

In proceeding to this operation, the patient must be either firmly seated in an arm chair; her head being supported with a pillow by an assistant behind, whilst her arms are properly secured by an assistant on each side; or when no objection is made, what will be better, placed on a table. The operator should be seated; and if the skin is found, an incision should be made with a scalpel through the teguments from one extremity of the tumor to the other, carrying it an inch or so on one side of the nipple. When the breast alone is diseased, the cut should be perpendicular, but when the disease is extended in such a manner as to make the longest diameter of the swelling across the body, the incision should be formed horizontally. In the latter case, an incision should also be made from the first

wound to the inferior part of the tumor, in order to afford a free discharge to any matter afterwards produced.

The teguments should now be separated from the parts below, and being kept asunder, all the glandular part of the breast is to be carefully dissected out, with whatever part it be connected. In order to save the pectoral muscle while this is done, the arm should be kept extended. Not only the whole breast itself should be extirpated, when it is in the smallest degree affected, but all enlarged glands that are discovered in its vicinity.

The arteries, which are commonly numerous, should now be secured by the tenaculum; and the fore being cleared of blood, the divided teguments must be brought together, and connected by ligatures, which should hang an inch or two out of the wound, that they may be withdrawn at the end of three or four days. The wound is to be covered with lint, spread with emollient ointment, and a thick compress of linen being placed over this, the whole should be gently compressed by a napkin and scapulary.

In this manner, when none of the integuments have been removed, the wound will heal by the first intention, by the adhesion of the skin to the subjacent muscles. But it does not often happen that we are applied to till the skin is much diseased, or at least adherent to the mamma to a greater or less extent. In this case, after making the longitudinal incision through that part of it which is found, a circular or oblong incision communicating with the other, should separate the diseased portion; and the parts affected should then be all dissected off together. A fore is necessarily left, which renders the cure tedious in proportion to the quantity of skin taken away.—This is to be treated with lint, and emollient unguents.

When the axillary and other glands are also diseased, an incision should be extended from the principal fore, through the teguments to their farther extremity, and they should

should then be dissected out very cautiously. In performing this, it will be better to pass a ligature through the larger glands, in order to assist in their separation. The skin is here likewise to be re-united by suture or compression as may seem most proper.

It is a point of the utmost importance in performing this operation to preserve as much skin as possible. It saves a great deal of pain afterwards, expedites the healing of the sore, and lessens the chance of a return of the disease from irritation.

C H A P. XXIX.

Of Affections of the Brain from external violence.

S E C T. I.

General Remarks.

THE brain is an organ essentially necessary to life, and its parts cannot be deranged but with the utmost hazard. For although there are some rare instances of it being much injured, and even of parts of it being evacuated at wounds, without any important consequences ensuing; yet, as in many cases, apparently trifling wounds and bruises of the head, which at first exhibit no marks of danger, afterwards induce a train of symptoms that we are
unable

unable to remove, and which only terminate with the death of the patient, we may justly conclude, that affections of the brain, both with respect to the danger attending them, and the difficulty which occurs in the treatment of them, are of more importance than any other diseases that the human body is subject to.

The uncertainty which prevails with respect to the nature and treatment of these complaints principally arises from the following circumstances.

1. The importance of a sound state of the brain to health, and the delicacy of its structure, rendering injuries to it easily productive of alarming consequences.

2. The difficulty of ascertaining the state of the derangement, on account of the brain being surrounded by bone.

3. The impossibility of having free access to the parts affected, when we know with certainty which they are; And,

4. The writers on the subject having attended more to the causes, than to the nature and treatment of the affections themselves. Thus, the various contusions, wounds, and fractures of the head, have been minutely described, and almost solely attended to, when it is their effects upon the brain which we ought to consider, and not their external appearances; because these effects seem often not at all proportioned to the cause; for we find fractures of the smallest size will sometimes be succeeded by the most dangerous symptoms, whilst others of the greatest extent produce no alarming appearance whatever.

All the symptoms of affections of the brain from external violence, seem evidently to owe their origin to compression of the brain from *commotion* or *concussion*, and to *inflammation*. These symptoms are frequently complicated with each other; but they are also often separate and uncombined; and it is in this state only that a description of them

can be given. The appearances induced in the compounded affections can only be learned from observation; but an accurate knowledge of them, as they occur unconnected with each other, will contribute much to direct the proper treatment, under whatever form they may appear.

S E C T. II.

Of Compression of the Brain from external Violence.

THE most frequent and remarkable symptoms that have been said to indicate a compressed brain from external injuries, are, giddiness; dimness of sight; stupefaction; loss of voluntary motion; vomiting; an apoplectic stertor in the breathing; convulsive tremors in different muscles; a dilated pupil, even when the eyes are exposed to a clear light; paralysis of different parts, especially of that side of the body opposite to the part of the head injured; involuntary evacuation of the urine and fæces; an oppressed, and in many cases, an irregular pulse: and when the violence done to the head has been considerable, a discharge of blood from the nose, eyes, and ears.

Some of the milder symptoms, such as vertigo, stupefaction, and temporary loss of sensibility, are frequently induced by slight blows on the head; but as they appear to be chiefly occasioned by a concussion or shock given to the brain, they are generally soon removed by rest, or remedies applied—But when any other of the symptoms occur, and particularly a large discharge of blood from the ears, eyes, or nose, we may with certainty conclude that much violence has been done to the brain, and that compression is induced on some part of it.

As the cavity of the skull is completely filled by the brain, it follows, that whatever diminishes that cavity will
produce

produce compression of the brain. This diminution may be effected, by fractures of any of the cranial bones, with depression; by the introduction of any extraneous body through both tables of the bones; and by the effusion of blood, pus, serum, or any other matter. It may be produced likewise by the thickening of the bones of the skull in syphilis, and by water in the ventricles of the brain in hydrocephalus internus. The two last mentioned cases do not come properly under our consideration. The effusion of pus, or any matter not evidently blood or serum, must be the consequence of inflammation, and will be considered hereafter.

As the introduction of extraneous bodies into the cranium is necessarily attended with fracture and depression of the skull, we shall consider both these cases together.

§ 1. *Of Compression of the Brain from Fractures with Depression.*

THE only general and useful distinction of fractures is, into those which are attended with depression, and those which are not: these last we term fissures, and shall consider them in a separate section.

Fractures of the skull may be produced by falls from a height; by blows with sharp or blunt instruments; and by missile weapons such as stones, &c. thrown from a distance—Little advantage is derived from a knowledge of the means by which a fracture is produced—For although in many instances when occasioned by a blunt instrument, or a fall from a considerable height, it is frequently attended by more alarming consequences than when it is produced by a sharp instrument, this is not universally the case. It is however proper to enquire into the nature of the cause.

The indications in this affection are,

1. To discover, as exactly as possible, the site, the course, and the full extent of the fracture.

2. To obviate the effects of the injury, by elevating or removing the depressed parts of the bone.

3. To endeavour to complete the cure, by the application of proper dressings, and attention to the after treatment.—When circumstances admit the accomplishment of these objects, we can often afford more certain relief than in any other disease.

If the integuments are torn away, or cut, the state of the bone is immediately discovered; but when they are entire, it is difficult to ascertain it. In this case, if any mark of external injury is perceived, particularly a tumor on any part of the head, with evident appearances of its proceeding from a recent contusion, the other symptoms will probably, on incision into it, be found to originate from fracture directly underneath. But, as frequently happens, when affections of the brain, and fractures of the skull, succeed injuries which do not produce any external mark, the whole head should be shaved, and then sometimes a redness of a particular spot will be perceived, and indicate the part affected. When no tumor, inflammation, or other mark of injury occurs, we may sometimes be led to the seat of the accident by pressing firmly all over the head: and if we find the patient to moan on pressing one particular part, or he puts up his hand, or draws away his head on this trial being repeated, we may conclude this the seat of the injury. If the patient applies his hand frequently to the same part of the head, it will merit our attention.

When the symptoms of a compressed brain are evidently marked, we ought to proceed immediately to the examination of the cranium, wherever the injury appears to be seated, by laying the bone bare by an incision. When the bone appears to be much injured, which may happen without a laceration of the scalp, this should be done with caution,

caution, for fear of hurting the brain. But when this is not the case, the incision may be made at once through the scalp. In order to expose the bone more completely, it has been proposed to make a crucial incision, or one in the form of a T, and by some to remove a circular or oval piece of the scalp; but when either of these modes are used, a painful wound is produced, difficult to heal; tedious exfoliations are sometimes induced; and the covering formed afterwards never answers so well as the teguments removed. A simple incision appears to be amply sufficient; on this being made, the parts retract so as to admit of a free examination of the bone, and if a fracture is discovered, the course of it may be traced as well by continuing the course of the incision along it, as by removing part of the scalp; and this will generally give room for the application of the trepan. In some few cases indeed, where the bone is fractured in different directions, it may be necessary to remove a small corner of the divided integuments.

Upon making the incision, if there is a fracture and depression of the skull, the means hereafter to be recommended should be immediately employed; but where no external mark of fracture is met with, or any injury whatever, and the patient continues to labour under the symptoms of a compressed brain; if the pericranium has been separated; and especially if the bone has become of a pale white or dusky hue; the trepan should be applied where these appearances occur. We shall hereafter endeavour to shew, that by this means alone, effused blood, or serum, which may produce the compression, can be removed; and that it would be highly improper to trust to absorption of the extravasated fluids, as advised by some.

For although no mark of disease should appear on the external table of the bone, yet there is a possibility that the *internal* table may be broken and depressed, and this may produce as bad consequences as if the whole bone was

beat in. Of this I have met with some instances, and authors tell us of many.

It will often happen that no relief is afforded by the trepan in the cases mentioned: This may arise from various circumstances, but the most fatal is what is termed a contra-fissure, by which the cranium is fractured, and perhaps depressed, or effusion occasioned, at a part distant from that which received the blow, and where alone there are marks of injury.

The existence of such a case has been called in question by theorists, but every practitioner of experience must have seen instances of this kind. It does not happen that injuries are necessarily produced immediately opposite to the parts receiving the impression, but it frequently happens that the skull is fractured in a part not immediately contiguous to those on which the blow was inflicted; and this often occurs when no external mark can be discovered on the teguments correspondent to the part fractured, and when the bone remains entire on the part which immediately received the injury.

Many of the older writers apprehended considerable hazard from exposing the brain to the air, by the operation of the trepan; while some of the moderns consider the danger so trifling, as to direct the operation as a preventative of bad symptoms. But I am clearly of opinion, that the trepan should never be used but where there are symptoms of a compressed brain, and which would probably soon prove fatal if their cause was not removed; because it appears by no means an innocent remedy, and is frequently of itself productive of dangerous symptoms.

We now proceed to the second general indication, to remove or elevate the depressed portion of bone:—

If the teguments are not separated at all, or not sufficiently, by the accident, to admit of an examination of the bone injured, the head should be shaved, and an incision

made by a scalpel through the teguments, and continued along the course of the fracture. By this it frequently happens that some blood-vessels are divided, which discharge very freely: if the patient is very weak, these should be immediately secured by ligature, lint, and compression; but when this is not the case, they should be suffered to bleed in proportion to the patient's strength. They will in common soon retract and restrain the hemorrhagy; and if they do not, they may be easily secured as above directed.

In performing the operation of perforating the skull, the patient should be laid on a firm table, and his head there secured by a pillow. The instrument now usually employed for removing a part of the cranium, in order to admit of the raising of the portion depressed, is termed a *trepbine*; but the *trepan*, (pl. i. fig. 5.) is much preferable, as it perforates the bones in half the time, and is equally safe. It differs from the *trepbine* only in the handle being worked like a carpenter's wimble.

In cases of depression of the skull in children, we have been advised to try the effects of adhesive plasters laid upon the cranial integuments, and connected with ligatures; by pulling the strings, it was proposed to elevate the depressed part; but this mode is evidently inadequate.

We have by some been directed to introduce a screw nearly through the cranium, and then by pulling it, to endeavour to raise the depression; but as by this method we could neither remove any splinters of the bones, if their internal table should be broken, or take out extravasated blood, if lodged on the brain, it would obviously be of no service in most cases.

When any portion of the bones injured can be removed by the hand, or forceps, it should be done; and if by this means the depressed part cannot be elevated to its proper situation, the use of the *trepan* becomes necessary.

The

The operation of trepanning may be performed on any part of the cranium: but on account of hemorrhagy, and the difficulty of the operation when performed in these places, it will, if possible, be proper to avoid the under part of the parietal and temporal bones, the inferior part of the frontal bones, the whole course of the longitudinal sinus, and the under part of the os occipitis.

In proceeding to this operation, as much of the pericranium should be taken off by the scalpel or raspatory, (pl. i. fig. 3.) as will admit a free application of the trepan; and this should be done at the point where the greatest resistance seems to occur to the elevation of the bone. The perforation ought to be formed so as to include not only the fracture or fissure, but if possible a small portion of the depressed piece.

A small hole is to be made in a proper part of the undepressed bone with the perforator, (pl. i. fig. 7.) to receive the pin of the trepan saw. By this the saw is kept in its situation until it is carried sufficiently deep to render such support unnecessary, when the pin is to be removed, lest it might injure the membranes of the brain.

The surgeon is now to press equably and firmly upon the instrument until he makes the perforation. If the trephine is used, the saw is made to cut by forming about half a circle with the hand alone, turned first forwards and then backwards; but when the trepan is employed, all the necessary pressure is to be applied on the head of the instrument with one hand, while the handle of it is turned with the other. The instrument should be frequently removed, and the depth of the perforation ascertained by a pointed piece of quill or a probe: and if it is deeper in one place than another, the saw should be made to bear more on the part least cut, so as to preserve the perforation of an equal depth all around. While the surgeon examines and cleans the cut, an assistant should brush the saw; or
there

there should be two saws of an equal size, that no interruption may be given to the operation. A cylindrical form of the instrument will contribute considerably to expedite the sawing.

When the bone is probably nearly sawed through, as may be judged in some cases from our having met with the diploe, the perforation should be very frequently examined, and as soon as it is found to go through the bone, the pressure should then be removed from this, and equally applied over the remaining uncut part. As soon as it is practicable, from the bone being loosened in one or two points, it should be taken out by the forceps, (pl. ii. fig. 1.) or the levator, without waiting for its entire separation by the saw, for by this practice I have seen very expert operators injure the dura mater. If any splinters are left, they may be removed by the forceps, or by the lenticular, (pl. i. fig. 2.)

That the intention of this operation may be fully answered, the piece of bone removed should never in an adult be less than an inch in diameter. If the depressed part cannot be raised by the levator, (pl. i. fig. 1.) after one perforation, as many more as may seem necessary should be made. The levator should always be fixed upon a small stand, (pl. i. fig. 4.) as the force used for elevating the bone does not then materially affect the parts to which it is applied. Great attention should be paid to the entire removal of the depression, of extravasated blood or serum on the brain, and of all extraneous bodies; and when this is done, the wound should be lightly covered with lint spread with cerate, a compress of soft linen applied over this, and a night-cap should secure the whole.

When the patient is removed to bed, the head should be placed in such a manner that the discharge from the wound may have free vent.

If the compression of the brain has been completely taken off by the operation, it sometimes happens that the symptoms

symptoms are mitigated immediately, or at least in the course of a few hours; but when no favourable change is perceived in a short time, we may attribute the continuance of the bad symptoms, either to a concussion of the brain itself, or to an inflammation of its membranes; and the remedies hereafter directed must be then applied, according to the circumstances of the case.

In all cases after the operation of trepanning, the patient should be kept quiet; little or no light should be admitted to his apartment; his food should be of the mildest kind; and his drink should be whey, or some other mild diluent liquor.

As the membranes of the brain are very apt to become inflamed in these cases, it will be proper, both as a preventative and a curative of inflammation, to produce a plentiful suppuration from the wound by the application of warm emollient poultices and fomentations over the dressings—the matter collected in the sore may be removed by lint or a sponge.

After the sloughs formed are cast off, the wound commonly fills up, and cicatrizes in the usual way; but in some cases, excrescences of considerable magnitude shoot out from the perforations. These are, in general, productions of the dura mater, and should seldom be meddled with until the different perforations are filled up with bone; when, if they do not drop off spontaneously, they should be removed by excision, caustic, or ligature: Compression can never be safely employed either to prevent or remove them.

When the scalp has been removed to any considerable extent, as the bone will afterwards be covered only by cuticle and cellular substance, a piece of tin or lead, lined with flannel, should be fitted to the part, with a view to protect it from the cold and other external injuries.

§ 2. *Of Compression of the Brain from Extravasation.*

The symptoms of a compressed brain from extravasation of blood or serum, or from the formation of pus, are exactly similar to those produced by a depression of the cranium and other causes, and therefore need not be here repeated.

Extravasation of blood or serum is a frequent concomitant of a fracture or fissure of the skull; but it also occurs in cases where no mark of either is to be perceived, or even the smallest sign of external injury. In every instance, however, the trepan affords the only mode of relief with which we are at present acquainted. When there is any external injury the perforation should be made on the part diseased: but when there is no such guide, we should make repeated openings, beginning as near the base of the skull as possible, until the seat of the extravasation is discovered.

When the removal of the blood or serum, lying upon the dura mater, does not take off the symptoms of compression, and when this membrane appears dark coloured and tense, as there will be reason to suppose there is extravasated blood beneath it, it should be cautiously opened by the shoulder of a lancet, and the orifice enlarged by crooked scissars sufficiently for the removal of the effused matter. And in like manner, when we have reason to believe there is a collection of pus, an opening should certainly be made to admit of its discharge. In either of these cases we give the patient the only chance of relief.

S E C T. III.

Of Concussion or Commotion of the Brain.

EVERY affection of the head, attended with stupefaction, and immediately consequent to external violence, but with no external marks of injury, is in general attributed to a commotion or concussion of the brain; by which is meant such a derangement of its parts as obstructs its functions, but which cannot be ascertained by dissection.

This affection may readily be distinguished from inflammation of the brain, by an attention to the characteristic symptoms of each; but it is not always so easy to discriminate between it and compression of that organ. In slight cases of concussion, in which the symptoms induced soon disappear, there can be no difficulty; but where the symptoms are in a considerable degree, a discrimination is sometimes not easily to be made.

Almost all the symptoms produced by compression of the brain have been found to follow from concussion; but those which are most frequently induced, are, stupefaction; torpor in greater or less degree; a slow, soft pulse; and a dilated state of the pupils, even when the eyes are exposed to a strong light.

The chief marks of distinction between concussion and compression of the brain are, according to my observation, to be derived from the state of the pulse and of respiration. In the former case, the pulse is generally soft, slow and equal, the breathing is free and easy, and the patient appears as if in a sound natural sleep; but in the latter, the pulse is slow, often oppressed and irregular, and the respiration is deep and oppressed, as in apoplexy.

Concussion of the brain appears to me to operate upon the general system in nearly the same manner as syncope induced

duced by fear, inanition, or any similar cause. In what manner a blow or fall induces suddenly such a state of debility, I cannot pretend to explain; but I have no doubt of the fact, from frequent and attentive observation of the symptoms of diseases of the brain from external violence, and of the effects of remedies in different cases.

Blood-letting appears uniformly to be injurious in cases of concussion, whereas it always relieves the symptoms of compression of the brain.

In cases of concussion, I would recommend the exhibition of warm wine, as in other diseases of debility; keeping the patient warm; the application of blisters all over the injured part of the head, and of sinapisms to the feet; and the administration of laxatives, so as to keep the body gently open. When wine, on which we are to place our chief dependance, cannot be given in sufficient quantities, volatile alkali, ardent spirits, and other cordials should be exhibited. Opiates, joined with antimonials, have been recommended by Mr. Broomfield; but I have found wine to be more useful. Repeated vesications to the neck and head seem to me more serviceable than the issues advised by some.

When patients are recovering, a liberal use of the bark, with the chalybeate waters, has sometimes been of benefit. Gentle emetics have likewise been serviceable; and where languor and loss of memory have continued longer than usual, electricity has been productive of good effects.

It is to be observed, that these remedies are to be used for the removal of symptoms solely from concussion, and which do not depend in any degree upon compression or inflammation, a circumstance which may usually be determined from what has been already mentioned, and more particularly from the injurious effects of blood-letting. But whenever there remains any doubt, and especially when a patient continues in a state of insensibility, we are

to suspect compression, and employ the trepan in the manner already advised.

S E C T. IV.

Of Inflammation of the Membranes of the Brain from external violence.

THIS dangerous complaint seldom makes its appearance until some days, weeks, or even months after an injury is received. In general the first symptom of it is an universal uneasiness over the head, attended with listlessness and some degree of pain in the part injured, of which perhaps the patient has hardly till now, had any cause to complain. The listlessness increases—the patient appears stupid—the pain in the injured part is gradually augmented, while a sensation of fulness is felt in the other parts of the head—giddiness and nausea, or even vomiting, come on—heat and uneasiness appear—the sleep is disturbed and not refreshing—the pulse is quick and hard—the face is commonly flushed—and the eyes are from the beginning somewhat inflamed and painful upon exposure to light.

In some instances, where the symptoms are accompanied by a wound on the head, the inflammation of the eyes and flushing of the face seem to be produced by, and continued from, an erysipelatous affection around the sore; in which cases, the edges of the sore first become hard and swelled, and the swelling apparently originating from the aponeurotic expansion of the muscles of the head, spreads very quickly over the whole of it, and particularly down the forehead, in such a manner as to close the eyes. This swelling is soft, is painful to the touch, and has an erysipelatous appearance. It arises in many instances merely from the external sore, and is not usually so dangerous as

that puffy circumscribed tumor, to which the parts injured by the blow are often liable. When it originates from the external affection, it may generally be soon removed by the common remedies of erysipelas; but, in a few cases, it is likewise produced from a previous affection of the dura mater, when it is of a very dangerous tendency.

In the course of a day or two from the time that these symptoms become formidable, the part which received the blow assumes a morbid appearance. If the bone was at first laid bare, it now becomes pale, white and dry, either over its whole surface, or in particular spots, which by degrees extend over the whole; and the edges of the sore, from the beginning of the bad symptoms, become hard, dry, painful and much swelled; but when the bone has not been denuded, and none of the soft parts have been divided, but merely contused, they now begin to swell, become puffy, and somewhat painful upon being touched; and if the head be shaved, the skin over the part affected will be found of a reddish colour. If the swelling be laid open, the pericranium will be discovered to be detached from the skull: a small quantity of a thin, bloody, and somewhat fetid ichor will be found beneath it; and the bone will be discoloured as above described.

By the application of proper remedies, these symptoms may in many instances be removed; but when this is not the case, or they are not properly attended to, they constantly become aggravated, and delirium, frequent shiverings, coma, or stupor, are superadded to them.

About this period, all the symptoms which we have described become so much milder, as not to be distinctly observed, or are altogether lost in those which now begin to appear. Paralysis of one side is soon followed by deep coma; the pupils are dilated, and are scarcely affected by the impression of light; the urine and fæces are passed involuntarily; subfultus tendinum, and other convulsive symptoms

symptoms take place; and death is the certain consequence if the patient is not soon relieved.

The symptoms described in the two last paragraphs are indicative of the formation of matter, and can only be relieved by the trepan: those first mentioned being the consequence of inflammation, are to be removed by the general remedies of inflammation.

External violence may induce inflammation of the brain, by depressing part of the cranium; by contusion; and by producing fissures or fractures of the skull not attended with depression. The first of these we have already considered, and shall now proceed to treat of the others.

§ 1. *Of Contusions of the Head producing Inflammation of the Brain.*

Contusions of the head are produced, as in other parts, by blows or falls; and are sometimes accompanied with wounds, at other times they are not.

The immediate and most frequent effect produced from them, when they afterwards prove troublesome, is to deprive the patient of his senses, and leave some degree of giddiness. In a gradual manner, however, he recovers, so that after a night's rest he appears perfectly well, unless a wound was produced at the same time with the contusion, until some days, weeks, or even months after the accident, according to circumstances, when the symptoms above described make their appearance.

Hence it is evident, that accidents of this kind, which at first appear trifling may be productive of very dangerous consequences, and therefore that all injuries done to the head merit a great deal of attention.

In the treatment of contusions of the head, the indications are;

1. To employ every means preventative of inflammation.

tion. 2. To produce resolution of the inflammation when it has actually come on. 3. If this cannot be done, and suppuration takes place, to procure a free vent to the matter: And, 4. If a gangrene supervenes, to remove it or obviate its effects.

1. Patients recover so speedily from the immediate effects of contusion, in most instances, that we seldom have an opportunity of employing the prophylactic remedies of inflammation. But when this is afforded, we would recommend blood-letting, general and topical—laxatives—the application of solution of saccharum saturni to the part affected—a low diet, and total abstinence from exercise.

2. For the removal of inflammation it will be necessary to employ, 1. Blood-letting—When a sufficient quantity of blood can be obtained by topical bleeding this should be preferred; hence leeches or cupping should, if possible, be used near to the affected part. Deep scarifications with a lancet or scalpel, when the parts have not been divided but merely bruised and inflamed, are very serviceable for this purpose. When general bleeding is necessary, it will be best to open the jugular vein or temporal artery, and draw off blood until the pulse begins to flag, if possible, to the quantity of 20 or 25 ounces: this will be much more useful than repeated small bleedings. It will be proper to repeat the bleeding in a few hours if the symptoms continue violent, to an extent to be determined by the circumstances of the case.

2. Strong purgatives, or stimulating glysters—these are very useful and should never be omitted.

3. Gentle diaphoretics. It is a matter of consequence to keep a gentle moisture on the skin. If this cannot be effected by warm fomentations to the feet and legs, and by laying the patient in blankets, we must employ internal sudorifics. Dover's powder is apt to excite vomiting; on this account

I prefer a combination of an antimonial with opium—fifteen or twenty drops of antimonial wine, with four or five of laudanum may be given every two hours until a sweat is brought on, when a less quantity will serve to support it.

4. Opiates. A prejudice against the use of opium in diseases of this kind has hitherto prevailed; but experience has convinced me that this is unfounded, and that it may always be employed with advantage to remove pain or restlessness.

5. Suitable applications to the injured part. Experience has evinced to me the utility of producing a plentiful suppuration from the part affected in all contusions of the head. For this purpose, when the accident is attended with a wound, it should be covered with pledgits of lint spread with some emollient ointment, and soft warm cataplasms should be applied over these, and frequently renewed. The symptoms are thus generally mitigated, and sometimes entirely removed. When there is no wound, and when from the swelling and pain of the injured part, some time after the accident, there will be reason to expect the coming on of bad symptoms, the tumor should be immediately laid open down to the pericranium; and if this is separated, it ought likewise to be divided, any matter that may be collected taken away, and the wound treated as just above directed.

By the contrary treatment of suffering the swelling to remain unopened until a fluctuation is perceived, I have reason to believe that the matter collected, which is generally thin and acrid, is the most frequent cause of the succeeding inflammation of the dura mater which often takes place. It produces this effect by first exciting inflammation of the parts externally, which is extended to the internal parts by the communicant vessels. Injuries of the head very probably, in most instances, operate by inducing an effusion between the skull and pericranium; this being often
 very

very small, does not occasion any evident tumor until its acrimony excites an inflammation of the surrounding parts; and hence we may readily account for the effects of these injuries not appearing until some time has elapsed after the accident.

It is to be observed, however, that the treatment we have just recommended is not applicable to tumors recently formed from external injuries. These are to be removed in common by solution of lead, or of crude sal ammoniac, or by the application of brandy, or some other astringent. Such swellings give a sensation like that afforded by fractured cranium; but we can never be deceived if we attend to the concomitant symptoms.

3. When we have reason to suppose pus is formed within the cranium, the only probable means of relief is afforded by the application of the trepan, in the manner formerly directed in sections 1 and 2.

4. When on perforating the skull, it is found that the dura mater has become sloughy, with some tendency to gangrene, the utmost danger is to be dreaded. There are, however, some instances of recovery, in such cases, upon record: all that can be done is to keep the fores clean; discharge any matter that may collect; apply soft light dressings, and give Peruvian bark and vitriolic acid in as large quantities as the stomach will bear them. If there remains any tendency to inflammation, the diet should be low and cooling, and the bowels should be kept moderately open; but if the system is low, and the pulse feeble, wine, and a generous diet should be allowed.

The operation of trepanning has been recommended in inflammation of the brain, and in some cases of epilepsy; but it must evidently be injurious in the former case, from the irritation it gives to the diseased parts; and in two cases of epilepsy in which I have seen it employed, there was every probability

probability that it occasioned the death of the patients by exciting inflammation and a consequent suppuration.

§ 2. *Of Fissures, or Simple Fractures of the Skull.*

By a fissure we understand a mere division of the skull, not attended with depression: This may either penetrate the whole thickness of the bone, or be confined to one lamella of it: it may also either be attended with a division of the corresponding teguments, or these may be left entire.

Fissures always require a great deal of attention; for although there are many instances of those of great extent healing without the occurrence of bad symptoms, yet there are also instances of very small fissures terminating fatally.

Fissures are often accompanied by original affections of the brain, and they are productive of danger themselves by inducing effusions of blood or serum upon the brain, or by tending to excite inflammation of its membranes.

When effusion takes place, as it must immediately be attended with symptoms of compression, the remedies formerly recommended must be employed. The trepan affords the only effectual relief: the fissures should be traced through their whole extent, and a perforation being made in the most depending part of each of them, if this does not prove entirely successful, the operation should be repeated along the course of the fractures, as long as the symptoms of compression remain, care being taken to include the fissure in every perforation.

It often happens that the fissure is so exceedingly small that it is difficult to distinguish it from the furrows produced by the blood-vessels, or from the sutures. This is, however, a matter of little consequence with regard to practice.

When the pericranium is not separated from the cranium by the accident, but is found separated in a particular part

on cutting down to it, it affords a pretty certain mark of a fracture beneath. When the bone is bared by the accident, it has been proposed to ascertain it by various means. By pouring ink over the bone it has been said, that it will sink into the crack and there remain, even if we attempt to wash it off with water. But it is to be observed, that unless the bones be very firmly ossified indeed, the ink will always sink into the sutures, and hence this method can seldom be of any use in discovering a fissure. Some other modes recommended, as by holding a string between the teeth and striking it; and chewing some hard substance to excite pain in the part injured, have no effect unless the injury be extensive, and then they are unnecessary.

It often happens that blood continues to ooze out constantly from the fissure; this, when it occurs, is a very certain characteristic.

It has been by some advised in all cases of fissure to apply the trepan, chiefly with a view to evacuate any collection of fluid more freely than it could be done by the fissure; but, if the fissure is wide, there can occur no necessity for it; and we know from experience, that those of small extent frequently do well without the formation of any matter; and it would certainly not be prudent to advise a hazardous operation merely for the chance of its becoming necessary. And besides, instances are often met with in which fissures penetrate no deeper than the external table of the skull; this cannot be previously known, and could never need the operation.

I am of opinion, that unless symptoms of compression come on, the trepan can never be necessary, and that fissures while unattended by bad symptoms, should be treated merely as a cause that may give rise to inflammation. The patient should be bled according to circumstances; the bowels should be kept open; the fore should be treated
with

mild dressings; and violent exertions of every kind should be avoided.*

By these means a cure will frequently be obtained; but when inflammation is induced, and suppuration is consequent to it, the trepan is to be used as in other cases.

C H A P. XXX.

Of the Diseases of the Eyes.

S E C T. I.

Of Ophthalmia, or Inflammation of the Eyes.

THE symptoms of ophthalmia vary somewhat according to the particular seat of the complaint; but those which in general occur are, a preternatural redness of the tunica conjunctiva, owing to a turgescence of its blood-vessels; pain and heat over the whole surface of the eye, attended with a sensation of some extraneous body between the palpebræ and the eye ball: and a plentiful effusion of tears. All these symptoms are commonly increased by motion of the eye or its coverings, and by exposure

K k

posure

* In all these cases, the experience and judgment of the surgeon must govern his conduct, as no precise positive directions can be laid down for that variety of cases and circumstances which occur in practice: the young surgeon should always have recourse to the advice and assistance of those more experienced, whenever he can procure it; they will not only relieve his own mind, but secure his character from the imputation of rashness or ignorance.

posure to light. When the pain produced by light is considerable, we have reason to conclude, that the parts at the bottom of the eye, particularly the retina, are chiefly affected; but when the pain thus occasioned is not great, the inflammation is probably confined to the external coverings of the eye. In superficial affections, the symptoms are usually entirely local; but whenever they are deep seated, there are severe shooting pains through the head, and commonly fever to a greater or less degree.

The tears discharged are frequently so hot and acrid as to excoriate the cheeks; and after some continuance of the disease, together with the tears, there is often a considerable quantity of a yellow purulent like matter discharged. When the inflammation has extended to, or has originated in the tarsi, a discharge of viscid fluid takes place from them, which adds greatly to the patient's distress, by cementing the eye-lids so firmly together, as to render it very difficult to separate them.

Ophthalmia sometimes, though not very frequently, terminates in suppuration, oftener in obstruction or induration of some part of the membranes of the eye, but very rarely in gangrene.

This disease may be induced by whatever occasions inflammation in any other part of the body. It is also produced by smoke; by much light, and particularly from much exposure to the rays of the sun; exposure to fire; to snow; and by the introduction of sand, lime, or any other extraneous body beneath the eye-lids. It is also induced by scrophula, or lues venerea.

When ophthalmia depends on the two latter causes, the employment of the remedies adapted to the general diathesis becomes necessary. We propose in this place merely to consider the disease when produced by local causes.

The indications of cure are, to remove extraneous irritating substances; to diminish pain and irritability induced; to remove the turgescence of the blood-vessels of the eyes; and to prevent a return of the disease.

When inflammation is produced by extraneous substances between the eye-lids and eyes, they should, if possible, be removed. The eye may be opened sufficiently to admit of this by the fingers; but it is more effectually done, if while an assistant lifts up the superior eye-lid with a blunt hook, the surgeon depresses the inferior eye-lid. The substance may by this means be discovered, and if loose, may be taken out with the end of a blunt probe, covered with a bit of soft linen, or silk; or if it is fixed in the eye, it may be removed by a pair of small forceps.

It often happens that we cannot discover the offending matter; in these cases tepid water, or milk and water, should be frequently injected under the eye-lids, and the eyes should be frequently dipped and bathed in warm water.—When the inflammation has subsisted for some time, it often continues even after its exciting cause has been removed.

Whenever the topical symptoms are considerable, and there is much fever, it will be necessary to use general bleeding, brisk purgatives, and a low cooling regimen. The light should be excluded from both the eyes; and the diseased eye should be kept constantly covered, either with soft linen soaked in a watery solution of lead, or with cold poultices composed of this solution and crumb of bread.

By these means very violent ophthalmias may often be removed; but instances frequently occur in which they are not effectual. In such, blood may be discharged by cupping the temples, or by the application of leeches to them; but it will sometimes happen, that even these give no relief: the vessels of the eye itself should then be divided.

This may be done either with the shoulder of a lancet,
or

or with a small knife. An assistant supporting the head of the patient behind, and another securing his hands, the surgeon with the fore and middle fingers of one hand, is to separate the eye-lids, while with the instrument he makes repeated small scarifications on the turgid vessels, avoiding those of the cornea, without they seem very much distended with blood. In order to produce a free discharge from the vessels, the eye should be frequently dipped in warm water, or soft linen immersed in warm water, should be constantly applied to it.

This operation is very easily and safely performed by any surgeon of a tolerable degree of steadiness; and a few drops of blood evacuated by it is frequently of more service than any other remedy.

When scarification does not remove the pain, or when it is not admitted, a little laudanum, dropped into the eye, will sometimes be effectual in taking it off. The pain as well as every other symptom produced by ophthalmia, is often relieved by shaving the head and washing it frequently in cold water. Blisters applied to the head, behind the ears, or on the neck, are likewise advantageous, as well as issues and setons in the back of the neck.

To obviate that gluing together of the eye-lids which is apt to take place, particularly at night, it will be proper to insinuate a small quantity of some emollient ointment between them, every evening. There are often slight ulcerations of the tarsi, which contribute to produce this adhesion: when these are discovered, and are unconnected with any general disease, they are most effectually removed by the application of mild mercurial ointment, by means of a pencil, night and morning, and the use of a weak saturnine or vitriolic lotion, once or twice a-day.

It is of great importance to prevent the admission of light to the eye as long as it is productive of pain; and even when one eye only is inflamed, both of them should

be lightly covered with a loose bandage of silk or linen; and when the patient is able to go abroad, the bandage (pl. vi. fig. 2.) will be found very useful. The quantity of light admitted can be easily regulated, and the eyes by it are neither compressed nor kept too warm.

To prevent a return of ophthalmia nothing is so certainly useful as cold bathing, general and topical. Shaving the head, and bathing it daily, has been found of considerable service. Peruvian bark is also very useful, and when the disease is periodical, it is the most effectual remedy: all exciting causes are carefully to be avoided.

S E C T. II.

Of Wounds of the Eye-lids, and of the Eye-ball.

WHEN the eye-lids are wounded in a longitudinal direction, all that is necessary is to bring the lips of the cut together, and retain them by strips of adhesive plaster, until a re-union takes place: but when the wound is transverse, and particularly if the tarsus is divided, the parts should be kept together by one or more sutures. The interrupted suture is usually employed, but I prefer the twisted suture. The pins used should be short and very thin, that they may not injure the contiguous parts; and in the introduction of them, care should be taken to make them pass through the fibres of the orbicularis muscle, or little advantage will be gained by the operation, and that they do not pass through the internal membrane of the eyelid, or they will injure the globe of the eye.

In performing this operation, we should be careful that the parts are not so closely drawn together, as to impede the action of the eye afterwards; and as soon as it is finished, as it is of consequence to prevent the motion of the eyes

eyes during the cure, the eye-lids should be closed, and covered with a piece of soft linen spread with saturnine cerate; and a compress of lint being laid over the affected as well as the sound eye, the whole should be retained by a napkin. Inflammation should be guarded against, or removed if present, and in three days the sutures may be removed, as a union will then probably have taken place.

When so much of the eye-lid is taken off, that the remaining parts cannot be brought into contact without impeding the motion of the eye-ball, it will be best to leave them apart, use light easy dressings, and trust to nature for supplying the deficiency with cellular substance.

Wounds of the eye-ball which penetrate deep, are frequently dangerous from the contiguity of the brain; but those which go no farther than the anterior part of the eye, although they may destroy the beauty and utility of the organ, are not in other respects hazardous.

Wounds of the cornea, particularly if directly opposite to the pupil, are most frequently productive of loss of sight in greater or less degree, from the cicatrix consequent to them; but they do not usually occasion so much inflammation as those of the same extent in the sclerotica.

These affections are attended with risk in proportion to their extent; the larger the wound is the greater danger will there be of inflammation, and of destruction of sight, from evacuation of the humors of the eye, or from cicatrices.

The circumstance which requires our chief attention in wounds of the eye, is the prevention or removal of inflammation; for if a large opening is made in the eye, a great portion of the humors will certainly be evacuated. All that art can do is, together with a strict antiphlogistic course, to keep the eye lightly covered with some emollient application of the saturnine kind, and to bathe it now and then with a watery solution of lead. When pain to any considerable

considerable degree occurs, opium may be given in proportion to its violence.

By these means, symptoms of a very formidable appearance will often be entirely removed.

S E C T. III.

Of Tumors of the Eye-lids.

THE eye-lids are frequently infested with small, troublesome tumors of various kinds.

Towards the internal angle of the eye, and most frequently on the under eye-lid, near the punctum lachrymale, many people are liable to frequent returns of a small encysted tumor of the inflammatory kind, by nosologists termed hordeolum, but commonly known by the appellation of a *stye*. This begins with a sensation of fulness, stiffness, and uneasiness of the internal canthus of the eye. At first the skin is scarcely if at all discoloured, but if supuration follows, which will always be the case if the tumor is left to itself, it becomes first of a pale red, and afterwards of a yellow colour towards the upper part, where it commonly bursts, and discharges a small quantity of a thick purulent matter. This tumor is very slow in its progress, and the peculiar appearance of it may be readily accounted for from its particular situation.

Styes are more frequently met with than any other tumors of the eye-lids, and are usually seated near the nose; but the other species are situated indiscriminately in every part of them. These are of three kinds.

The first we shall mention is commonly of a roundish form; is somewhat soft; it seems to move when pressed upon; the skin retains its natural appearance; and from the contents of it being always of a white and fat-like nature,

ture, it is termed steatoma. The matter of which these tumors are composed, is always surrounded by a firm membranous cyst.

From different parts of the eye-lids, we frequently observe small pendulous excrescences to hang by very narrow necks: on other occasions they are connected to the skin by means of thin broad bases. Some of these tumors being of a soft fleshy consistence are termed *farcomata*: others being hard, are termed *verrucae*, or warts.

In the treatment of styes, we are by some directed to endeavour to disperse them by astringent applications; but by this mode we sometimes produce tumors of a hard and inveterate nature, and may injure the eye-lids by the applications themselves. I think it the best practice to endeavour by poultices to bring them to a speedy suppuration, and then to discharge the matter; the sore usually heals very speedily, and the parts soon recover their tone, if bathed with some mild astringent.

Excision alone should be depended on for the removal of the *farcomata* and *verrucae*; if caustic or ligature are employed, they are always tedious in their operation, and often produce troublesome inflammatory affections.

The patient being seated opposite to a window, and his head being secured by an assistant, if the tumor is not large enough to be laid hold of by the fingers, a ligature ought either to be passed through it or around it, by a needle, that it may be raised from the parts beneath: if the basis of the swelling is narrow, it may be separated by one stroke of the scalpel, but if its attachment to the subjacent parts is of any considerable extent, it is better to remove it by cautious dissection. The only dressing in common necessary is lint retained by adhesive plaster.

When we have to remove a steatomatous or encysted tumor, instead of dissecting off the swelling covered with the skin, it is better merely to divide the skin and cellular
substance

substance by a simple incision entirely across the most prominent part of the tumor with a scalpel, a strong waxed thread being then passed through the centre of the cyst, an assistant should by means of it raise the tumor sufficiently, while the surgeon dissects it entirely out.

If the internal membrane of the eye-lid is divided in the operation, the lips of the wound in it must be laid as nearly together as possible, and any superfluous matter that forms must be frequently removed; but nothing more should be attempted. When, however, the external skin of the eye-lid is cut, the wound should be closed by strips of adhesive plaster.

In extirpating these tumors, whenever the cyst is pretty firm, and the contents are steatomatous, they are more easily and effectually removed by preserving the cyst entire; but when the cyst is thin, and especially if its contents are fluid, from suppuration of some part of it, which is frequently the case, it will conduce to the facility and expedition of the operation, to puncture the cyst, and discharge its contents as soon as it is laid bare.*

S E C T. IV.

Of Inversion of the Cilia, or Eye-lashes.

THE eye-lashes are sometimes so much turned inwards upon the eye, as to irritate it and produce inflammation and pain.

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* This species of tumor is frequently so situated as to admit of removal by turning the ciliary ligament outwards, then laying hold of it with a small hook and dissecting it out, without wounding the internal skin of the eye-lid.

This disease is usually termed *Trichiasis* or *Entropium*, and may depend entirely upon a derangement of the hairs themselves, which leaving their usual direction, turn in towards the eye-ball; but it more frequently originates from an inversion of the tarsus, induced either by some unequal spasmodic affection of the orbicularis muscle in the under eye-lid, for it seldom occurs in the upper palpebra, or by a cicatrix in the skin of this part. It is also sometimes the effect of tumors; and it has likewise been attributed to a relaxation of the teguments of the eye-lid.

When the complaint is induced merely by a derangement of the hairs themselves, if the hairs have acquired their full strength, as it will be impossible to bring them back into a proper direction, they should be pulled out by a small pair of forceps, which usually gives immediate relief; and to prevent a return of the disease, as soon as the succeeding hairs have acquired about half their full size, they should be turned down upon the eye-lid with the end of a blunt probe, and there retained for one, two, or three weeks, by covering them with narrow slips of adhesive plaster, or with strong mucilage or glue by means of a pencil. This method will almost always succeed in the removal of this troublesome and painful complaint.

If *trichiasis* arises from partial spasms of the orbicular muscle, the only effectual mode of cure consists in making an incision through the internal part of the palpebra, so as to divide the affected fibres. No dressing is necessary to be applied to the wound.

When a tumor or cicatrix appears to be the cause of the inversion, it should be dissected out. When, in the latter case, the disease is not immediately removed by the operation, the edges of the wound should be united by adhesive plaster, or, if necessary, by the twisted or interrupted suture. When the operation succeeds there will be nothing more than soft easy dressings requisite.

It is not very probable that entropium is ever occasioned by a relaxation of the teguments of the palpebra; when it appears to be the case, however, a solution of alum in infusion of oak bark will probably remove it; but if this does not succeed, there is no remedy but the removal of the relaxed skin by the scalpel, and afterwards uniting the edges of the wound by future.

Inflammation of the eye is a very constant attendant of this disease; when it is not removed by taking away the hairs, the remedies formerly directed for ophthalmia must be employed.

The upper lid is subject to a dropical swelling which sometimes may be productive of trichiasis: This may be often cured by making two or three small punctures in it with the point of a lancet; but when this does not succeed, it will be necessary to cut off a part of the skin with a scalpel, and close the wound afterwards by adhesive plaster or future.

S E C T. V.

Of the Turning Outwards of the Eye-lids.

WHEN the internal surface of either of the eye-lids is turned outwards, so as to fold over any part of the cilia or of the contiguous skin, the disease is termed ectropium; when the upper eye-lid only is affected, it has been called Lagophthalmus.

This complaint is not only productive of deformity, but also, in many instances, of considerable pain. It may be induced by an enlargement of any part of the eye, or other tumors within the orbit; by dropical swellings of the palpebra; by violent inflammations of the tunica conjunctiva lining the eye-lids; by mere relaxation of the palpebra;

palpebra; and by cicatrices of wounds or abscesses, producing a corrugation of the skin of the eye-lid.

When the disease is induced by tumors, these must be removed; when topical dropsy is the cause, it must be treated as directed in the last section. If inflammation has given rise to it, and it continues after that has subsided, deep scarifications into the affected part will be particularly beneficial: And if the complaint originates in relaxation, as will be particularly the case in old age, cold water, brandy, and astringent lotions should be frequently employed; but in aged persons no operation should be advised.

Cicatrices, from confluent small-pox, and other causes, sometimes induce this disease. When the contraction is only in one point, it may be removed merely by an incision through the skin and cellular substance; but when there is an adhesion the whole length of the cicatrix, after making an incision, the skin should be raised by a pair of small forceps, and the whole of it separated by the knife from the parts with which it adheres. The cilium then being restored to its natural place, the skin is to be kept in a proper situation by adhesive plaster, if possible, if not, by a bandage, until the wound fills up and heals.

S E C T. VI.

Of Concretion of the Eye-lids.

AN adhesion of the eye-lids to each other, or to the ball of the eye, is most frequently occasioned by inflammation—It is sometimes met with in new-born children.

When the adhesion is slight, and not of long duration, it may be removed in general by a blunt probe; but when the concretion is firm, or any way extensive, it can only

be separated by the knife. In performing this operation, the patient's head should be supported by an assistant, who should likewise support or elevate the upper eye-lid; whilst the surgeon, with a pair of small forceps, must raise or separate the under lid, and at the same time, cautiously remove the adhesion with a scalpel. The eye must afterwards be covered with a pledgit of lint spread with saturnine cerate; and at every subsequent dressing, a small quantity of the ointment may be insinuated between the eye-lids. All means of exciting inflammation should be carefully avoided; and if it comes on, it should be removed as in other cases.

S E C T. VII.

Of Fleishy Excrescences on the Cornea.

THIS disease is denominated from its appearance, Pterygium, or Onyx, by different writers. It is most frequently met with at the internal angle of the eye, but it attacks other parts in various instances. In some cases it is small, but in others, it gradually extends over the whole cornea.

This affection seems to consist in an organic membranous substance formed by a protrusion of some of the blood-vessels of the tunica conjunctiva from external violence, inflammation, or other causes; and its increase is probably owing to subsequent inflammations. Ophthalmia is its most frequent cause; and it seldom appears until the disease begins to subside, or has entirely gone off. During the inflammatory state, this swelling is generally of a deep red colour, and very painful; but afterwards, and when it arises without any previous inflammation, it is of a pale yellow, and unattended with much pain, unless irritated.

When the inflammation has gone off, as long as this complaint does not impede the motion of the eye-lids, we should

should trust chiefly to astringent applications, such as solutions of alum and white vitriol, as strong as the patient can bear them, perhaps ℥ss of the former, and ℥i. of the latter to ℥iv. of water, and used three or four times a-day— A weak solution of corrosive sublimate, as gr. i. to ℥iv. or verdegris, may also be employed with benefit.

Escharotic powders, as calcined alum, white vitriol, or verdegris, mixed with loaf sugar, and sprinkled on the part once or twice a day, have been used. But we should be very cautious in the application of remedies of this kind. They may be used alone, or alternated with the astringents abovementioned.

When these remedies fail in preventing the tumor from acquiring an inconvenient size, if it is attached to the eye by a small pedicle only, it may be removed by one stroke of the scalpel; but whenever it is connected to the whole, or a large part of the surface of the eye, it has usually been recommended to dissect off the whole; but this is a tedious and hazardous operation: The following answers every purpose of it without danger. The patient being placed upon a pillow on the floor, the surgeon sitting behind him on a chair, should have the head of the patient reclined on his knees, with the face so raised, that a sufficient degree of light may fall on the eyes. The patient's hands then being secured, the under eye-lid should be drawn down as far as possible by an assistant, while the upper palpebra is supported in such a manner by the surgeon with his left hand, as to expose to view the whole of the diseased part. A small knife* is now to be employed in making scarifications through the excrescence near to and all around its outer circumference, so as to cut off all communication between the roots and extremities of

* The knife best adapted to this purpose, is made about the size and shape of that used for extracting the cataract, except that it is somewhat more rounded at the point, and has a back like a common scalpel.

of those vessels of which it is formed. And in order to render the operation more certainly successful, after the discharge of blood induced by the first incisions is somewhat abated, one, two, or more circular scarifications may be made within each other.

These incisions had better be made by repeated strokes of the knife through the excrescence, for fear of injuring the eye-ball; and they may be done with equal safety, and with more ease, in the manner above recommended than by lifting the excrescence by a ligature passed through it, as advised by some operators.

The incisions should be allowed to bleed freely, and may afterwards be bathed two or three times a-day with a weak solution of saccharum saturni. If the excrescences do not seem to decrease in a few days, the operation may be repeated, and again renewed from time to time, as long as any part of the disease remains; and whenever any part of the tumor becomes loose, it may be cut off, but not without.

Although this operation very commonly proves successful, yet there are some instances in which no advantage is derived from it, and the disease uniformly increases after its performance: In these cases, we must trust to palliatives. The eye should be frequently bathed with a weak saturnine solution, and be covered with pledgits of Goulard's cerate. When these applications have no effect, and the tumor increases to such a size as to destroy vision, and becomes very painful, it will be necessary, lest it should degenerate into a cancer, to remove it at once, by extirpating the whole eye-ball.

S E C T. VIII.

Of Abscesses in the Globe of the Eye.

WHEN inflammation of the eye terminates in suppuration, which is seldom the case, it commonly originates from negligence, or from a scrophulous or some other general affection.

The effusion of puriform matter into the ball of the eye, is commonly produced from the internal part of its membranes; by mixing with the aqueous humors it produces an enlargement of the eye, a loss of vision, and such an opacity, that, in general, neither the iris, pupil, or crystalline lens can be distinguished. In some few cases, however, the iris is pushed forward, and can be observed in close contact with the cornea; and the coats of the eye being here weaker than in any other part, a protrusion commonly takes place, which, if not opened soon, bursts of itself, and discharges part, or perhaps all of the contents of the eye; and at this opening the iris, in a thickened diseased state, is very generally pushed out. In some cases, partial swellings occur likewise in the sclerotica.

During the formation of this disease the patient suffers not only a loss of sight, but severe pains in the eyes, shooting backwards into the head, are generally attendant, accompanied by constant restlessness, heat, and other symptoms of fever; and these continue very commonly until the contents of the eye are evacuated. In some instances there is no pain; but the matter formed is then small in quantity, and the swelling is chiefly of a watery nature, probably originating from an increase of the aqueous humor.

All the varieties of this disease we comprehend under the name of staphyloma. Small, partial abscesses seated

on different parts of the cornea or sclerotica, and in which there is no general affection of the eye, are included under the title of Hypopyon. In both these diseases, the motion of the eye-lids is more or less impeded.

All the varieties of the staphyloma require the same treatment. As it rarely happens that the use of the eye can be preserved, our chief object in general is, to abate the violence of the pain, and to remove the deformity produced. For the accomplishment of the first intention, the disease is to be treated by the remedies of ophthalmia: And if, notwithstanding the employment of these, suppuration is induced, and the pain produced by the consequent increased distention of the eye is very great, nothing but an incision through its coats so as to evacuate the effused matter and the thinner humors, will give relief. The patient's head being secured by an assistant, and the operator standing before him, the eye-lids may be sufficiently separated by one hand, while the knife recommended in section vii. being introduced into the most prominent part of the tumor, or into the most depending part of the transparent cornea, is to be carried forward horizontally until an opening of a sufficient size is formed.

It has been recommended instead of the above described operation, either to dissect off the protuberant part of the eye, or to remove it by a ligature; but neither of these painful modes are in common necessary, nor are they more effectual than the method we have advised. In some very long continued cases of staphyloma, indeed, where the humors of the eye seem to be entirely absorbed or destroyed, and in which the tumor is altogether formed by a thickening of the coats of the eye, and particularly of the iris, the only effectual remedy is the removal of all the prominent part of the eye; but in common, the disease should be considered merely as an abscess, and treated as abscesses in other parts of the body.

After the contents of the eye have been evacuated, the parts should be gently covered with a soft compress moistened with weak lead water, and the patient should be kept upon a low, cooling regimen, until the wound is healed, or there is no risk of inflammation.

The hypopyon is to be treated upon the same plan; the pain is to be moderated by opiates, &c. and as soon as matter is formed, it should be evacuated by an incision, in order to prevent a chance of its being discharged into the globe of the eye, and destroy vision entirely.

The fungous excrescences that occur after operations in these diseases, may be kept down by the occasional application of burnt alum finely powdered, or of lunar caustic.

S E C T. IX.

Of Dropsical Swellings of the Eye-Ball.

A DROPSY of the eye-ball is produced solely by an increased quantity of the aqueous humor. The first symptom of the disease is, a sense of fulness in the eye, which produces a good deal of distress, long before any increase of size in the eye-ball is perceptible: This at length makes its appearance; the motion of the eye-lids begins to be impeded; and vision gradually becomes more imperfect, until at length the patient is just able to distinguish light from darkness. At this period too, some part of the eye, most frequently the transparent cornea, generally begins to protrude, so as to form a small tumor. If the contents of the eye are not now discharged by an operation, the tumor soon bursts.

In the early stage of this disease there is no difficulty in distinguishing it from staphyloma; but in the advanced state this is not always easy to be done. The external appearances of these diseases are sometimes exactly similar; but in the dropfy of the eye, the patient is always sensible to the effects of light; and if the pupil can be distinguished, light will commonly produce some degree of contraction in it. It is, however, of no consequence to discriminate between them, for the treatment adapted to one is equally proper for the other. See the last section.

In the earlier stages of this complaint, as the consequent loss of vision seems to originate often merely from distention, would it not be better to evacuate the fluid, by an incision of perhaps three-tenths of an inch long with the knife (pl. vii. fig. 8.) into the most depending part of the transparent cornea; or by introducing a flat trocar with a lancet point, of the size of a crow quill, about the tenth of an inch from the cornea transparens, behind the iris, and at the most depending part of the eye? This might be repeated occasionally, if the disease should return. It is an operation perfectly safe; and after its performance, with a view to strengthen the eye, and prevent a return of the complaint, the parts might be bathed frequently with some astringent lotion.

Instead of discharging the humor by an incision, in an advanced stage of the disease, when vision is destroyed, it has been proposed to employ a seton; but it is probable this would give too much irritation.

S E C T. X.

Of Blood effused into the Cavity of the Eye-Ball.

BLOOD may be effused into one or other of the chambers of the eye by various causes. It has occurred in some instances of putrid diseases, and in inflammations of the eye; but it is more frequently the consequence of a rupture of some blood vessel, from a blow, or from a wound penetrating into the posterior chamber. When the wound does not extend farther than the anterior chamber of the eye, as the vessels surrounding that do not in common convey red blood, it seldom occurs as an effect.

Whenever blood is mixed in such quantity with the aqueous humor as to obstruct vision, it should be removed by an operation; but when it sinks below the axis of vision, and produces no inconvenience, it may be suffered to remain.

The operation for the removal of blood from the eye-ball is similar to that described in the last section. An opening should be made in the most depending part of the transparent cornea, with the knife, about a sixteenth part of an inch from the junction of the iris with the other coats of the eye; and thence carrying the point of it horizontally forward to the distance of about three-tenths of an inch, it ought at this part to be pushed through the cornea:—by proceeding slowly and steadily, all that part of this membrane should then be divided which lies between the two openings made by the instrument at its entrance into, and its passage from the cavity of the eye, care being taken to make the incision at an equal distance from the iris through its whole length.

The aqueous humor, together with the commixed blood, will now be discharged, particularly if the patient turn his
face

face downwards, and the sides of the divided cornea be separated by a blunt probe, or a small scoop. The cornea will then collapse, and a compress of lint moistened with lead water being applied, the wound will soon close, and the aqueous humor be quickly regenerated.

S E C T. XI.

Of the Ulcers on the Globe of the Eye.

THE danger of sores on the eyes depends chiefly on their situation, but in some measure also on their form. Ulcers on the cornea, from the cicatrices consequent to them, are very apt to produce loss of vision in greater or less degree; while those seated on the sclerotica never produce that effect. And ulcers that are broad and superficial, although they may induce loss of vision, yet they do not in addition to this evacuate the humors of the eye, as those which are deep and narrow often do, either by penetrating entirely through the coats of the eye, or by weakening them to such a degree that the humors force a passage for themselves.

In some cases these ulcers instead of occasioning a loss of substance, shoot out soft and fungous excrescences.

Ulcers of the eye may occur from a variety of causes, as from wounds, burns, bruises, &c. and from general affections, such as lues venerea, or scrophula. But in most cases they may be traced to inflammation terminating in the formation of matter. Inflammation is likewise a frequent and troublesome accompaniment of them.

When these affections are attended with much inflammation, all the remedies of ophthalmia in general become necessary; and when we find a number of inflamed vessels passing directly from the sores along the centre of the eye,

eye, it will not only contribute much to the removal of the inflammation to divide them, but will also be of great service in healing the ulcers. This must be done very cautiously, for if the scarifications are made very extensive and deep, they will be very apt to degenerate into troublesome sores.

After the inflammatory state of these ulcers is removed, they should be treated as ulcers in general, by the application of emollient, or of stimulating ointments,* or liniments, of escharotics, or of astringents, according to the particular circumstances of the case. And if any general disease is connected with the topical affections, remedies adapted to this should be used at the same time with the local applications. Ointments, or escharotics, can be most conveniently applied by means of a pencil. It is hardly necessary to observe, that lint or bandages cannot in general be used in cases of this kind.

When large pendulous excrescences are produced from ulcers on the eye, they should be raised by means of a ligature passed through them, and then dissected off with the scalpel. But when they are small, or broad and low, the eye being fixed with a speculum, lunar caustic should be applied by means of a pencil over their surface, and before the speculum is removed, the caustic should be washed off by a pencil, dipped in warm water or milk.

When the constitution is sound, ulcers of the eye will commonly heal without much difficulty, but in some instances it happens that they constantly increase in virulency, notwithstanding every thing used for removing them. In such cases as soon as they have increased to such a degree as to endanger the communication of the disease to the parts contiguous to the eye, the eye-ball should certainly be extirpated.

S E C T.

* Stimulating applications may be used in these cases with more freedom than is generally supposed: Such as corrosive sublimate, verdegris, white vitriol, &c. B.

S E C T. XII.

Of Specks or Films upon the Eye.

THE disease termed leucoma, albugo, or nubecula, consists in an opaque spot formed on some part of the eye. When it occurs on the sclerotica, it seldom requires the assistance of the surgeon; but when it is seated on the cornea, it always merits great attention, as a very small degree of it frequently induces a partial and sometimes a total loss of vision.

These specks or films are generally of a whitish colour, and seem to originate, in every instance, from that effusion which is so frequent a consequence of inflammation. When an abscess is thus produced, the bursting or opening of it very commonly leaves an opaque spot, attended with some degree of prominency of the parts in which it was seated; but where the effusion instead of being near the surface of the cornea is dispersed among the different lamellæ of which that membrane is composed; or when the degree of inflammation has not been sufficient for carrying it on to suppuration, the opacity induced, does not, as in the case of an abscess, form a protuberance, but rather appears to constitute a part of the cornea itself.

These spots on the eye are of various forms, and of different degrees of magnitude. Whenever they affect the sight materially, they should certainly if possible be removed. In the cure, it is of the greatest consequence to ascertain which of the two varieties above described the case belongs to. When the effused matter seems to be spread through the whole substance of that part of the cornea in which it is seated, without elevating it in any degree, no advantage can be expected from any external applications, because we cannot by these remove the dis-

ease

ease without destroying the cornea itself. In such cases, as the opacity is sometimes removed by an exertion of the system alone, probably by means of absorption, it will be proper to employ such remedies as we know excite this operation, such as a gentle course of mercury, now and then brisk purgatives, and issues. But we seldom derive much advantage from them.*

When there is an evident prominency in the diseased spot, produced from an elevation and opacity of the external lamina alone, we can often cure the complaint entirely, and almost in every case produce an alleviation of it. This variety of leucoma may be removed either by the knife, or by escharotics; but in general the former is preferable. The eye being fixed with a speculum, (pl. vi. fig. 6.) the surgeon should seat himself between the patient and a clear light; and then with repeated strokes of the small knife, (recommended in sect. vii.) he should endeavour to cut away all that portion of the cornea which is in any degree separated from the rest. This may be done with the greatest safety by an operator with a steady hand.

As patients will not always submit to this operation, we are sometimes under the necessity of employing escharotics. These may be used sufficiently strong to remove leucoma, in many instances, without injuring the sound parts contiguous to those diseased. When escharotic powders are employed alone, or mixed with emollient ointments, they should be very finely levigated. The most effectual of these are red precipitate, or verdegis, mixed with three or four

* When the opacity is confined to the middle of the cornea, and the other parts of the eye are sound, Mr. Pellier says he has derived considerable advantage from enlarging the pupil, by means of a small pair of curved scissars carefully introduced upon a grooved director, through an opening in the cornea to the back part of the iris. The cornea is to be cut exactly as directed in the operation for extracting a cataract, and the iris is to be divided its whole breadth. If this affection should be complicated with a cataract, the cataract is to be extracted.

four parts of fine sugar. Calcined alum, and white vitriol, combined with egg-shells in fine powder, have frequently proved useful. A lotion, or wash, seems to be the best form in which escharotics can be applied to the eye: to make these, verdegris, white vitriol, or corrosive sublimate, may be dissolved in water.

As it is impossible to confine any of these applications to the diseased part; all that can be done is to insert them within the eye-lid; by the motion of which they are soon conveyed over the whole surface of the eye. In order to reap advantage from them, it will be advisable to employ two or more at the same time; thus a small quantity of the powders or ointments may be used evening and morning, and a wash may be employed twice or thrice in the day.

S E C T. XIII.

Of Protrusions of the Globe of the Eye from the Socket.

THE eye may be protruded from its socket by different causes: 1. By hypopyon, staphyloma, and dropical swellings. 2. By external violence. And 3. By tumors formed behind or beneath it.

When the protrusion originates from the first set of causes, the size of the swelling must be diminished by incision, and the other means already directed in those cases.

If external violence displaces the eye, and its connection with the orbit is not entirely destroyed, it should be immediately replaced after removing any extraneous matter that may happen to have been introduced into the orbit; and with a view to prevent or lessen the consequent inflammation, bleeding, general and topical, and a strict antiphlogistic regimen should be advised; the eye should be cover-

ed with cooling saturnine applications; and light ought to be entirely excluded from it.

There are several instances upon record of the eye being entirely thrown out of the orbit, and on its being afterwards replaced, the patients have entirely recovered the use of it.

When the eye-ball is protruded by a tumor situated beneath or behind it, the cure must depend entirely on a removal of the tumor. If the swelling is formed by a collection of fluid, a cure will sometimes be obtained merely by laying the cyst open; but when it is of a firmer nature it must be totally extirpated.

An enlargement of the lachrymal gland has in some induced this disease—extirpation of the tumor is then the only remedy.

Tumors within the orbit, of whatever kind, should always be removed as soon as they begin to injure the functions of the eye; for if this is long neglected, the adjacent bones, as well as the eye, may be brought into a diseased state; and when this seems to be induced in any considerable degree, the operation will come too late.

S E C T. XIV.

Of Cancerous Affections of the Eye, and Extirpation of the Eye-Ball.

IT sometimes happens that ophthalmia and staphyloma degenerate into cancer. The eye-ball becomes enlarged, and protrudes beyond the boundaries of the socket; it acquires a firm, and even a hard consistence; and the power of vision is destroyed. The tumor has commonly a red or fleshy appearance; in some instances, a yellow glutinous matter, but most frequently a thin acrid ichor is discharged from the surface of it. For a considerable time

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the patient complains only of heat, or a sensation of burning in the swelling; but at last he becomes distressed with severe pains shooting through its substance, and across the brain to the opposite side of the head.

Whenever this disease occurs, as there is no prospect of curing it but by extirpation of the whole eye-ball, and as this is an operation attended with no danger from hemorrhagy, or any other cause, it should always be employed as early as possible. *See* section on cancerous ulcers.

In performing the operation, the patient should either be firmly seated in a proper light, with the head supported by an assistant, or what answers better, he should be laid upon a table, with his head on a pillow. When the eyelids are diseased, they must be removed with the eye; but when they are sound, they should be allowed to remain.

By means of two flat hooks, (pl. vi. fig. 7.) the palpebræ are to be separated by assistants, and then the operator is to take hold of the eye with his fingers, if it is sufficiently protruded; but if this cannot be done, it will be necessary to pass a broad flat ligature through the centre of it, in order to secure it during the operation. While this is done with one hand, the surgeon with a common scalpel in the other, must endeavour by a slow dissection, to separate the whole globe of the eye from the parts with which it is connected. Every diseased part must be removed; but great care must be taken to avoid injuring the bones.

Whenever the hemorrhagy is considerable, which is seldom the case, it may be easily restrained by pressure alone; or a piece of dry sponge being applied to the vessels, pressure may be applied with it, by filling the orbit with lint, and applying a napkin over the whole. If sponge is used, it will be proper to tie a piece of strong waxed

waxed thread to it, that it may be readily removed when there is no farther risk of hemorrhagy.*

S E C T. XV.

Of Artificial Eyes.

ARTIFICIAL eyes are chiefly useful when the eye has been but in part removed, or it has been diminished in size by the operation for staphyloma, or hydrophthalia; for when all the globe has been taken away, it is difficult to fit and preserve them in a proper situation.

They are usually made of a concave plate of gold, of silver, or of glass, coloured so as to match the eye remaining, and adapted to the orbit. Those of glass can be fitted more exactly, and kept cleaner than those formed of metal; and they should consequently be preferred.

S E C T. XVI.

Of Cataracts.

§. 1. *General Remarks on Cataracts.*

A CATARACT is a deprivation of sight, induced by an opacity of the crystalline lens, or of its capsule.†

Instances

* Though the hemorrhage consequent upon this operation, may be easily restrained by pressure with the sponge and lint as directed, yet a violent one has ensued the fourth day after in consequence of a severe cough which forced out the plug of lint from the socket in the night, and the patient lost about forty ounces of blood before any assistance could arrive. This ought to put young surgeons upon their guard in such cases.

† M. Pellier, a very able and successful French oculist, tells us, that cataract is sometimes induced by an opacity in the fluid, with which the
substance

Instances have occurred in which cataracts have formed in a few hours; but in common their production is gradual. The first symptom is usually a weakness or dimness of sight; and this commonly takes place long before any alteration in the appearance of the lens can be perceived. This gradually increases; and after some time, upon examination, the lens will be found of a dusky hue, and somewhat opaque. The patient at length either becomes totally blind, or perhaps is just able to distinguish bright colours, or light from darkness. The lens grows opaque in proportion to the degree of blindness, and gradually becomes white, or of a grey or pearl colour: in a few instances the opacity is partial, but it is in common extended over the whole lens.

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substance of the lens is immediately surrounded. That it is in some cases complicated with a dissolution, and in others with an opacity of the vitreous humor, originating from very violent inflammation, and which are both incurable; and sometimes with adhesions of the lens to the capsule of the vitreous humor; which is probably the most common cause of a failure in couching.

He also informs us, that when a cataract is of a firm consistence, it is almost always of a brown colour; and when fluid of a cream colour, except in children at birth, when it is of a milk white; and that the eye, in the latter case, appears full, and somewhat larger than usual, and the capsule is considerably thickened: This if it is of a yellow colour, a small portion of the lens is commonly hard, and the rest fluid: And that he has seen instances of a black cataract; which is to be distinguished from a gutta serena, by the pupil retaining its contractile power. Mr. Bell appears to be well convinced, that Mr. Pellier is capable of distinguishing these varieties of cataract by the marks here laid down.

Mr. Pellier prefers extraction to depression of the cataract in every case, except the pupil is very small. He always fixes the patient with his side towards the light, during the operation; but the eye opposite to that operated upon, previously covered, is placed near the light. He separates adhesions of the lens, or replaces the iris when it is thrown forward, by means of a small instrument which he terms a curette. When there is

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In simple cataracts the pupil contracts and dilates according to the degree of light in which it is placed; but when they are combined with gutta serena, it is immovable, and generally is much dilated. Pain is not a common symptom of this disease; and when it occurs, it probably originates from an attendant inflammation at the bottom of the eye.

There is no danger of confounding cataracts with any other diseases of the eye, if a proper attention is given to the characteristic marks of each.

The body of the lens itself is commonly the seat of this disease; but in some few instances it is found to depend on an affection of the capsule, forming what is termed the membranous cataract.

The proximate cause of cataract seems generally to consist in some degree of obstruction in the vessels of the lens,

reason to suppose the cataract fluid, he merely introduces a knife through the cornea and pupil, and makes an opening in the capsule. When the membrane is diseased, he always advises us to avoid tearing it, and to extract it together with the lens. That Mr. Pellier ever takes out the capsule together with the lens, by pressure, as he directs, Mr. Bell from several facts, and for very substantial reasons, very confidently denies. Mr. Bell advises the blunt probe to open the capsule, as less dangerous than the knife.

If the cataract is accompanied by an incurable opacity confined to the middle of the cornea, and every other part of the eye is found, Mr. Pellier proposes to enlarge the pupil. See Note to Sect. on Leucoma.

Mr. Pellier advises repeated small doses of opiates a few hours after the operation. Besides other remedies, he uses a liniment of powdered alum, or of white vitriol and saccharum saturni beat up with white of egg, and applied between folds of soft linen, and a little of the latter insinuated between the eye-lids, three or four times a-day, to remove the consequent inflammation and pain. When the iris, after the operation, is forced out at the incision by any cause, he says it may be touched frequently with gentle caustics, such as Goulard's extract of lead concentrated by long boiling, or any mild antimonial caustic; immersing the whole eye immediately afterwards in warm milk, or some emollient decoction, and then covering it with a compress wet with lead water, &c.

lens, induced in some instances by external violence, but in others by some internal cause with which we are unacquainted. This is rendered probable from the disease often happening to women about the period of the cessation of the menses, when obstructions in many parts of the body are more particularly apt to be induced.

The indications of cure in this disease are, 1. To remove the opacity of the lens; or when this cannot be accomplished, 2. To remove the lens itself from the axis of vision.

In the incipient state of cataract, mercurial preparations, and particularly calomel, are sometimes serviceable. When inflammation occurs, it must be treated as in other cases. The extractum hyoscyami, the flammula jovis, and other vegetable preparations, are much recommended by some; but I cannot say any thing of them from my own experience.

In confirmed cataracts of long duration, we seldom derive advantage from any internal medicines; and we are consequently reduced to the necessity of removing the diseased lens from the axis of vision. This is accomplished, either by pressing it to the bottom of the eye, by an operation termed couching, or by removing it entirely from the eye, by the operation of extraction.

§. 2. *Of Couching or Depression of the Cataract.*

By the operation of couching, the opaque lens is separated from its capsule, and being pressed down behind the iris, below the axis of vision, if the operation succeeds, it either remains there during life, or is dissolved in the aqueous humor. And although the sight will never be so perfect afterwards, as it was before the lens became diseased, if the eye be otherwise sound, it will be quite sufficient for the common purposes of life.

As this operation as well as extraction, is always succeeded by inflammation to a greater or less extent, it should never be risked unless the patient is blind to such a degree as to prevent him from following his ordinary business; and never then, when the cataract is complicated with gutta serena, or with an opacity of the cornea. Although the lens is frequently harder than natural, and in some instances softer, this, were it always known, should not influence us in determining upon the operation.

In order to obviate the inflammation consequent to couching, it will be proper to confine the patient to a low regimen a few days previous to the operation, and to give him two or three doses of some cooling laxative at proper intervals.

It will be best to have the patient placed in an apartment exposed to the north, during the operation; for although it may be necessary to have a good light, the sunshine should not be admitted, as it will, by irritating the eye, prevent it from being steadily fixed. The patient should be placed upon a low seat, with his face towards the window; and the surgeon upon a chair considerably higher, should be seated directly before him. An assistant standing behind must be directed to place the patient's head upon his breast, while he secures it in this situation by his right hand under the chin, and his left placed upon the forehead; and the patient's hands should be properly secured by an assistant on each side.

The assistant is now to raise the upper eye-lid with the fingers of his left hand; and the surgeon applying the groove in the speculum, in such a manner that it may receive the edge of the eye-lid, the opening or circle formed by the brim of the speculum is to be pressed upon the ball of the eye till the cornea, and nearly the eighth of an inch of the sclerotica, is protruded. A steady and equal pressure being made on the instrument by the left hand of the operator,
and

and he having the elbow of the right leaning on a table, or on his knee, in order to preserve the arm steady, must take a couching needle (pl. vi. fig. 3.) between the thumb and fore and middle fingers, while the ring and little fingers are made to rest upon the cheek of the patient: the point of the instrument is to be carried forward beyond the external canthus of the eye, and being brought nearly into contact with the sclerotic, it must be suddenly plunged through this coat somewhat below the centre of the eye, the twelfth of an inch perhaps, and about one-tenth of an inch behind the iris.

In order to avoid injuring the iris, the flat side of the needle is to be introduced towards it; and it is thus to be carried forward in a horizontal direction, until the point of it is discovered behind the pupil. The flat surface of the needle is then to be turned downwards; and the point being pushed into the upper part of the lens, we endeavour to depress it to the bottom of the eye by raising the handle of the instrument: It will be instantly known that this is effected by the disappearance of the lens, and by the patient discovering more light than he had been lately accustomed to. In order to give the operation a better chance of success, it will be advisable to carry the lens slowly on the point of the instrument towards the outer and back part of the eye. By this means, the crystalline will be partly lodged in the vitreous humor, and there will be less risk of its rising again to its former situation, an occurrence which has sometimes taken place.

The needle should now be withdrawn, and the speculum taken off; and there will be no harm in making a cautious trial of the good effects of the operation, by presenting some object before the eye. A compress of soft lint wet with a weak saturnine solution should then be lightly applied over the eye, and this being secured by a triangular napkin, the patient should be confined in a dark

room, and kept upon a low regimen for some time. As additional preventative remedies of inflammation, a purgative or two may be given, and when necessary, blood should be taken from the temporal artery, or jugular vein, or from the vicinity of the eye by leeches.

In the course of three or four days, the dressings may be removed from the eye. It may then generally be ascertained whether the operation has succeeded or not. The power of vision does not always immediately return; and there are instances in which the sight, very imperfect at first, has gradually become better for several months after the operation, which probably happens from the slow subsidence of inflammation excited in the capsule of the lens.

When the first operation is unsuccessful, as soon as the inflammation produced has gone off, the trial may be repeated; and again if this second attempt should not be effectual. A failure, I am disposed to think, generally arises from not pushing the lens beneath the vitreous humor, which by its pressure may probably prevent it from rising. Experience proves that no bad effect is produced from doing this, and much harm may ensue from neglecting it.

Couching, as above described, is supposed to have been performed on the left eye; but in operating on the right eye, if the needle is to be entered in the usual way at the external canthus, it must either be done with the left hand, or if the surgeon wishes to use the right hand, he must stand or sit behind the patient, having the head supported on his breast. As there are few surgeons who can use the left hand with sufficient dexterity, and we cannot have a good command of the eye when standing behind the patient, it will be better to use the needle (pl. vi. fig. 4.) with which the operator may couch the right eye with the right hand very well; the only difference between this and the method already described, consisting in entering the
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the needle at the internal canthus, and drawing the cataract toward the nose.

Instead of couching in the manner we have described, it has been proposed to pass the needle through the transparent cornea and pupil; but besides that the cataract cannot thus be so easily depressed, there must be a very great risk of injuring the iris.

§. 3. *Of Extracting the Cataract.*

IN proceeding to this operation the patient must be placed and secured exactly in the manner directed for couching; and the surgeon must likewise be seated, and have his arm steadily supported, as advised in that operation. When the lens is to be extracted from the left eye, the speculum must be applied in the manner we have formerly mentioned, and pressed with the left hand upon the eye, with as much firmness as is necessary for securing the eye, but no more, as it would not only give needless pain, but would press the cornea so near the iris, that this might be injured by the knife.

The surgeon is now to take the knife (pl. vii. fig. 8.) between the thumb and forefingers of his right hand, allowing nearly an inch to project past the extremity of his middle finger; and the point of it being brought into contact with the lucid cornea, it must be made to penetrate this coat at about the distance of the sixteenth part of an inch from the iris, in a line running from the external canthus of the eye directly across the centre of the pupil: the convex surface of the knife being kept next to the iris, it must be carried in this direction until the point of it reaches the other side of the eye directly opposite to where it entered, and must there be pushed out until nearly a quarter of an inch of the instrument is through the cornea. The knife must then be moved slowly downwards
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in such a manner, that all that portion of the cornea, lying between the point at which it entered and that at which it passed out, may be divided at an equal distance from the iris. A femilunar opening will thus be formed sufficiently large for the passage of the cataract: while this is made, the pressure of the speculum upon the eye-ball should be gradually lessened, otherwise the vitreous humour may be pressed out; but it should not be entirely removed, lest the pressure of the knife should draw the eye too far down towards the socket, by which the incision will not be carried sufficiently low, and consequently not made large enough to admit of an easy extraction of the lens.

The operator must now lift up the flap formed in the cornea with the flat crooked probe, (pl. vii. fig. 2.) and cautiously passing it through the pupil, must scratch an opening in the capsule of the lens; the cataract must then be forced out by a very moderate and equable pressure on the globe of the eye, by means of the speculum. When the lens is lodged in the anterior chamber of the eye, and we cannot remove it by gentle pressure, or with the scoop, it will be better to enlarge the opening by a pair of small probe pointed scissors, than to employ much pressure, by which a great deal of injury may be produced.

With a view to facilitate the passage of the lens, it will be proper to place a dark cloth between the eye and the light, in order to dilate the pupil as much as possible.

When the opacity is found to reside in the capsule of the lens, we have commonly been advised to attempt its removal by passing forceps, and other instruments through the pupil; but as this cannot be accomplished without great risk of injuring the iris, and other parts of the eye, I would advise rather to trust to time, and an antiphlogistic regimen to carry off the opacity. This does no mischief, and I have known cures performed by it; but I
never

never knew them to succeed the contrary practice, which has frequently destroyed the iris entirely.

When the operation is to be performed on the right eye, it may be done with the same differences as directed in performing couching, either with the straight knife, or with the crooked knife, (pl. vii. fig. 10.).

The operation being finished, the patient is to be dressed and treated in the same manner as directed after couching. As however a greater degree of inflammation is apt to succeed to extraction than to couching, bleeding, and a very strict antiphlogistic regimen, will be more necessary. In favourable circumstances, the wound commonly heals in ten or fourteen days, but sometimes it continues open for several weeks.

When this operation is not performed with sufficient caution, it often happens that the whole, or at least a considerable part of the vitreous humor escapes at the incision. In some of these cases, the eye always remains sunk in the head, and useless; but most frequently the globe soon begins to fill again, and in the course of two or three weeks it commonly acquires its usual size. Whether this arises merely from an aqueous secretion, or whether the vitreous humor is regenerated, is doubtful; but I am disposed to believe from the effects of the operation in a case where a cataract was removed from each eye, that the vitreous humor is in such cases reproduced. This substance was retained in one eye; it was evacuated from the other; and yet in a few weeks the patient saw equally well with both.

As an improvement on this operation, when the cornea is to be cut, I would propose that it be divided on its superior part, in the same manner as it is usually cut below. This, from reasoning, and from experiments on brutes, I am led to believe would tend considerably to prevent the escape of the glassy humor, and to lessen the obstruction

to vision which always necessarily happens, in some degree, from the cicatrix left on the cornea.

But not only these objections, but all danger of injuring the iris, which is very frequently more or less hurt by the passage of the cataract, and from which our want of success perhaps generally arises, would be obviated by forming a sufficient opening behind the iris, about the tenth of an inch beyond the cornea, instead of cutting the cornea itself, and extracting the lens by the curved sharp pointed probe, (pl. vii. fig. 1.).

On account of the circumstances just mentioned, from which a loss of vision, sooner or later, is very frequently produced by the common operation of extraction of the cataract; from the less degree of danger from pain, and injury to the eye, and more especially, from the more frequent and permanent restoration of vision, from couching, I am induced to consider it as much to be preferred to extraction, as this is at present practised.

S E C T. XVII.

Of the Fistula Lachrymalis.

EVERY obstruction to the passage of the tears from the eye to the nose, is usually comprehended under the term of *Fistula Lachrymalis*.

This disease assumes a variety of appearances, according to the seat of the obstruction, and to the effects produced by it upon the neighbouring parts. When the lachrymal puncta, and the small ducts connected with them, are obstructed in consequence of burns, wounds, or violent inflammatory affections, the tears necessarily fall over the cheek; and this, together with a consequent dryness in the corresponding nostril, constitutes that varie-

ty of the disease, which alone should be termed Epiphora; for when the obstruction is seated in any other part of the lachrymal passages, the complaint is attended with symptoms of a much more perplexing and painful nature.

When the lachrymal puncta and ducts remain open, if obstruction takes place in the under part of the lachrymal sac, or in the duct leading from this to the nose, the first symptom is a small tumor in the internal canthus of the eye, which is made to disappear upon pressure being applied to it, by a plentiful flow of tears passing into the eye, and from thence over the cheek, and perhaps a greater or less quantity passing into the nose. If the tears are now regularly pressed out before the swelling acquires any considerable size, and before they have become acrid by stagnation, they are, in general, found to be perfectly of a natural appearance. This state of the disease has been termed a dropsy of the lachrymal sac; and by a proper application of pressure may be often cured.

It most frequently happens however, either from inattention in the patient, admitting of the sac being overstretched, or from some other cause, that the disease gradually grows worse—the passage into the nose becomes entirely obstructed—the swelling in the canthus increases, but still is unaltered in colour—the tears are then pressed out with more difficulty; and are mixed with a proportion of thick, opaque, white mucus—But the patient seldom suffers much pain, or any other inconvenience than what arises from the tears and mucus passing over the cheek.

At length the tumor begins to become tense, red, and painful to the touch, and the matter pressed out has much the appearance of pus. The parts gradually become more inflamed, until the teguments at last burst, and form an opening in the most prominent part of the swelling, at
which

which the tears and matter are now entirely discharged. This opening being usually small, heals again in a few days; but it bursts as soon as any considerable collection is again formed in it: and it continues thus to form and discharge alternately, until the opening becomes sufficiently large to prevent any further collection. This forms a sinuous, callous ulcer, sometimes with retorted edges; and the disease is now properly termed a fistula lachrymalis.

It happens in many cases, particularly when the habit is tainted with syphilis or scrophula, an occurrence by no means unfrequent, that the contiguous bones become carious: in such circumstances the discharge is thin, fœtid, and commonly so acrid as to corrode the adjacent integuments; and the fore assumes a different appearance according to the general affection with which it is connected.

The prognosis as well as the method of cure in this disease, must depend entirely upon the nature of the obstruction in the lachrymal passages, and the particular stage of the affection. When the disease is recent, and proceeds from inflammation of the lachrymal passages, which is the most frequent cause, and is induced by measles, ophthalmia, catarrh, &c. our prognostic may generally be favourable; but when the complaint is of long standing, and the bones have become carious from scrophula, or the venereal disease, the cure will chiefly depend on the removal of the general affection, and is seldom completely obtained.

When the disease is a consequence of tumors in the contiguous parts, e. g. of polypi in the nose which press on the lower part of the nasal duct, the prognosis must almost entirely depend on the practicability of removing the swelling.

If the disease originates from inflammation, the common remedies of inflammation in general must be used—general

ral or local bleeding—laxatives—a low diet—and saturnine applications to the parts. In some instances, these remove the complaint; but in many others, the sides of the ducts are united by the inflammation, and thus continue the complaint after the inflammation has entirely subsided.

When the obstruction thus produced is seated in the puncta lachrymalia, or in the ducts leading from these to the sac, we are to attempt its removal by inserting a small probe (pl. vi.) into each punctum, so as to pass it along the course of the ducts into the lachrymal sac. The openings thus formed, may be preserved by afterwards injecting, twice or thrice daily with a small syringe, a weak solution of alum, or of saccharum saturni, and by keeping at other times small leaden probes constantly inserted, till the sides of the ducts are rendered perfectly callous; the tears will then pass as formerly into the nose. This is a nice, but not a difficult operation.

Instead of the method we have advised, it has been proposed to introduce a seton into the ducts, and suffer it to remain until their cavities become callous. Independent, however, of the difficulty of doing this, it would probably excite so much pain and inflammation, that it would do more harm than good.

But the obstruction producing this disease is most frequently situated in the duct leading from the lachrymal sac to the nose. While this produces no farther inconvenience than a frequent discharge of tears over the cheek, with perhaps a slight swelling forming now and then in the corner of the eye, nothing more should be directed than to press out the tears from the sac by the finger, so frequently as to prevent them from becoming acrid by stagnation, and to avoid exposure to cold, or any other cause that might excite inflammation of the eye, or other contiguous parts.

We are indeed advised to attempt the removal of the obstruction, by inserting probes into the lachrymal or nasal ducts, or by injecting fluids into these passages. But besides the difficulty, and sometimes impossibility of performing these operations, the pain and inflammation excited by them often does a great deal of injury. The practice of introducing quicksilver into the sac for the removal of the obstruction, will probably seldom be found serviceable, but is less exceptionable than the others. A continued application of pressure, as advised by some, does not appear to have the least chance of removing the disease.

Although the palliatives above described should be trusted to in the simple state of the complaint, whenever the tumor in the angle of the eye becomes larger, inflamed, and painful, and there is danger of the bones being injured by the acrid matter collected in the part affected, we are under the necessity of having recourse to a different method of treatment. In such circumstances, our views must be, to discharge the contents of the swelling; to procure a free discharge in future for the tears from the lachrymal sac into the nose; and to prevent the passage from being again obliterated: And this being done, to heal the external opening.

While the swelling continues hard, it would be improper to open it, as this would give a great deal of pain, and the parts below could not then be freely examined. But a warm emollient poultice should be kept constantly over the tumor until it becomes quite soft; the point of a lancet should then be pushed into the superior part of it fairly into the sac, and should be carried downwards in a straight direction to the most depending part. When there is already an opening formed, it should be sufficiently enlarged by a scalpel introduced upon a director. A few fibres of the orbicularis muscle
will

will thus be cut, but this will produce no inconvenience. The contents of the swelling are now to be gently forced out; a small doffel of lint spread with emollient ointment should be inserted between the lips of the wound, and a slip of adhesive plaster placed above to retain it. As a plentiful discharge commonly takes place, it is necessary in general to renew the dressings every day; and in order to preserve the opening of a proper size for admitting a free examination of the parts beneath, a piece of prepared sponge, of such a size as not to irritate the parts, may be introduced instead of the lint every second or third day; and the more effectually to prevent its irritation, a piece of soft oiled linen should be put around it. A piece of waxed thread may also be tied to it, that it may be easily withdrawn when necessary.

It was formerly the practice, instead of the dressings we have recommended, to employ the actual cautery or escharotics for the purpose of destroying the hard edges of the sore—This produced a great deal of pain, deformity, and sometimes an obliteration of the cavity of the different ducts, the consequence of which, was a constant discharge of tears over the cheek. In many cases, however, the lachrymal ducts continued open, and a frequent recurrence of the complaint then succeeded.

By the management we have advised, any degree of hardness remaining in the wound will soon be removed; and the sore being cleared of a tough viscid kind of mucus with which it is always covered for a few days after the operation, we are now to attempt the formation of a free passage for the tears from the sac into the nose. This is effected by removing the obstruction in the nasal duct; or when this is impracticable, by forming an artificial opening directly through the os unguis, from the under and back part of the lachrymal sac.

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With a view to accomplish the first of these objects, a firm round pointed probe, (such as in pl. vi. fig. 7.) should be inserted into the bottom of the sac, and pushed forward with a moderate force in the direction of the nasal duct; if it enters the beginning of the canal we may then go on with safety, and a probability of success, but if the instrument cannot be entered into the canal we should desist, as it is then probably rendered impervious by an adhesion of its sides. When the probe can be passed, the opening may be preserved by keeping a piece of cat-gut, or of lead wire constantly in it, until it becomes sufficiently large.

Should every trial for discovering the natural conduit of the tears be ineffectual, we are reduced to the necessity of forming an artificial passage for them. This has been accomplished till very lately by the actual cautery. But the cautery should never be had recourse to in these cases, because it is always productive of considerable injury to the parts contiguous to those which alone ought to be operated upon; and because every good purpose which it answers can be obtained with equal certainty, and with more ease and safety, by forcing any firm sharp instrument from the back part of the sac through the os unguis: This is best performed by a small round trocar.

In proceeding to this part of the operation, the patient's head should be supported by an assistant; and the surgeon, sitting or standing between him and the window, must introduce the canula of the trocar into the under and back part of the sac: it must be kept firmly in this situation with one hand, while the stilette is inserted into it with the other; and the point of it should then be carried forward obliquely downwards, through the os unguis just where the sac terminates and the nasal duct begins, and into the nose, taking care to avoid following the natural passage, for fear of injuring the os maxillare. The
entrance

entrance of the instrument into the nose will be followed immediately by the discharge of a small quantity of bloody mucus from the nostril. The stillette should now be turned round until the opening is made sufficiently free, and then it may be withdrawn. A leaden probe equal in size to the stillette, being introduced through the opening, the canula may likewise be taken out, and the external end of the probe should then be somewhat curved to prevent it from slipping into the nose. The fore must be covered with a small pledgit of lint, spread with emollient ointment, and the whole may be retained with a strip of adhesive plaster.

The leaden probe should be kept in the fore until the sides of the passage become perfectly callous, which will usually happen in about eight or nine weeks. It should be taken out every day or two, that the matter adhering to it, and that collected in the fore may be removed: and at each dressing, infusion of oak bark, solution of alum, or some other astringent should be injected with a small syringe from the external opening into the nose. On withdrawing the leaden probe, the external opening should be well cleaned; and as it has then become very small, it will soon heal by bringing the sides of it together and retaining them by adhesive plaster, or when this does not succeed in a few days, touching the edges with lunar caustic will commonly complete the cure very quickly. In the mean time, moderate pressure by the finger, frequently applied, or by a machine, should be used, and ought to be continued until there is reason to suppose the sac and contiguous parts have recovered their lost tone.

What we have said respecting the propriety of continuing the leaden probe for a considerable time, and of applying pressure afterwards on the sac, is entirely applicable when the natural passage of the tears is discovered. In-

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stead of a probe of lead some advise a piece of cat-gut, or of bougie; but these are more difficult to introduce—absorb too easily the mucus of the part—are apt to be entangled in the bone—and are not so effectual in rendering the passage callous.

When the disease returns, which is sometimes the case, after the performance of this operation, it may originate from some general affection, as scrophula, or syphilis; from a mere caries of the bone; or from too small an opening being made.

When the bones are discovered to be carious, the tumor must again be laid open; an exfoliation of the bones produced if possible; and then the os unguis must be perforated as before, if the exfoliation does not form a sufficient opening. If this second operation should be unsuccessful from the sore again filling up, we will have reason to suspect a general affection of the habit, which must be removed before a permanent cure can be expected. When the taint of the habit is venereal, large and tedious exfoliations usually take place, and a perfect cure is not often obtained.

In order to obviate the uncertainty of this operation, it has been proposed in every case to introduce a silver or gold canula, either through the natural passage of the tears, or through the artificial opening; and by leaving it there, and healing the skin over it, thus to form a passage which no disease of the constitution can have any effect upon. But as the operation when well performed, is generally successful, and it is a very disagreeable and formidable circumstance to most people to have any extraneous body remaining for a long time in a wound, I would never advise it until the usual operation is found to be ineffectual: It would then be proper to use the canula: In pl. vi. fig. 9. is one of the best forms of it; it should always be made of gold, and so long as that the lower part may just pass

pass through the os unguis, while the upper part is covered by the integuments.*

It has been advised, in order to prevent the imaginary bad consequences of splintering the os unguis by the use of the trocar, to employ an instrument made in the form of the canula of a trocar, with a handle like that of the stillette, but with a sharp edge. By this a piece of the bone is easily cut out; but as the operation is more effectually done with the trocar, and experience shews that there is no danger from its use, it should certainly be preferred.

CHAP.

* M. Pellier constantly employs this method, and generally accomplishes a cure in three weeks, and sometimes in two. He says he never fails in finding the end of the lachrymal duct; and always makes an opening in the course of it. The tube (fig. 9.) is introduced on the perforator, (pl. vi. fig. 10.) and pressed into the orifice made, by the compressor (fig. 10.) In order to ascertain whether the tube is of a proper length, a little milk and water should be injected after its introduction, and if this passes readily into the nose it will do; if it does not, the tube must be withdrawn and, shortened. The wound must be dressed with lint and cerate for eight or ten days, or as long as it affords much matter, and then healed by adhesive plaster; and milk and water should be daily injected through the canula.

C H A P. XXXI.

Of Diseases of the Nose and Fauces.

S E C T. I.

Of Hemorrhagies from the Nostrils.

HEMORRHAGIES from the nostrils are in general of little importance; but as they sometimes are dangerous, and have even proved fatal, they always merit attention.

Cold, in most cases, is an effectual remedy—It should be applied in a variety of ways: The patient should be placed in a large apartment, through which a current of air passes; his food and drink ought to be cold; his face frequently bathed or immersed in cold water, or vinegar and water; a strong solution of alum, or some other astringent, should be used as a gargle, and compresses wet with it applied over the nose:—When in bed he should be lightly covered, and have his head high.

If these means fail, the uncertain remedy of compression must be tried. Compression may be made by a dossil of lint introduced into the nostril; but a piece of hog's gut that has been dried and moistened again, tied at one end, and introduced by means of a probe or director along the nostril as far as the upper part of the pharynx, and then filled with some cold liquid, as water, vinegar, &c. and tied at the

end

end hanging out at the nostril, is more effectual in restraining the hemorrhage.

When both these are ineffectual, we must introduce a strong ligature into each nostril, by means of a crooked tube, take hold of the ends in the fauces with a pair of forceps, and draw them out; then tie a bolster of soft lint to each, large enough to fill the posterior nares, and by pulling the ends of the ligatures that hang out of the nostrils, firmly fix the cushions of lint in the upper part of the pharynx; and afterwards apply a compress of lint to each nostril, and secure them by tying the ligatures over them. By this means, if the cushions are well adapted, and firmly fixed, no blood can escape from the nares, and what is effused will coagulate. The dossils of lint should remain until the re-union of the vessels has taken place. By using two ligatures, &c. a more firm and equal pressure is applied than by the employment of one only, as commonly advised. Rest should be enjoined after the operation.

Future returns of the disease may be prevented by bleeding, cooling laxatives, and a low diet.

S E C T. II.

Of the Ozæna.

AN *ozæna*, or ulceration in the nostrils, is often a consequence of catarrh, and is usually attended by a swelling of the adjacent parts. Its most common cause is cold; but external violence of every kind that terminates in an inflamed state of the membrane of the nose, such as the application of acrid irritating substances, blows, bruises, &c. may also produce it.

In this state of the disease, astringent applications are chiefly to be depended on, such as a decoction of

Peruvian or oak bark, mixed with solution of alum, brandy or other ardent spirits, diluted with water; lime-water, &c.

Dossils of lint, wet with some of these, should be introduced to the affected part three or four times a day; and at night, lint spread with an ointment prepared with a considerable proportion of lap. calam. or zinc. calc.

A collection of matter in the antrum highmorianum may be mistaken for an ozæna, as the matter is sometimes in such cases discharged through the nose: Considerable attention is therefore requisite to discriminate these complaints.

When the matter discharged in an ozæna is thin, fœtid, and of a brown or blackish colour, we have cause to suspect a caries of the contiguous bones, which must be removed before a cure can be expected. This seems to originate commonly from a lues venerea; but whatever be its cause, mercury seems to be the best remedy for it. The local applications abovementioned are also to be employed; and as fungous excrescences are frequently produced, ointments with corrosive substances may be occasionally used with the greatest safety, particularly red precipitate and verdegris, in the proportion of an eighth or ninth part of the first, and a smaller quantity of the latter, to one of wax and oil.

When the carious bones have exfoliated, a continuation of the astringents already mentioned will commonly effect a cure.

Ozæna is often difficult and tedious of cure when a caries is attendant; in this case we have no remedy that can with certainty be depended on. The mode of cure above recommended will however commonly succeed.

S E C T. III.

Of Imperforated Nostrils.

IMPERFORATED nostrils in new-born children is a rare occurrence; but instances of preternatural adhesions of the nostrils, in consequence of small pox, burns, or venereal sores are often met with.

Obstructions of this kind are in various degree: whenever the breathing is much impeded by them, or a considerable deformity is produced, the assistance of surgery should be afforded.

When any opening is left in the nostril, a small grooved director being inserted into it, the passage may be easily enlarged to its natural size, by running a bistouri or scalpel into the groove in the course of the adhesion. But when no passage is discovered, we should endeavour by a cautious dissection with a small scalpel, to discover the nostril, keeping in a proper direction between the septum and alar nasi; and when once discovered, it may be easily enlarged in the manner already described. We must then proceed in the same manner on the other side. To prevent the reunion of the divided parts, we should introduce small metallic tubes, covered with soft leather, and spread with some emollient ointment; these are to be retained by adhesive plaster, connected with them, or by a bandage applied around the head, and should be used as long as any soreness continues. Dressings of lint might answer, but the tubes allow of breathing through the nostrils, distend the parts more equably, and are more easily retained.

When from burns, small pox, &c. an adhesion of the lip to the nose occurs, together with the obstruction above-mentioned, it should be separated slowly by a scalpel, and the sore thus produced healed before the nostrils are operated

rated on. To remove any contraction of the lip which may occur, it ought at each dressing to be tied down by a double-headed roller passed around and over the head.

S E C T. IV.

Of Polypi in the Nose and Throat.

THE whole of the nasal cavity, and of the back part of the throat is liable to excrescences, which from their supposed resemblance to the insects of this name, have been commonly termed polypi. These most frequently originate from that part of the membrane of the nose which covers or lines the ossa spongiosa, and in general are confined to one side of the nose. In some instances, however, they occupy both nostrils; and now and then become so large as to be perceptible on looking into the fauces. Cases have occurred in which they originated from the pharynx.

The first symptom of this disease is commonly a partial loss of smell, attended with a sensation of fulness or obstruction in some part of the nose. This increases till a small tumor or excrescence is perceived in one or both nostrils, which, in some instances, descends no farther than to be merely perceptible when the head is somewhat raised; in others, it falls down upon the upper lip before, and perhaps pushes back into the throat.

In some, this elongation of the tumor is permanent, but in most cases the swelling retracts within the nares in dry, and protrudes only in rainy or hazy weather. In some instances, the swelling appears very considerable in the least tendency to a damp atmosphere, and even in those who, in dry weather, were not known to labour under the disease.

Polypi are of various degrees of firmness; most of them are soft and compressible; but some acquire almost the
hardness

hardness of cartilages. Both kinds are apt to bleed on being fretted, or roughly handled; but those of a soft spongy nature *only* are so remarkably affected by the weather.

The colour of polypi is likewise variable; in common they are pale and transparent, and these according to my observation, are usually soft and compressible, while the more firm are generally of a deep red colour.

In the commencement of the disorder the pain is inconsiderable, and in the softer kind, it is seldom at any time considerable; but the harder polypi are generally painful in proportion to the increase of their size, particularly when irritated. Polypi also become in some instances unequal and ulcerated; a large, thin, and foetid discharge takes place from them; and if they are not then extirpated, are apt to degenerate into cancers, but more particularly those of a firm texture.

The softer kinds of these swellings when of considerable size, produce a great deal of distress, by falling on the lip, and by passing into the fauces, and obstructing deglutition and respiration. In some instances, not only the nostrils are much distended, but the bones of the nose are separated and raised.

Polypi are said most frequently to depend on a scrophulous or venereal taint. They may be symptoms of these diseases, but in such cases we would consider the general disease merely as an occasional cause of the local affection; for in almost every case, a local injury may be traced as the cause of polypus; and upon the whole we conclude it is always of a local and circumscribed nature. Even when it originates from syphilis, it remains after the general affection is completely removed.

The harder polypi probably may arise from the same causes that produce similar tumors in other parts; but they generally seem to be connected with a caries of the bone beneath: and this renders them more hazardous and difficult

cult of cure than those of a softer nature, which we imagine are commonly produced by a mere distention and relaxation of the membrana schneideriana. When any portion of this membrane becomes inflamed from cold, &c. or is ruptured or eroded, as frequently happens from blowing or picking the nose, a weakness is produced, which is apt to terminate in a prominency; and this being increased by every succeeding cold, a polypus comes to take place.

The further progress of the disease may depend on various causes; but generally it will advance more or less rapidly, according as the parts are more or less liable to inflammation. Thus we have instances of polypi remaining small and stationary for a number of years, when the patients were not much exposed to the open air: while among poor people who are exposed to every inclemency of weather, and consequently more liable to frequent catarrh, the disease advances with great rapidity.

The risk with which polypi are attended is, according to my experience, nearly in proportion to their firmness. The removal of the softer kinds may always be undertaken with a probability of success; but in polypi of a fleshy, or still firmer texture, it is always attended with considerable hazard, for they often cannot be entirely removed; and even when their removal is practicable, they are very apt to be regenerated, or to become cancerous.

As long as the hard polypi remain stationary, and are not attended with pain, if the breathing or deglutition are not obstructed by them, they should not be touched: but when the reverse of these circumstances takes place, we should always endeavour to extract them, provided they do not adhere throughout their whole extent to the bones, or these bones are not carious.—A caries of the adjacent bones is very apt to take place in an advanced stage.

In the soft polypous tumors, astringent applications, such as solution of alum, decoction of oak bark, vinegar,

or spirits, frequently prevent them from acquiring an increase of bulk, and will sometimes diminish, but never remove them. These applications should always be used on their first appearance.

The methods employed for the removal of polypi have been, the use of *caustics*, actual and potential; the passing of a *seton* or cord through the nostril, with some corrosive unguent on the part in contact with the tumor; *excision* with the scalpel or scissars; the application of a *ligature* around the neck of the tumor; and evulsion or extraction by the *forceps*.

Caustics are not employed at present, because they cannot be prevented from injuring the sound as well as the diseased parts. The seton is inadequate to the removal of polypi, and seems only useful when small portions are left after the extirpation of the greater by other means. When the tumor originates low enough to admit of excision, the scalpel should be employed; but this is rarely the case: and the nostril is often so filled, that we have no room for the introduction of a knife.

The *ligature* is the best remedy; it is less painful than tearing or twisting off the polypus by the forceps, and equally practicable. It is thus to be applied when the tumor is in the throat.

Take a pliable piece of silver wire, which when doubled, is long enough to pass through the nose into the pharynx: let the doubled extremity be slowly and gently insinuated through one of the nostrils, and when it appears in the throat, let the operator with his fingers open the doubled extremity sufficiently for passing it over the pendulous end of the tumor; and having pressed it down to the root of it, pass the ends of the ligature hanging out of the nostril, through the pipes of a double canula, similar to that represented in (pl. iv. fig. 5.) except that the end is a little crooked; the canula is to be inserted into

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the same nostril, and pushed back along the course of the wire, till it comes in contact with the root of the polypus. The fingers being still continued in the throat to preserve the ligature in a proper situation, the wire must now be drawn tolerably tight, and the ends being fixed on the handle of the canula, it must be left so till the next day, when it should be drawn somewhat tighter; and this being daily repeated, the tumor will soon drop off—If small, in two days, if large, frequently in three: But we must be careful not to draw the ligature so tight as to cut the tumor and induce hemorrhagy.

All polypi which originate in the throat, or which proceed back from the nostril into the fauces, and even those which are deeply seated in the pharynx, if the ligature can be applied over them with the fingers, or with a forked or slit crooked probe, may thus be removed.—Those which are seated low down in the œsophagus, might probably be treated in the same way.

When the polypus is fixed deep in the œsophagus, and on all occasions in which the application of the ligature is tedious and difficult, it is proper to secure a free respiration, by previously performing Bronchotomy: In such cases a speculum oris should also be used.

To apply the ligature to a polypus seated in the anterior part of the nose, and which proceeds towards the upper lip; let the double of it be passed over the most depending part of the polypus, and be slowly pushed up to the root of it with a slit probe: the probe being given to an assistant to keep the ligature in its situation, the ends of the thread must be passed through the double canula, (pl. iv. fig. 5.) which being inserted into the nostril on the opposite side of the polypus, and pushed along till it reaches the root of it, the ligature should now be drawn so tight as to make some impression on the tumor, and the

ends

ends of it must then be tied to the wings of the instrument, and daily tightened till the tumor drops off.

Mr. Cheselden recommends to pass a ligature through the nostril into the throat, in such a manner that the doubling may include the root of the polypus, and the opposite ends may be taken out of the mouth and twisted so as to remove the tumor—this mode would often fail.

For the extraction of polypi by the anterior nares, straight forceps with eyes have been commonly employed—and those who choose to use forceps for the removal of polypi which pass into the throat behind the uvula have used crooked forceps. Dr. Richter, of Gottingen, has invented a pair of crooked forceps, (pl. ii. fig. 2.) by which pressure may be applied equally to every part of the tumor included in them—the blades being separately introduced, where the polypus is large. In this respect, and on account of their facility of introduction, they are the best yet invented. The blades are connected and introduced like those of the midwifery forceps. The part introduced should always be made small, on account of the straitness of the passage.

In proceeding to extract a polypus by the forceps, the patient should be firmly seated with his head leaning back, and supported by an assistant behind; and in order to discover the origin of the tumor, it will be useful to place the face so that the light of a clear sun may fall into the nostril. The surgeon is now to take the forceps and insert one blade on each side of the polypus, and bringing the points as near as possible, or quite to the root or neck of it, and grasping it firmly, endeavour to extract it entire, by pulling downwards, or from side to side, or more properly perhaps by twisting the polypus round till it is completely separated. By turning it round, the attachment may be more readily loosened, probably, than by any other way, and the membrane is not so liable to be torn—and if the

polypus is firm, it may frequently be brought away at once; but if soft, it will be extracted piecemeal—as much as possible should be removed.

A hemorrhagy in considerable degree often attends the first attempt to remove the tumor; but this should not be regarded, unless it be very profuse; and in patients of a robust habit, even after the operation, it will be proper to suffer a moderate discharge, as this will tend to prevent the inflammation which otherwise would be apt to occur. The means formerly recommended are proper to restrain the bleeding when it seems proceeding too far. If any part of the polypus remains and we can bring it into view, it may be touched with lunar caustic covered with a canula, the day after the operation, and every second or third day afterwards, till it is removed—when any remaining part cannot be seen, the seton might be employed to remove it; but a bougie, probably, would answer better—this might also be serviceable in dissipating an incipient polypus. I have seen very beneficial effects from it in one case: A hollow silver tube covered with plaster, was used during part of the time, through which the patient breathed freely, and which was secured by strips of adhesive plaster, connecting it with the lip—a piece of tape passed round the head might be employed for the same purpose.

When polypi are so large that forceps cannot be introduced, it will be proper to lay the nostril open, by dividing the cartilaginous parts by means of a longitudinal incision; and after extracting the tumor, to re-unite the wound by an adhesive plaster or by future. There is no risk in cutting the ala nasi; for if we find, on laying open the parts, that the tumor cannot with propriety, be taken away, the wound will soon heal again.

When a firm polypus has ulcerated, and the cartilages and bones of the nose are affected, this treatment would be imprudent; but in the softer kinds which scarcely ever
become

become cancerous, and where the cartilages and bones are not affected, it should be used without hesitation.

In a case of firm fleshy polypus, which filled the nostril so that the forceps could not be introduced, Dr. Richter pushed a red hot trocar covered by a canula, through the centre of the tumor, and thus formed a passage through which the patient breathed easily, and by which the tumor was much lessened.

S E C T. V.

Of Extirpation of the Tonfils.

ENLARGEMENTS of the tonfils seem to originate commonly from inflammation, and are but seldom if ever schirrous; independent of inflammation they are never painful; they never terminate as far as we know in cancer; and when the diseased part is extirpated, the complaint never returns.

Whenever these tumors become so large as to produce much interruption to the passage of the aliment and air, they should be removed.

For this purpose, the *cauteries*, actual and potential, have been advised; but the impossibility of confining their effects to the diseased parts should always prevent their employment. Excision with the scalpel, or crooked scissars is also inadmissible, on account of the consequent hemorrhagy.—The method by ligature is the only proper mode. Silver wire, or catgut may be introduced through the nose, as in operating on a polypus in the throat, and fixed on the amygdala, a straight or somewhat crooked canula being employed in the manner the canula is used in that operation, and the process conducted exactly in the same way.

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The more pendulous the tumor, the more easily will the ligature be fixed, but in any case the difficulty is inconsiderable.

The ligature, if carried through the mouth, would be very inconvenient; but should any difficulty occur in the employment of the mode recommended, this may be used.

If it be necessary to remove both almonds, it will be proper to allow any inflammation that may occur from the first operation to subside, previous to the removal of the remaining gland.

The mode above described I conceive to be the best; but the operation may often be done differently. Let a sufficiently strong ligature be formed of waxed thread, and carried round the tumor, either with the fingers or a split probe. A noose is then to be formed on it and drawn round the almond by fixing one end of the thread at its side, with a small steel instrument which is straight, except at the ends, where it is formed into rings, while the other is drawn out of the mouth by the other hand of the surgeon. When the tumor is of a pyramidal form, and broad at the base, a double ligature being put into the eye of a long needle, fixed in a handle, with the eye near the point, the needle is to be pushed through the middle of the swelling near its base, and the thread being disengaged by forceps, the needle must be withdrawn. By the assistance of the ringed instrument, a knot must then be formed on each half of the tumor.

Both these operations are recommended by Mr. Cheselden: Mr. Sharpe concurs with me in thinking them unnecessary, and properly superseded by the mode first described.

S E C T. VI.

Of Extirpation of the Uvula.

WHEN the uvula, in consequence of frequent inflammation, &c. becomes relaxed to such a degree as by irritating the throat, to induce cough, retching, and vomiting, and to obstruct deglutition; and when this cannot be remedied by astringent gargles, extirpation can alone be depended on for a cure.

This may be effected by excision or ligature:—when the uvula is merely elongated, the first should be employed; but where it is much enlarged, as there would be danger of considerable hemorrhage from the use of the knife, the ligature should be preferred.

The crooked, probe-pointed bistouri, is the best instrument for cutting off the uvula; but it may be done with a pair of common or curved scissars. In both cases the mouth should previously be secured with a speculum oris, and the uvula should be taken hold of with a pair of small forceps, or a sharp hook. If much blood is discharged after the operation, we must use an astringent gargle, or touch the vessel with lunar caustic.

When a ligature is employed, the mode of fixing it described in the last chapter but one, may be adopted; and the canula may be introduced either through the mouth or nose: or it may be done by Mr. Cheselden's method of tying the tonsils. After passing the ligature, it should be tied as directed in the case of polypus, by Mr. Cheselden. See Ch. penult.

S E C T. VII.

Of Scarifying and Fomenting the Throat.

FOMENTING the throat is often useful in inflammatory angina. For this purpose the inhaler of Mr. Mudge (pl. viii. fig. 3.) answers better than any thing yet proposed. This instrument is equally serviceable in catarrhs, for conveying warm vapour to the trachea and lungs.

Scarifying the throat also is often a beneficial remedy in inflammatory angina; an instrument for this purpose is delineated in pl. viii. fig. 5.

C H A P. XXXII.

Of the Diseases of the Lips.

S E C T. I.

Of the Hare-Lip.

NATURAL deficiencies occur more frequently in the lips than in any other parts of the body: children are often born with fissures in one of them, but particularly in the upper lip. In some there is a considerable deficiency of parts, and in others two fissures with an intermediate space. These affections are all included under the name of

hare-

bare-lip, from a supposed resemblance in them to the lip of that animal.

The opening is commonly confined to the lip, but sometimes it extends along the palate and uvula into the throat; and in many instances the bones of the palate are separated, in part, or altogether wanting.

Deformity is a constant consequence of this disease. It sometimes prevents sucking, and when in the under lip, is commonly attended with inability to retain the saliva: and it is always productive of impediment in the speech. When the division extends along the bones, chewing and swallowing are obstructed by the food passing up to the nose.

These are reasons for attempting the cure as early as possible. I have effected this, in healthy children, in the third month of their age; and the operation may be performed thus early with as much probability of success as at any time of life—Young children are more easily managed than those at a more advanced age.

The intention of this operation is to cut off the sides of the fissure, in order to reduce it to the state of a fresh wound; and then to bring the divided parts into contact, and to retain them there till a firm adhesion takes place between them.

Some contend that adhesive plasters or bandages, are fully adequate to the retention of the parts after they are properly cut; these may succeed in some cases, but they will frequently fail, and induce a necessity for a second operation;—when sutures are properly employed they never fail.

In performing the operation, if the patient is an adult, he should be seated with his head to the right, properly supported by an assistant behind; but if a child, he will be more firmly secured by being laid on a table, and kept in a proper posture by an assistant standing on each side. The operator is now to make an attentive examination

nation of the diseased parts and of those contiguous to them. The upper lip is to be separated from the gums beneath; and if a tooth projects it should be removed, as it would irritate the lip. If there is a projection from the angles of the divided palate bones, it must be taken off by cutting pliers, (pl. ix. fig. 1.) or forceps. One side of the lip is now to be taken between the thumb and fore-finger of the left hand, and an assistant doing the same, and stretching it pretty tightly, an incision must be made from the under border of the lip to the superior part, with a scalpel, in which a small portion of the sound parts must be included; the same must be performed on the opposite side, terminating in the same point in the upper part of the lip; by this means, a piece including the fissure, will be cut out resembling an inverted Δ .

The vessels should be suffered to bleed freely if the patient is plethoric; and then the sides of the wound should be united. To effect this the cheeks should be pushed forward so as to bring the edges of the wound nearly into contact, and an assistant behind should support them in this situation. Pins are then to be introduced in the manner described, when treating of the twisted future. The first should be near the under edge of the lip, leaving merely space enough to support it. Another should be inserted in the centre of the cut, and a third very near the superior angle of it.—In infants two pins will suffice.

In passing the pins, they should be entered nearly half an inch from the edge of the wound; and being carried almost to the bottom, they must be again passed outward in a similar direction, and to an equal distance on the opposite side of the fissure. The assistant should now press forward the cheeks so as to bring the parts into close contact, and a waxed ligature must be applied over the pins, beginning with the under one, and having made three or four turns, describ-

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ing the figure of 8: it should then be carried to the contiguous pin, and being in a similar manner carried round that, the operation must be finished by passing it to the other; taking care to draw it so tight as to retain the parts well in close contact, but not so strait as to irritate them. A piece of lint covered with mucilage should now be put over the cut—it should also cover the ends of the pins, that they may not be entangled by the bed-clothes, &c.

When there is a great deficiency of parts, and the edges of the wound are with difficulty brought together, an oblong piece of leather spread with common glue, or with a strong mucilage, being applied over each cheek, and reaching from the angle of the jaw to within an inch of the pins on each side, each piece of leather should have three firm ligatures fixed to the end next the lip, which should be made to pass between the pins, and be tied so as to retain the parts together.

The pins should remain five or six days, and during this time the patient should be fed on spoon-meats, and be prevented from laughing, crying, or stretching the mouth in any way.

When the hare-lip is double, there is a necessity for performing the operation twice: But we should complete the cure of one lip before attempting to operate on the other. The incision should always be extended to the upper part of the lip: the sides of it should be exactly of an equal length, and to insure this, it will be proper previously to mark the length and direction of the cut with ink—and the lip should be equally and tightly stretched during the incisions: for this purpose, curved forceps may be used to lay hold of the lip, and the incisions made along the side of them in the proper direction.

Some writers direct us to introduce a piece of paste-board, lead, or tin beneath the lip, and cut upon it; but the incision is more easily made as above directed.

fars may be employed with as much safety and ease as the scalpel.

Flexible needles are used by some instead of the pins we have recommended, but they are not so proper. In passing the pins, particular care should be taken that they go nearly through to the opposite side of the lip; otherwise a fissure may remain in the inner part of the lip, and a troublesome oozing of blood may take place behind. Death has ensued from this discharge, in consequence of ignorance of its quantity, from the patient's being directed to swallow his saliva. This should induce us to forbid swallowing the saliva, while it is tinged with blood— Besides this dangerous inconvenience, sometimes a small quantity of blood taken into the stomach, excites nausea and vomiting, which stretch the lip and separate the closed parts.

Fissures of the lip, from whatever cause, are to be treated in this way; except that in a recent wound, all that is necessary is to insert the pins and apply the ligatures. While any inflammation continues in wounds where supuration has commenced, we should avoid the application of the ligatures; but as soon as this subsides, the operation may be used with as much success as when the wound is recent.

In cases where the bones of the palate are separated, after uniting the soft parts, some advantage may be obtained from a thin plate of gold or silver fitted to the arch of the palate, inserted in the fissure, and fixed by a piece of sponge stitched to the convex side: The sponge should be dry when inserted, and the moisture it imbibes will retain it. By this means the speech and swallowing will be much aided. When, however, the fissure is wider externally than within, sponge cannot be applied.—A plate with gold springs to fix on the contiguous parts has been proposed, but it does not succeed.

S E C T. II.

Of the Extirpation of Cancerous Lips.

THE under lip is more subject to cancer than any other part of the body; and the scalpel alone can be trusted to for relief. When the whole lip or a considerable part is affected, the diseased parts must be removed, the arteries tied, and the fore dressed as a recent wound. This uncovers the teeth and gums, and produces an incapacity of retaining the saliva, and a difficulty of swallowing liquids; but there is no alternative—When an inconsiderable portion of the lip only is affected, the edges of the wound should be united by the twisted future as already described: By this means much deformity and inconvenience will be prevented; and the disease will be less apt to return, than when it is treated without employing future.—If a third of the lip remains, the future may be used: It succeeded in a case in which mere extirpation had been twice tried.

When the disease extends to the cheek, a transverse incision of the cheek as well as a longitudinal one of the lip will be necessary, and both are to be afterwards closed by pins and ligatures.

C H A P. XXXIII.

Of Diseases of the Mouth.

S E C T. I.

Of Dentition.

IN Dentition, the gums covering the teeth that are about to appear become inflamed and full—the child frequently rubs them—the saliva is generally increased, though in some rare instances lessened in quantity—The bowels are irregular; sometimes costiveness, and sometimes diarrhoea occurs: Fever is produced; and sometimes subfultus tendinum, and convulsions.

When opiates, blisters, and particularly warm bathing, fail to relieve the symptoms, making an incision through the gums directly upon the approaching tooth or teeth is frequently effectual; this is commonly termed *scarifying the gums*. It should be employed early, and repeated two or three times over the same tooth if necessary. A gum lancet is the best instrument to perform this operation with; but a lancet or bistouri may be employed. The incision should be of a crucial form, and carried down to the tooth: It commonly heals easily; and often instantly relieves children who appear to be in the most imminent danger.

Pain over the whole jaw, with inflammation and swelling of the gums and cheeks, often extending to the throat, sometimes occur from the approach of the second set of teeth, particularly from the dentes sapientiae; the same treatment

treatment will commonly suffice for the removal of these symptoms. It is oftener unsuccessful when the dentes sapientiæ produce the irritation, than when it originates from any others; and extraction of the offending tooth, will alone succeed in many instances.

S E C T. II.

Of Derangement of the Teeth.

THE second set of teeth frequently appear in an irregular manner; some of them will be farther out of the jaw, and others farther in, than they ought to be. This often produces considerable deformity; and seems to occur most frequently in the incisores or canini, and seldom or never in the molares.

Derangements of the teeth originate; from a deficiency of space in the jaw, in consequence of which, they cannot all be admitted into one circle; from a natural conformation; or from some of the first set remaining after the second have appeared.

When the derangement seems owing to any of the first set remaining, these should be immediately removed; and if it is caused by those of the second set being too large for the space allowed them, we should not hesitate to take some of them away. When the teeth which occupy the circle are regular and good, the tooth or teeth which are out of the circle should be pulled; but when either of the contiguous teeth do not fill the space so properly as these would do, or are rough and disagreeable in appearance, it will sometimes be advisable to pull one of those in the circle, and endeavour to bring the others in the natural range. Nature will then sometimes supply the vacancy; but if she does not, as soon as the body of the deranged tooth has

has passed out of the gums, it should be connected firmly to the adjoining teeth by a ligature, tightened from time to time, until the tooth is brought within the circle. A plate of gold or silver fixed to the contiguous teeth, and made to surround those deranged, so that when pressed by the opposite jaw it acts with considerable force in bringing the teeth together, is a mode very troublesome, and much less effectual.

A ligature may be applied, perhaps in the best manner yet known, by passing a thin plate of gold perforated with several small holes, and exactly fitted to the sides of those teeth opposite to the one to be moved, then over four contiguous teeth, tying it to them by waxed thread; and afterwards putting a piece of flexible wire or catgut through two of the holes; carrying the doubling of the ligature over the tooth to be moved, drawing the ends through the holes, and fixing them with pliers. The ligature should be tightened every three or four days until the tooth is properly placed.

Deformity is frequently the consequence of an opening in the anterior part of the jaw, produced either by a deficiency of one or more teeth, or from their being accidentally knocked out. If a surgeon is called immediately after an accidental loss of teeth, he should replace them if not broken; or if the patient chooses, one or more teeth may be transplanted: If an inflammation and swelling have already come on, these should be previously removed. When several teeth are lost, artificial teeth may also be fixed to those that remain firm. If one tooth only is wanting, in young people, a ligature fixed round the two contiguous teeth will often by degrees draw them together: this nature sometimes in part effects; but, in that case, the points *only* will approximate.

S E C T. III.

Of Gum-Boils.

THE gums are very frequently subject to abscesses, because they are much exposed to the causes productive of them. Gum-boils may originate from cold, and other common causes of inflammation; but they more commonly are produced from tooth-ach. They occur not only from caries, but also from inflammation at the roots of the teeth.

A gum-boil commonly appears after a fit of tooth-ach has continued for some time: It begins with pain, and a small tumor in the part; the cheek soon after swells, and frequently the whole face. When suppuration takes place, the swelling becomes pointed, and if not opened soon bursts on the side of the gum, or between the gum and teeth. Effectual relief is afforded by the discharge of matter; but as the cause commonly remains, the discharge continues till this is removed; or if the opening closes, the disease is commonly soon renewed. When indeed inflammation at the root of a tooth is the cause, and the periosteum is not separated, a cure may be produced, after the discharge of the matter, by the union of the sides of the abscess: But when the tooth is carious, its root denuded, or when a part of the jaw is carious, removal of the diseased parts will alone accomplish a cure.

Where inflammation at the root of the tooth is the cause, the abscess should be laid completely open, a dossil of lint introduced, and the wound healed from the bottom. But when incision will not be admitted, we should inject tinct. myrrhæ, lime-water, spirits, and tinct. of bark diluted to remove the discharge. If the affection is seated very deep, so that there is danger of a caries of the jaw from the
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impoſthumation, we ſhould uſe warm fomentations to the part, and warm ſtimulating ſubſtances, ſuch as a roasted onion, to that part of the gum moſt affected, in order to excite a ſuppuration, that may point into the mouth; and as ſoon as matter is formed, we ſhould open the abſceſs. A free depending orifice ſhould afterwards be preſerved, till exfoliation takes place, and a cure is completed. Where there is a ſcrophulous or other conſtitutional affection, the ulceration is commonly very troubleſome, and only yields to remedies for the general affection.

S E C T. IV.

Of Abſceſſes in the Antrum Maxillare.

WHATEVER tends to produce inflammation in the membrane lining the antrum highmorianum may produce abſceſſes in it; ſuch as blows on the cheeks; inflammations of the membrane lining the nares, and even long continued inflammations of the eyes ſpreading into the antrum. Much expoſure to cold has frequently produced them; but repeated violent tooth-ach is their moſt common cauſe. Mr. Hunter conſiders the obliteration of the duct leading from the antrum to the noſe as a frequent ſource of theſe collections; but this appears to me to be merely a conſequence of ſome of the other cauſes, and to be occaſioned in common by adhesive inflammation.

The firſt ſymptom of this complaint is ſome degree of pain over the cheek; which frequently continues a conſiderable time before any ſwelling comes on. This increaſes, and extends perhaps to the eye, noſe, or ear; at length a hard ſwelling appears over the whole cheek, which after ſome continuance points, moſt frequently in the centre of the cheek, a little above the roots of the poſterior molares.

lares. In some instances, the matter bursts out between the roots of these teeth and the gums, and prevents the discharge externally; this probably takes place in common, when the roots of the teeth penetrate the antrum. For the most part too, as soon as matter is formed, some of it is discharged by the nostril when the patient lies on the opposite side with the head low. In judging of the origin of a discharge by the nostril, we must consider that it may be produced from inflammation of the membrana schneideriana; from an ozæna; from affections of the frontal sinuses; and from abscesses in the lachrymal sac, as well as from matter in the antrum maxillare.

As soon as we have evidence of the disease, if a perforation is not made to discharge the matter, the bones of the cheek will be elevated, and at last rendered carious. The opening may either be made into the side of the antrum, where it projects over the two great molares, or one of these teeth may be taken out, and a perforation made directly upwards in the course of one of the fangs. The last is the only effectual mode. If either of the large molares is diseased that should be removed; but if they are both sound, the one next the dens sapientiæ should be taken away, because the antrum is thinnest beneath it.

Sometimes the matter is discharged immediately on drawing the tooth, either from having penetrated the socket, or from the os maxillare being corroded by its contents. If the opening thus formed, is insufficient to admit of a free discharge, it should be enlarged; but if no opening occurs, one is to be made by pushing a trocar, or some other proper sharp instrument, into the antrum, in the direction of one of the fangs. In performing this, the patient should be seated on the floor opposite to a clear light, and his head laid on the knee of the operator, who may either stand or sit behind him. The instrument should be

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withdrawn

withdrawn as soon as by the non-resistance to its point we find it has entered the cavity.

As soon as the matter is discharged, a wooden plug, with a knob at its head, should be introduced into the orifice, to prevent the air and food from entering it. This plug should be removed twice or thrice a day, to admit of a free and quick evacuation of the collected matter; and a cure will commonly soon be obtained. But in some cases, either from relaxation of the membrane of the antrum, or other causes, the discharge continues considerable a long time. In this case, liquids moderately astringent should be frequently injected; but nothing should be used which contains any solid matter, that might be deposited in the antrum: I commonly use a solution of alum, brandy diluted, or lime-water. When the bones are carious, of which we may be satisfied by the appearance and smell of the discharge, or by the probe, we cannot expect a cure till exfoliation has taken place.

Blood may be effused into the antrum, from blows, &c. and require this operation.—Worms sometimes are produced in it; they are indicated by violent pains in the region of the cavity, not induced by any obvious cause. In this case an opening should be made immediately above the roots of the large molares, and after extracting all the worms we can find, oil, a filtrated solution of assafoetida, or a weak infusion of tobacco, should be injected from time to time, to destroy any that may remain.

It has been proposed by Mr. Hunter, to perforate the antrum through the nostril; and with equal propriety it might be perforated through the roof of the mouth; but it must be obvious, that the mode above recommended is infinitely preferable to either.

By the means we have advised, almost every disease from collections in the antrum maxillare, may be removed;

ed; but there are complaints, apparently originating from an enlargement of the bones of the cheek, which frequently terminate in the death of the patient. In abscesses of the antrum, the cheek seldom swells very much; and when the disease has been of long duration, if the matter does not find an opening into the nostril, or along the root of the teeth, it commonly points towards the prominent part of the cheek; but when no matter is collected, and the disease proceeds from an affection of the bones, although the swelling gradually arrives to a considerable size, it spreads *equally* over the cheek, without pointing at any particular part, except in the last stages when suppuration occurs in some of the soft parts. Till the skin is inflamed, which only happens in an advanced period, the swelling remains colourless. But the most characteristic mark of this species of swelling, is the remarkable degree of elasticity which it acquires: The bones yield to pressure, and on its removal instantly return to their former situation. If an incision is now made into them, they appear soft and cartilaginous, and sometimes somewhat gelatinous.

In the instances of this disease, where carious teeth appeared to have some effect in producing it, their removal has produced a temporary stop to its progress; and in some others, long continued gentle courses of mercury, with decoction of mezereon, have had the same effect; but no permanent benefit arises either from internal medicines or external applications.

S E C T. V.

Of Excrescences on the Gums.

THE gums are liable to excrescences of different degrees of firmness, from the hardness of a wart to the softness of fungus, nearly of the colour of themselves.—These excrescences impede mastication and the speech, but are seldom painful—they occur most frequently in the under jaw and inside of the teeth, and commonly adhere throughout their whole extent. They frequently originate from carious teeth, and sometimes from caries of the alveoli.

Removal of the diseased bone will commonly be followed in these instances, by disappearance of the excrescence; but if it is not, the tumor should be extirpated. I never knew either a hemorrhagy of any consequence, or a cancer to succeed the extirpation. When the excrescence is attached by a narrow neck, a ligature should be applied to it; but when it has a broad base, we must use the scalpel. In proceeding to the extirpation, the patient should be firmly seated opposite to a clear light, and the head should be supported by an assistant behind; and unless the patient has a good deal of resolution, a speculum oris should be used. A common scalpel will frequently serve for the dissection, but a curved knife and crooked scissars will sometimes be better, and should be at hand. The tumor must be elevated with a dissecting hook that has two fangs, which is here much preferable to the common hook. Great care should be taken not to injure the parts connected with the tumor unnecessarily; but if it is firmly connected to the gums, a part of them should be removed, even to the depth of the socket; although this may induce a danger of injuring the teeth. A moderate discharge of blood may be suffered; but if it tends to profuseness, the

the patient should take some brandy or tincture of myrrh, into the mouth; and if this does not restrain it, lunar caustic should be applied to the wound. Dressings to the fore, are, from its situation, inadmissible. For some days after the operation, it should be washed with a warm emollient decoction; and if a cicatrix does not then readily form, lime-water, port-wine, or any mild astringent, should be applied to it.

S E C T. VI.

Of Loose Teeth.

THE teeth are frequently loosened by external violence; as falls and blows; and often by improper force in pulling those contiguous to them. In these cases, they should be fixed as firmly as possible in their former situations, by pressing them as far as they will go into the sockets, and there securing them by ligatures of Indian weed, cat-gut, or waxed silk, carried round the adjoining teeth; and the patient should live on spoon-meat till they become fast. In youth this practice will commonly succeed; but in old age, loose teeth from any cause can seldom be again firmly fixed, and in very advanced periods of life, it ought not perhaps to be attempted. The teeth also become loosened by deposition of tartar, between the roots and the gums; and in some cases between the roots and sockets. In these cases, scaling off the tartar will commonly remove the complaint—this should be done as early as possible.

Sponginess of the gums, and their separation from the teeth, frequently produce looseness of the teeth. This sometimes occurs from the use of mercury; and often happens in scurvy. When it originates from scurvy, a removal of the general disease is the remedy. But it of-

ten occurs as a local affection; and then deep scarifications of the gums, occasionally repeated, is the best and most effectual mode of cure—This often produces an adhesion of the gums to the teeth: and then, astringent gargles made of tinctures of Peruvian and oak barks, and of myrrh, and a strong solution of alum, with cold water, should be employed frequently, and the teeth should not be used till they have been for some time firm. Astringents used before an adhesion of the gums to the teeth takes place, often renders them hard and incapable of forming a connection with the teeth. When the teeth have long been loose, there is but little chance of making them fast again.

This disease is sometimes produced by abscesses between the roots and alveoli of the teeth—(vide chapter on gum-boils.) It also occurs in old age, from a new removal of the alveoli; probably in consequence of the osseous matter being absorbed, when nature cannot afford a supply of it—this case is irremediable.

S E C T. VII.

Of Cleaning the Teeth.

THE teeth sometimes lose their colour, and acquire either a dusky yellow hue, or become black to a certain degree, without any adventitious matter being perceptible on them. 2. They, on some occasions become foul, and give a disagreeable taint to the breath, from a long removal of the mucus of the mouth. But, 3. The most frequent cause of foul teeth, is the deposition of a calcareous kind of matter from the saliva. Some will have the teeth thickly incrusted with this substance a few weeks after having them cleaned: and most people are subject to such a deposition in greater or less degree. It first appears on
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the fore-teeth, in the angles between two of them, where they are least rubbed by the tongue or lips; but the effects of mastication commonly prevent it from spreading to the points of them. In many cases it is confined to one or two teeth; but in others a continued crust seems formed all over the whole jaw; and this sometimes to so great a degree, as to disfigure the cheek externally, and to have been mistaken for an exostosis of the jaw-bone.

Slight ulcerations of the gums are often produced when any considerable quantity of this tartar is collected, which frequently insinuates itself between the gums and alveoli so as to separate them a good deal from each other.

Acids will dissolve and remove the tartar, but at the same time they injure the enamel, and many have lost their teeth from the use of them. Scaling instruments afford a certain relief, and from a proper application of them no harm can ensue. When the teeth are once well cleaned, frequent washing with cold water, and rubbing them every second or third morning with burnt bread, Peruvian bark, cream of tartar, chalk, or any other mild application, in fine powders will *generally* keep them clean and white.

The instruments employed (such as in pl. ix. fig. 5. 6.) should be moderately sharp; but their edges should not be very fine, or they will turn or break. In performing the operation, the patient should be seated on a low chair, with his face to the light, and his head supported by an assistant: the surgeon should sit opposite to him, and wrapping the fore-finger of his left hand in a wet cloth, should press firmly on the point of the tooth, while the back part of the instrument will form a point of resistance for the thumb of the same hand. The sharp edge of the instrument is now to be insinuated beneath the under part of the incrustation, avoiding the neck of the tooth for fear of loosening it: it must then be pushed with firmness to the superior part of the tooth, and repeatedly ap-
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plied till the incrustation is removed. When the teeth are all cleaned, they should be rubbed well with a piece of sponge in the form of a brush, covered with a fine powder prepared of equal parts of cream of tartar and Peruvian bark.

The teeth sometimes acquire a kind of foulness and lose their colour, when there is no apparent deposition on them. Moderate friction with a scaling instrument will frequently remove this. But the worst kind of foulness is when they become black, and seem perforated with a number of small holes. Alkaline applications are the best in these cases; they often render the teeth clean, and never injure them. A lather of common soap, or a solution of salt of tartar applied over the teeth with a pencil brush will often answer. When the disease is thus removed, frequent washing with cold water, and rubbing them with the above-mentioned powders, are the most effectual preventatives of a return; but they are often unsuccessful. This variety of the affection seems to depend on a putrescent cause, for it is evidently attended with a mortification of the teeth; and hence antiseptics would probably prove useful.

Lucerne and alkanet roots dried and beat at one end into the form of a brush, are very proper to rub the interstices between the teeth; but no kind of brush should be employed to rub the roots of the teeth, or the upper parts of the gums; because they may separate the gums from the teeth. For this reason I always make use of a piece of sponge, fixed on a small handle, which may be used with the greatest safety.

S E C T. VIII.

Of the Tooth-ach.

THIS disease, besides its usual symptoms of pain in one or more of the teeth and swelling in the contiguous gums, is frequently attended with a swelling of the cheek; and pain and inflammation in the eye and ear of the affected side; and to these perhaps succeeds fever, with its consequences.

These symptoms may originate, 1. From the nerve and other parts within the cavity of the tooth affected being laid bare, either by external violence, or by the enamel falling off in consequence of caries, or some other affection. 2. From inflammation of the parts within the tooth, or of the membrane which surrounds the root of it. And, 3. From sympathy, i. e. in consequence of affections of distant parts; as from diseases of the eye, of the ear, and of the stomach.

§ 1. *Of Tooth-ach from the Nerve being laid bare, and of the Methods of Extracting Teeth.*

From whatever cause the nerve of a tooth becomes exposed, pain, and many other of the symptoms abovementioned, will be the inevitable consequence. This does not seem so much to be produced from the mere exposure of the nerve to the action of the aliment and air, as from a certain degree of irritability induced by the exposure; for we frequently see the cavity of the tooth laid open by external violence, and nothing more than a temporary pain somewhat proportioned to the accident induced: and it often happens, that teeth gradually moulder away without any pain or uneasiness whatever being produced. These occurrences could not take place if a mere denuda-

tion of the nerve was the ultimate cause of the tooth-ach.

An irritable state of the nerve may be brought on by various causes; and more particularly by saccharine acid, and other stimulating substances contained in the food, being frequently applied to it—by a too frequent use of tooth picks—and by much exposure to a stream of cold air, and especially if this is at the same time moist.

The operation of these causes in inducing tooth-ach when the nerve is already exposed, by the destruction of the enamel from external violence, or from caries and a consequent decay of the ossific part of the tooth, is easily understood: but the production of a caries of the enamel, when no external violence has been applied, the most frequent cause of the complaint, has not been so satisfactorily explained.

It has been placed in the large use of acids, and in the lodgement of putrescent particles of the aliment on the teeth, from want of washing the mouth after meals. With respect to the first of these, there is no doubt that they prove injurious to the enamel, and should therefore be avoided: And the second should certainly also be guarded against; because it not only gives a disagreeable foetor to the breath, but also contributes to the formation of an inconvenient incrustation on the teeth. It does not, however, appear that caries of the teeth is the consequence of either of them. If acids occasioned it, it should affect all the teeth, or at least a considerable part of them, at the same time, and in an equal degree; whereas it almost always begins in a small point, and extends itself very gradually. And if it was the consequence of the lodgement of putrescent particles, it should always appear in those parts of the teeth which are nearest to each other; but we know this is not the case. And it does not appear, from experiment, that the immersion of teeth extracted from the body, when they would prob-

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bly be much more readily affected with putrescency than while they retain the living principle, for a considerable time in putrid matter, has the least effect in producing a carious state of them.

Upon the whole, I am of opinion that caries of the teeth is generally an effect of some constitutional cause. It often begins in one tooth, and is afterwards extended to a less or greater number of others: And I have seen instances in which the whole of the teeth were extracted one after another as the disease extended itself, and the patient at last received no permanent benefit, from the pain fixing upon the jaw.

This view of the subject shews the impropriety of removing teeth so frequently as is usually done. For if, upon extracting the first or second tooth that becomes carious, as soon as the violence of the pain renders it necessary, a third or a fourth should be affected, the patient should always be advised to submit to the pain rather than to have it removed, as the disease is then probably systematical, and will soon affect more—and it will often happen, that if one fit of the tooth-ach is borne, the same tooth will never again be seized by it.

In cases of carious teeth, it has been a prevailing practice to remove the affected part with a file, in order to prevent the disease from spreading; but I have almost universally seen this detrimental. It cannot have the effect expected from it; and it becomes injurious by exposing the sound parts to the air, and whatever is taken into the mouth.

When so much of the enamel is removed, either by caries or external violence, as to form a hollow of any magnitude, we may frequently prevent the tooth-ach, and preserve the teeth, by filling up the opening. If this is large, and particularly if narrow at the bottom and wider externally, mastick and gum-lac, or even bees-wax, will be very proper for the purpose; but when the opening is
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small, and the tooth is much hollowed internally, some of the metals are preferable. Gold-leaf is then frequently made use of; but nothing answers so well as common tin-foil. As much of this as appears necessary being cut off, it should be pushed in gradually (by the instrument delineated pl. viii. fig. 1.) beginning at one end, until the cavity is completely filled; any portion which may be left should then be cut off, and the surface of the whole made perfectly smooth by a small burnisher. Before the cavity is stopped, the nerve should always if possible be rendered insensible, either by delaying the operation for a few weeks after the nerve is laid bare, or by daily dropping into the opening a small quantity of oil of thyme, organum, or some other essential oil.

When the size of the opening prevents hard substances from being retained, instead of using wax and the other soft bodies above recommended, it has been proposed to stuff the tooth with tin-foil or gold-leaf, and retain it by means of a small peg driven through a hole drilled in the tooth. But this will not answer either when the external opening is very wide, or when the sides of the tooth are very thin.

Besides this means of preventing the return of tooth-ach, the patient should as much as possible avoid exposure to cold; his head should be kept warm; and it will be of great importance, and sometimes indispensable, that he should live in a dry situation.

For the removal of tooth-ach from exposure of the nerve, the only remedies I have found useful, are anodyne and corrosive applications to the part itself, and extraction of the tooth. Slight cases are sometimes relieved, or even altogether removed, by applying opium or laudanum to the nerve: camphor alone, or joined with these, is also in some cases of benefit; and either is now and then of use: but as these, and other applications of a milder nature, are often
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unsuccessful, we are then under the necessity of employing those which will destroy the nerve entirely. A long continued use of any of the strong essential oils will in some cases render the nerve somewhat insensible, but will not destroy it so effectually as to prevent a risk of future returns of the tooth-ach. This may be accomplished by the use of any of the concentrated mineral acids, by lunar caustic, or by the use of the actual cautery. In making use of the caustic or acids, however, we should be very careful to prevent them from spreading to the contiguous parts. The actual cautery may be employed without a risk of this, but it gives so much pain, and is so tedious in its operation, that few patients will submit to an effectual application of it. A piece of pointed small wire may be made use of as a cautery, when the instrument (pl. viii. fig. 1.) cannot be had.

When all these remedies fail, or are not employed to a sufficient extent, we are under the necessity of destroying the nerve by the extraction of the tooth; and this being done, if the tooth is not much decayed, or is not broken, particularly if it be one of the incisores or canini, after the socket is cleared of blood, it may be replaced, and will in time prove as useful as ever. See section on transplanting teeth.

Teeth may be extracted either in a perpendicular or lateral direction, or by making them turn upon their axes, by depressing the coronæ or upper parts of them.

As the removal of teeth in a perpendicular direction, would necessarily be attended with less violence to the contiguous soft parts, than by taking them out laterally, it should undoubtedly be preferred wherever it is practicable. This however can only be the case in the extraction of the incisores and canini, unless some of the others are loose; because we have not sufficient room to apply the instruments for effecting it in the molares. These last must therefore always be drawn laterally, notwithstanding

withstanding that not only the soft parts must thus be bruised or lacerated, but the alveolar processes broken.

The best instrument yet invented for drawing teeth in a lateral direction, is the common key instrument. In operating with this, if the tooth is in the lower jaw, the patient should be seated in a chair, in a clear light, with his head supported by an assistant standing behind; but if it be in the under jaw, he should be seated upon a pillow, with his head turned back, and supported upon the knees of the operator standing behind him. In order to prevent the gums from being torn, and to admit of a proper application of the key, the gums should be separated from the teeth by the scarificator or gum-lancet. The patient having cleared his mouth of blood, the point of the claw of the key must then be pressed as far down between the gum and tooth as possible, and retained there by the fore-finger of the left hand, while the fulcrum or heel of the instrument, previously covered with soft linen, being placed as far down as it will go upon the gums on the opposite side of the tooth, the operator must now with his right hand apply gradually such a force as he may find necessary for moving it; and by turning the hand sufficiently, any tooth may generally be drawn at one pull: where one effort however is not sufficient, and particularly in the molares, it will be better, as soon as the tooth is loosened, to turn the claw to the opposite side, and thus render it sufficiently loose to be taken out by the forceps.

With a view to prevent the loosening of teeth contiguous to the one drawn, the edges of the latter may be taken off by a thin file, smooth on one side.

By this method the incisores and canini may likewise be pulled, as well as in the manner hereafter described.

The alveoli of the teeth seem to be so nearly of an equal degree of strength on each side, that in the extraction this merits no attention. Neither is it a matter of any consequence

quence to regard the direction of the roots of most of the molares, for these run equally divergent on either side, and except in the two last, which should always be drawn to the inside, on account of the situation of the coronoid process of the lower jaw, it is perfectly indifferent with respect to both these circumstances, whether the extraction is made towards the inside or outside of the jaw. Even if the tooth is particularly decayed on one side, if the gums are properly separated, it is of little importance to which side the tooth is pulled:—whatever direction is used, the socket must necessarily be broken on both sides.

The heel of the instrument should always be made long, as it will then injure any particular part of the gums by its pressure much less than if it is short.

Even when a tooth has been cautiously extracted, troublesome circumstances sometimes occur from the operation:—these are, bruising of the gum, separation of splinters of bone from the jaw, and alarming hemorrhage. In the first case, if any part of the gum is nearly separated, it should be cut off with a pair of scissors; the mouth should then be fomented with warm milk, or any emollient decoction; and if there is a probability of a supuration taking place, this should be promoted by the application of roasted figs, and the abscess afterwards opened if necessary.

When the alveolar process only is broken, it will be of little consequence; but if the solid part of the bone is splintered, as will more particularly be apt to happen in children, a tedious sore will very probably ensue if it is not treated with great care. All loose pieces of bone should be immediately removed, and the rest will either come away afterwards, during the formation of matter, or be easily taken out; and if the constitution is sound, the ulcer will then heal, but not before.

Hemorrh-

Hemorrhagies of any importance seldom occur; but in cases, where any of the larger arteries of the parts contiguous to the tooth are divided by the force used in the operation, very alarming hemorrhagies sometimes take place. Taking a mouthful of cold water, red wine, brandy, vinegar, or alcohol will sometimes restrain them; if these fail, compression may be tried, by putting a dossil of lint into the opening, and making a constant pressure on it by keeping the mouth shut. This will almost always stop the bleeding; should it, however, be unsuccessful, the actual cautery is alone to be depended on.

For the purpose of extracting teeth in a perpendicular direction, the common teeth forceps will generally answer. In applying this, it should be pressed as far down upon the tooth as possible, otherwise it will be apt to break off the upper part of it; and the tooth should not be pulled directly upwards, but should be twisted alternately from one side to the other until it becomes loose. If the forceps are found to give insufficient force for the extraction, the key should be employed.

When the upper part of a tooth is entirely destroyed, leaving nothing but the fang or root, or what is commonly termed a stump, it may be removed very readily by the use of a simple or crooked lever, usually called a punch, previously separating the gums, as in extracting whole teeth. In using this, it should never be pushed lower down than is just sufficient to give a firm rest upon the fang; for if it is carried very low, the force employed is in a great measure lost against the strong part of the alveolus on the opposite side. When the tooth is merely loosened by the punch, it may be removed with the forceps.

§ 2. *Of Tooth-ach from Inflammation.*

Tooth-ach sometimes originates entirely from an inflammation, either of the membrane surrounding the root, or of the parts within the body of the tooth. This species is indicated by a severe and permanent pain of a tooth which is to appearance sound; and especially when the affection has evidently been induced by exposure to cold, or when it is connected with other symptoms of inflammation, such as an inflamed state of the contiguous cheek, swelling and suppuration in the adjoining gums, &c.

Although in most instances we may trace this variety of tooth-ach to cold, yet it may also be induced by any other cause of inflammation in general. It is also in some cases the consequence of a swelling of the fang of the tooth. But whatever be the cause of the inflammation, it is always attended by a very great degree of pain; probably on account of the bone with which the membrane is surrounded, preventing it from readily yielding to distention.

In the cure of tooth-ach from inflammation, the general remedies of affections of this kind in other parts are found the most useful. Local blood-letting, either by scarifying the contiguous gums, or by the application of leeches, often gives relief. I have known a blister applied directly opposite to the affected parts remove the pain entirely; and a large dose of laudanum is often very useful, by lessening the irritation. The head should be kept warm by covering it with flannel; and fomenting it with the steams of a decoction of emollient herbs, or even with warm water, will often procure relief when every other remedy has failed. In some cases, cold water, vinegar, or spirits, taken into the mouth prove serviceable; but warm applications are generally best.

When this complaint cannot be removed by the remedies already recommended, we are reduced to the necessity of advising the extraction of the tooth: but in this case, we should be particularly careful to avoid a hasty extraction, more especially if we have reason to believe there is an enlargement of the fang or fangs. After the tooth is removed, if it is uninjured, we are commonly advised to replace it: but in this variety of tooth-ach, and even when none but the parts contiguous to the tooth are inflamed, I have seldom or ever seen the practice successful.

§ 3. *Of Tooth-ach arising from Affections of distant Parts.*

We judge that this variety of tooth-ach occurs when there are no symptoms of either of the species described in § 1 and 2. It may originate from rheumatism, from an arthritic diathesis, from hysteria, from pregnancy, and from a foul state of the stomach.

In this last case, which is indicated by the state of the tongue and other circumstances, emetics often give immediate relief; and then the exhibition of Peruvian bark, particularly if the fits of the disease have returned periodically, will be the best means of preventing returns. Opiates never are of service, but often do injury by producing nausea, &c.—and even increase the pain. But when the complaint originates from gout, rheumatism, or hysteria, opiates will generally remove it entirely: and a return may be obviated by keeping the parts warm. In hysterical tooth-ach, ether, combined with opium, has succeeded when every thing else had failed. Opiates are never of permanent benefit in tooth-ach from pregnancy: general blood-letting is often the only effectual remedy—Applying leeches to the gums will sometimes answer the purpose.

S E C T. IX.

Of Transplanting Teeth.

By this operation we understand the removal of teeth from one living body to another.

In the transplantation of teeth, we are to be directed by the following considerations :

1. As the operation is in general employed more with a view to obviate deformity than to be productive of any real advantage, it is seldom practised with the molars : but it might be done with the two first of these as well as with the incisores and canini ; the others could hardly in any case be transplanted, on account of the number and divergence of their roots.

2. In order to ensure success, the alveoli and gums must be perfectly sound. They must be entirely free from scurvy and lues venerea ; and the patient must not have undergone a salivation for some considerable time before ; nor must he use mercury for some time afterwards. His being subject to gum-boils need not prevent the operation.

3. It is also necessary that the sockets be full and complete ; and hence it will seldom be admissible where teeth have remained long in the state of stumps ; because the waste of the fang is generally accompanied by a corresponding diminution of the socket ; whence there would not probably be room enough left for the roots of a sound tooth.

4. It is only in youth and middle-age that the operation is admissible. In childhood it can never be necessary ; and in old age, the sockets of the teeth are commonly much lessened ; and it is not probable, that a firm union can then
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take place by an inter-communication of blood-vessels as in other cases.

5. The transplanted tooth should fit the socket as exactly as possible; if it be too large, a small part of the fang may be filed off, but the corona should never be touched, for fear of producing a subsequent caries. The surface of the tooth should be also somewhat lower than that of the rest, to prevent pressure on it.

6. In order to preserve the socket and gums into which the tooth is to be placed in as found a condition as possible, the displaced tooth should be removed with the forceps in preference to the key.

7. When the socket is cleaned, and the new tooth inserted, it must be tied to the two contiguous, in order to keep it in its place until it becomes firmly fixed. If it is one of the canini, the ligatures, which should be made of several threads of fine silk waxed, should be first tied round the upper part of the new tooth, and after it is inserted, connected to those adjoining as close as possible to the gums. But when an incisor, or small molaris, is transplanted, it answers best to fix the ligature first to one of the fastened teeth, and afterwards to connect it to the others. If the ligatures become loose they should be immediately renewed; and the patient should avoid every thing which has any tendency to loosen the tooth. He should live upon spoon-meat during the cure, and guard very carefully against cold and moisture.

In favourable circumstances, the tooth will become fast in the course of eight or ten days; but it will sometimes remain loose for two or three months.

Although diseases are very seldom communicated by this operation, yet as there can be no doubt that this has sometimes been the case, we should always guard as much as may be against the possibility of it. For this purpose, teeth should never be transplanted from people who are not perfectly

perfectly healthy; and they should always be immerfed for a few feconds in luke-warm water, and afterwards well wiped.

S E C T. X.

Of the Ranula.

TUMORS are frequently met with beneath the tongue, on one or both fides of the frenum; thefe are all known by the term ranula. They are feldom attended with much pain; but they become in fome instances fo large as very much to impede the fucking of infants, and the maffication, and even the fpeech of adults. In fome cafes they contain a fatty matter; but in nineteen cafes of twenty, they are filled almoft entirely with a thin limpid liquor, refembling the faliva; and we find, on cutting into them, that they are often produced by a ftoppage of the falivary ducts, from calculous concretions forming in them. The tumor generally burfts when it arrives at the fize of a large nut, leaving an ulcer which is difficult to heal, unlefs the caufe be difcovered. The concretions are of various fizes; I have in feveral instances found them as large as a kidney-bean.

Whenever thefe fwellings are not of a firm confiftence, the moft effectual mode of treatment is to lay them open with a fcalpel from one end to the other; the calcareous particles will then eafily be difcovered; and thefe being removed, and the fore washed with warm water, or fome other emollient, it generally foon heals. But if there is afterwards any difficulty in curing the ulcer, it may be bathed with tincture of bark, or fome other astringent. Old fifulous fores of thefe parts will be commonly found to depend on a calcareous matter; and by making an incifion

sion down to this, and removing it by a scoop or forceps, they will soon be cured.

When tumors in this situation are of a fatty or firmer consistence, they should be totally extirpated; and this may be easily done unless they lie deep, and are very large. They may usually be removed without any danger of dividing the larger arteries: and the hemorrhagy may then be easily restrained by spirit of wine, or tincture of myrrh. But if any large vessels should be cut, as ligatures cannot possibly be applied to them, it will be necessary to have recourse to the potential or even the actual cautery. If the tumor cannot be held by the fingers during the operation, a small hook will answer this purpose better than the forceps which are usually employed.

S E C T. XI.

Of Ulcers of the Mouth and Tongue, and Extirpation of the Tongue.

THE tongue, and other parts within the mouth, are liable to all the variety of ulcers incident to other parts of the body, and the treatment they require is nearly similar. When they originate from the lues venerea, scrophula, or scurvy, the general remedies of these diseases become necessary; but when the affection is local, topical remedies are alone to be employed.

Local ulcers of the mouth appear to be most frequently occasioned by the sharp points of broken or carious teeth, which irritate or destroy part of the inside of the cheeks, or of the side of the tongue; when this is the case, the teeth should be smoothed with a small file. If sores appear to be induced by the formation of tartar upon the teeth, this must be removed as formerly directed.

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The removal of the original cause is usually soon followed by the cure of the sore; but when this is not the case, we may frequently derive advantage from washing the mouth with decoction of bark, a solution of alum, and other astringents. Notwithstanding the use of these, mercury, and of every other remedy, the sores, in some cases, constantly become worse: They grow ragged and unequal about the edges; discharge a thin foetid sanies; and then become very painful.

As long as a sore of this kind continues small, and shews no tendency to spread, there will be a chance of its healing. But whenever it constantly grows larger, and more painful, notwithstanding the employment of the remedies above recommended, we will have reason to suppose it of a cancerous nature, and should certainly advise its removal by immediate extirpation.

When the ulcer is small and superficial, it may be removed with ease and safety; but when it is large, this is attended with difficulty and danger. However, whenever the whole of the parts affected can be taken away, as the operation affords the only remedy, it should certainly be risked.

The easiest and most effectual method of removing a deep seated cancer in the cheek, is to make an incision through the whole substance of the cheek, beginning at the contiguous angle of the mouth, and ending at the same part, after carrying it round the sore. The diseased parts being thus entirely removed, the sides of the cut must be brought into contact, and secured by the twisted suture.

In removing any considerable portion of the tongue by the knife, the hemorrhagy is the only occurrence productive of danger. To remove this the surgeon should provide himself with all the ordinary remedies. When ligatures can be passed round the vessels, which may be
done

done farther back in the mouth than is commonly supposed, they should undoubtedly be employed. If the tenaculum or crooked needle cannot be used for this purpose, the apparatus described for tying schirrous tonsils, must be had recourse to. But when the vessels cannot be secured by either of these methods, keeping the mouth filled with astringent infusions or solutions, and particularly a solution of alum or diluted vitriolic acid, will sometimes be effectual in restraining the discharge; if these do not succeed, the potential or even the actual cautery must be employed as the last resource.

As this is a formidable operation, it has seldom been performed; and indeed it should not be attempted but by a surgeon of great firmness and experience.

S E C T. XII.

Of the Division of the Frenum Linguae.

THIS operation becomes necessary when the frenum of the tongue is either so short, or continued so near to the point of it that it impedes the sucking of children. It is usually performed by a scalpel or pair of scissors; the child being laid across the nurse's knees, and the surgeon elevating the tongue with the middle finger of the left hand, while he makes the incision with the right, taking care to avoid the larger blood-vessels of the tongue.

S E C T. XIII.

Of the Division of the Parotid Duct.

THE duct of the parotid gland is sometimes divided in extirpating cancerous sores from the cheek; sometimes by accident; and if the divided parts are not retained in contact until they heal, it often happens that the internal part of the wound closes, and a constant discharge of saliva takes place over the cheek, which at length produces a tedious fistulous sore.

In case of a recent division of this duct, the ends should be brought together, and retained by adhesive plaster, or the twisted suture, as may seem most proper; but when this has been neglected, or fails of success, as the inner part of the duct becomes closed, it will be necessary, for a cure, to make an artificial opening into the mouth, and endeavour to form a union between this part and the upper portion of the duct which leads from the parotid gland. For this purpose, a sharp pointed perforator, somewhat larger than the duct, should be entered on the side of the sore opposite and contiguous to the under extremity of the superior part of the duct, and carried obliquely, in the natural direction of the canal, into the mouth. A leaden probe exactly the size of the perforator, should then be introduced along the course of the opening, and retained there until the sides of it become callous; the probe should afterwards be withdrawn, and the extremity of the duct drawn into contact with the superior part of the artificial opening by means of adhesive plaster, and retained until a firm union has taken place. It will facilitate the union between the parts, if the edges of each are made raw with a lancet or scalpel, before they are brought together. The patient should live upon

spoon-meat till a cure is effected; should speak little or none; and make as little exertion with his jaws as possible.

C H A P. XXXIV.

Of Diseases of the Ears, and Operations practised upon them.

S E C T. I.

Of Deafness.

WHATEVER tends to obstruct either the meatus auditorius or eustachian tube, or to induce diseases of the tympanum, or parts connected with it, will be productive of deafness to a greater or less degree.

Obstructions in the eustachian tube may be occasioned by enlargement of the amygdala from any cause; by venereal ulcers in the throat; and by polypous excrescences. A removal of the first and last of these causes, will, in many instances, effect a cure of this variety of deafness; but when it is a consequence of ulceration or of inflammation, as the extremity of the duct will probably be obliterated, it will be irremediable. It has been proposed to open the duct by inserting a curved blunt probe into it; or even to inject some mild liquid into it with a curved syringe: there will probably, however, be no advantage derived

derived from such attempts, from the difficulty attending them.

The meatus auditorius may be obstructed in various ways. It may be imperforated at birth—it may have extraneous bodies forced into it—tumors or excrescences may form in it—and there may be so copious a secretion of wax into it, as to give more or less obstruction. We shall consider each of these cases separately.

§ 1. *Of an Imperforated Meatus Auditorius.*

This disease seldom occurs. It may be formed either by a thin membrane spread over the mouth of the passage, or by a fleshy kind of substance occupying more or less of the cavity. In both these cases, the only remedy is afforded by an operation.

The patient's head being secured in a proper light, the operator with a small sharp-pointed bistoury should make an incision of a proper length, exactly on the spot where the external passage should terminate, and carry it gradually through the obstructing substances, either till the resistance is entirely removed, or till there is reason to fear that the tympanum would be hurt if it were carried deeper: the instrument should then be withdrawn; and in order to prevent the parts from adhering together, a bit of oiled bougie should be introduced and retained until the cure is completed, removing it daily to wipe off any matter produced.

In this manner deafness may often be removed, when the obstruction does not extend quite to the tympanum; and it should always for obvious reasons be attempted about the time when the child begins to speak. At a more early period the child could not bear it; and if longer delayed it might produce dumbness.

§. 2. *Of Extraneous Bodies lodged in the Ear.*

A great deal of pain and uneasiness is often produced from this cause. Children frequently push small peas, cherry stones, lead drops, and other substances into their ears; and flies and other insects frequently creep into them.

When these lie near the extremity of the passage, such as can readily be taken hold of should be extracted with small forceps; but peas and other round bodies are more easily removed by a curved probe, or by means of the instrument (pl. viii. fig. 4.) and their extraction will be much facilitated by previously dropping a little oil into the passage.

When insects have got so far into the ear that they cannot be taken out with forceps; the best method of removing them, is by throwing in warm water, or any other mild fluid, with a syringe; and this will be much facilitated by previously killing them with tepid oil held for some time in the passage by reclining the head on the opposite side. I prefer oil, because it is less liable to do injury than almost any thing else.

If the substances insinuated have become much swelled by the absorption of moisture, it will be best to break them, either with the forceps, or with a small sharp hook, before attempting their removal.

§. 3. *Of Excrescences in the Meatus Auditorius.*

THE auditory passage is as liable to polypous excrescences as the nose and throat; but they seldom arrive to a large size, and are generally of a firm consistence. They are sometimes pendulous by one pedicle; but in other cases they seem to consist merely in a general thickening of the membrane of the conduit.

These substances may be removed either by the knife or ligature. When they lie near the external orifice, and can be laid hold of by forceps, or a dissecting hook, they may be easily cut out with a probe pointed bistouri; and without any danger from hemorrhagy; but when they lie deep, it will be most convenient to remove them by ligatures. This may be done by means of a split probe and a double canula, as advised in polypi of the nose.

But in cases where the excrescence extends a considerable way along the membrane, instead of being pendulous by a small neck, neither of these methods is applicable. Bougies will here generally succeed as well as in obstructions in the urethra. In the introduction of them however, we must be careful not to pass them to the depth of the tympanum, or they may do more harm than good. Escharotics have been recommended in these cases; but they must always give some risk of injuring the tympanum.

§. 4. *Of Deafness from Wax collected in the Ears.*

THE wax is sometimes collected in the ear in such large quantities as to induce a considerable degree of deafness; and in some instances it has become almost as hard as wood.

This variety of deafness may readily be ascertained; for in a proper position and good light, we may see along the meatus quite to the tympanum. The safest and easiest method of removing the wax is by throwing in warm milk and water, or soap suds, or some such article; previously dropping in a little oil to lubricate the passage.

Although obstruction of the external passage of the ear is the most frequent cause of deafness; yet it sometimes originates from diseases of the tympanum and parts within it; and it will take place to a certain degree, if the external

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nal parts of the ear be destroyed; or if there be a deficiency of wax in the auditory conduit.

The bones of the ears are sometimes diseased in scrophula; all that then can be done is to keep the parts clean, and free from the disagreeable smell induced by the discharge from the carious bones, by injecting warm milk and water morning and evening. We should however carefully distinguish this from a discharge consequent to abscesses in the meatus, and to inflammation of its membrane, or perhaps of the tympanum, which very frequently occurs, and which is, in my opinion, generally improperly treated. Contrary to common practice, I always endeavour to check the discharge when recent, as soon as possible, by the use of moderately astringent injections, such as brandy diluted, solution of alum, and others; and in long continued cases, after the introduction of an issue, near the part, I do not hesitate to follow the same plan. I have never seen any bad consequences from this mode of cure; and if the discharge is suffered to remain any length of time, it not only relaxes the tympanum, but may even destroy it.

When deafness arises from a relaxation of the tympanum, or from any deficiency in the external parts of the ear, some assistance may be derived from concentrating sound, so as to make a stronger impression on the organ of hearing, by means of the instrument delineated in pl. ix. fig. 2. or others of a somewhat similar construction.

If a deficiency of wax appears, dropping a little oil of almonds, or any other mild oil into the ear once or twice daily is sometimes useful. In some cases, I have found benefit from the use of soft soap, and from strained galbanum mixed with oil and onion juice; these besides keeping the passage moist, may, by acting as gentle stimuli, induce a return of the secretion.

S E C T. II.

Of Perforating the Lobes of the Ears.

THIS operation is seldom performed at present but for the purpose of ornament. The perforation should be made as high on the lobe as with propriety it can be done; the part should be previously marked with ink; and a piece of cork should be placed beneath the lobe. The perforator usually employed, is about the size of the hare-lip pin, has a handle at right angles with it, and is enclosed in a canula. After pushing the instrument through the ear until the canula comes out at the lower side, the cork is to be withdrawn with the perforator fixed into it. A small piece of lead is then to be inserted into the tube remaining in the ear; and this must be left until the passage becomes callous, moving it a little every day.

C H A P. XXXV.

Of the Wry Neck.

THE neck may be so much bent to one side, as to produce deformity either by an original mal-conformation of the bones; by a preternatural degree of contraction in the muscles of one side of the neck, particularly of the sterno-mastoideus; or by a contraction of the skin in consequence of extensive sores and burns.

In the first case we can afford no relief; but in the two last we can with certainty remove the complaint.

The wry neck has almost universally been attributed to a contraction of the sterno-mastoideus muscle; but in every instance of this kind that has fallen under my notice, it has been induced by a contracted state of the skin alone*. Which ever be the cause, however, the disease will be most effectually and safely removed by a gradual incision with a scalpel through all the contracted parts, from above downwards. The divided parts can only be effectually preserved apart afterwards, by supporting the head until the wound heals.

A contraction of the skin beneath the chin, drawing the head down upon the breast, is to be removed in the same manner.

C H A P.

* In the London Medical Journal for 1790, there are related two cases of wry neck, from an affection of the muscles, which were cured by electricity applied to the antagonists of the muscles contracted.

C H A P. XXXVI.

Of the Diseases of the Nipples.

WHEN the nipple is so far sunk into the breast that the child cannot take hold of it, it becomes necessary to draw it out by means of nipple glasses. These may be used either by the patient herself, or by an assistant. They are made of glass alone, or of a glass cup connected to a bag of gum elastic.

The best remedies for cracks or *ulcerations* of the nipples, are mild, astringent, and drying applications. The parts may be bathed with lime-water, port wine, or brandy and water, and afterwards covered with unguentum nutritum, or Goulard's cerate. The first is the best; but whichever of these ointments is used, they should be entirely washed off before the child is allowed to suck, on account of the lead contained in them. The child should not be permitted to suck oftener than is absolutely necessary; and when one nipple only is sore, he should if possible be confined to the well breast, and the other should be drawn occasionally. The nipples should be covered with small wooden cups, perforated to let the milk through; in order to prevent the clothes from retarding the cure.

C H A P. XXXVII.

Of Issues.

ISSUES are small artificial ulcers formed in different parts of the body for procuring a discharge of pus. It is now very well established, that these are only useful in proportion to the quantity of the matter they afford: (See Chapter on Ulcers). And as this is the case, they may be placed in any situation most convenient to the patient.

In the formation of issues however, it is to be observed, that they should never be placed immediately above a bone thinly covered, directly above a tendon, very contiguous to a large blood-vessel or nerve, or upon the belly of a muscle. The best situations for issues are, the space between the tendons on the back of the neck, the middle of the upper side of the humerus, and the hollow on the inside of the knee above the flexor tendons. They may likewise be inserted between two of the ribs, and on each side of the vertebræ of the back; or wherever there is a sufficient quantity of cellular substance for the protection of the parts beneath.

Issues are formed, by removing the skin by epispastics; by making an incision with a scalpel or lancet; by the application of caustic; and by the introduction of a cord.

If a blister is used, it must be exactly of the size of the intended sore; and after its operation, a discharge of matter may be kept up by dressing daily with cerate mixed
with

with cantharides. If incision or caustic is to be employed, an opening must be made of a sufficient size, and preserved by inserting daily some extraneous body covered with ointment, and secured by a compress and bandage.—Peas are commonly employed: but kidney beans, gentian root, or *aurantia curassavantia* cut into a proper form, will also answer very well.

When the opening is to be made by incision, the skin should be supported on one side by an assistant, and on the other by the surgeon, who should then make a cut of a sufficient length and depth for receiving the number of peas intended to be put into it. The common lapis infernalis answers best for making an issue by caustic. It should be first reduced to powder, and made into a paste with water or soft soap; a piece of leather spread with Burgundy pitch, or any adhesive plaster, with a small hole cut in the centre of it, should then be placed upon the part. The caustic being put into this opening, the whole should be covered with another adhesive plaster. These precautions are necessary to prevent the caustic from spreading farther than the part upon which it is wished to operate. In the course of ten or twelve hours the caustic may be removed, as by this time it will have produced an eschar of a sufficient depth. In three or four days the eschar will separate, and the opening must then be filled with peas as above directed.

When we wish to discharge a very large quantity of matter by issue, and particularly from deep-seated parts, we effect it by the introduction of a cord of cotton or silk, forming what is termed a seton. The parts at which the cord is to enter should always be marked with ink; and this being put into the flat needle (pl. ix. fig. 3.) and the parts supported by an assistant, the needle should be pushed in at one of the spots marked, and carried out at the other, leaving two or three inches of the cord hanging out at each

each orifice. The irritation which the seton gives soon produces a plentiful discharge of matter; which may be increased or diminished, by covering the cord daily before it is drawn, with a mild or irritating ointment.

C H A P. XXXVIII.

Of the Inoculation of the Small-Pox.

THERE is reason to suppose that almost all eruptive diseases, as well as some others, may be communicated by inoculation; but the operation is seldom practised but for the communication of the small-pox. The plague and measles have been given in this way. The latter has been tried in Scotland, but without advantage.

The small-pox can only be communicated with certainty, in inoculation, by means of the matter taken from some of the pustules, and applied to a wound made in some part of the body. This is now commonly done in a very simple manner: The point of a lancet, previously moistened in the matter, is insinuated through the cuticle, so as slightly to injure the cutis vera. If the matter has become hard it should be softened by warm water or steam.

The operation may be done in any part of the body; but the arm is generally preferred. In order the more certainly to ensure success, it may be performed in two or more places; but always at such a distance apart that the inflammation produced may not extend from one to the
other

other—on each leg or thigh for instance. No dressing is employed; and about the end of the second or third day, if the operation has succeeded, the wounds will have become red, swelled, and painful.

C H A P. XXXIX.

Of Wounds.

S E C T. I.

Of Wounds in General.

A WOUND may be defined, a recent solution of continuity in any of the softer parts of the body, attended by a corresponding division of the integuments.

Wounds must necessarily exhibit great variety in their nature and appearances, according to the parts injured, the manner in which they are produced, and their extent. Thus wounds in the muscular parts are very different in their appearances and nature, from those which affect tendinous parts; those made with a cutting instrument are materially different from contused or lacerated wounds; and punctured wounds are generally productive of very different effects from those which are more extensive.

We shall at present confine ourselves to the description of the phænomena which usually take place in the most frequent

frequent

frequent form of this affection, what we term a simple incised wound.

The first appearance we observe in a wound of this kind, is a separation of the divided parts; the degree of this depends on the depth and length of the wound, and on the direction of it with regard to the fibres of the part. This last circumstance has a very considerable influence in this respect, for when the fibres of a muscle have been cut transversely, they will separate sometimes to such a degree, as to give reason for supposing that a part of them has been removed; and it often happens that a wound of some depth in the direction of the fibres, will produce so little retraction of the skin that it appears almost as a line.

The next appearance is the hemorrhagy, which takes place to a greater or less extent, according to the size of the cut, and the size and number of the blood-vessels divided. If this is neglected, or is not worth attention, the irritation produced by the injury, as well as by the external air, excites the vessels to contraction, and thus stops the discharge. The discharge of red blood gradually ceasing, a serous fluid oozes out for a few hours, and the whole surface of the fore then soon becomes more or less dried, or covered over with coagulated blood.

The pain in these wounds is at first commonly inconsiderable, unless a nerve or tendon has been partially divided, in which cases it is usually severe. But in a few hours it becomes more considerable and more or less of inflammation succeeds; and if the wound is large, a proportionate degree of fever. These symptoms increasing, mortification is at length produced in some instances; but for the most part, the surface of the wound, which for some time remained perfectly dry, is gradually rendered moist and soft, by a thin serum oozing into it, which being allowed to collect, is at length changed into purulent matter; and in general, the general and topical symptoms of inflammation

inflammation abate more or less quickly according as this formation of matter is more or less plentiful; and go off entirely when a free suppuration takes place.

From this view of the progress of the symptoms of a wound, it is evident, that in its treatment, it should be chiefly attended to as an exciting cause of inflammation.

When no organ of importance to life is wounded, and when the cut is seated in a fleshy part, if nature be not impeded in her operation, the whole surface of the sore becomes covered with granulations, when a proper suppuration has taken place; and a cure is gradually accomplished in the manner described in the chapter on ulcers.

This favourable termination may be prevented by a variety of causes; but those which arise solely from the nature of the wound are, too great or too small a degree of inflammation, and a want of a free discharge of the matter that is produced:* Thus punctured wounds are very apt to be accompanied by too much inflammation; and lodgements of matter frequently occur in them. In contused wounds the texture of the parts is sometimes so much injured, that the circulation is stopped, and a mortification is occasioned. And wounds attended with much laceration are particularly liable to produce gangrene, ultimately from exciting too much inflammation.

In forming a prognosis in wounds, besides the circumstances just described, it will be necessary to pay attention to the age and habit of body of the patient; the texture of the wounded part; the part of the body injured; and the risk of a communication of the effects of the wound to the adjacent parts.

Thus it is well established by experience, that wounds are much less hazardous, and heal more readily in youth and middle-age than in very advanced periods of life; but it does not appear that healthy old age is any obstruction
in

* These are circumstances that require particular attention. B.

in a great many cases, particularly in the operations of lithotomy and amputation, to the healing of wounds; on the contrary it is often advantageous, by giving less tendency to inflammation.

It is well known also, that wounds are much less painful, and heal more easily in some parts than in others, in muscles, e. g. than in tendons, or glands.

With respect to the situation of a wound, it is obvious that wounds in the extremities, when confined to parts lying above any of the hard bones, are not so hazardous as those which pass into any of the joints; and in other parts, wounds which penetrate any of the larger cavities must be more dangerous than those which do not run so deep. This may be occasioned by the chance of some organ being directly injured, either by air or other extraneous bodies finding access to the exposed cavities, or by the lodgement of matter.

It is also to be considered that wounds, which at first did not appear to be attended with any risk, may eventually prove mortal; thus the lungs, stomach, aorta, or receptaculum chyli may be wounded slightly, and at length prove a very unexpected cause of the patient's death.

Wounds also prove fatal in some instances, from a communication of inflammation to parts which were not primarily injured in any degree; and they may likewise terminate in death from mismanagement in diet, dressings, and other circumstances.

S E C T. II.

Of the Cure of Simple Incised Wounds.

OUR first attention, in wounds, is to be directed to the hemorrhagy; both on account of the safety of the patient, and of ascertaining the extent and nature of the injury.

Hemorrhagies are to be restrained by the tourniquet, or by pressure with the hand, according as the wound is seated on the extremities, or on the trunk, or head, until the vessels can be tied, either by means of the tenaculum or needle. If necessary, the wound should be enlarged in order to admit of the application of the ligature; and this practice if properly attended to, would we believe have saved many limbs which have been amputated, from the supposed impossibility of otherwise restraining the bleeding.

When the injured arteries run in the substance of a bone, as they cannot then be tied, they should be cut entirely across, and their consequent contraction will, perhaps always, remove the hemorrhagy.

If the discharge proceeds from the very small vessels on the surface of the fore, remedies of a different kind from those just mentioned must be employed. See chap. on the means of removing hemorrhagies.

The bleeding being stopped, we are then to examine the wound carefully, and remove all extraneous substances that can be taken away without giving much pain, or danger of injuring parts of importance; any others that may be present must be left to be thrown off by the consequent supuration. This practice will often prevent very troublesome inflammation. But it is to be observed, that we are to be in some measure guided in our conduct here, by the nature of the substance lodged in the wound; for instance,

lead has often lain a considerable time in the body without being productive of injury; but almost every other substance seems to produce bad effects to a greater or less degree.

Where the fingers will effect the purpose, they should be preferred to forceps, or any other instrument, for the removal of substances from wounds. Sand, dust, or small pieces of glass, &c. are best removed by bathing the parts in warm water, either by means of a sponge, or of a syringe, or by pouring it upon them: And in doing this, as well as in using the fingers or forceps, much of our success will depend on putting the patient in such a position as will most effectually relax the injured parts, and produce as wide a separation of the lips of the wound as possible.

We are in the third place, to proceed to the employment of those means which will probably heal the wound in the most easy and expeditious manner. Wherever the nature of the injury will admit of it, the divided parts should be brought into contact: the irritation excited by the wound itself will then generally be productive of a certain degree of inflammation, which will accomplish a union in the course of a few days, by the intervention of a glutinous fluid exhaled from the vessels. This connection is, in many instances, soon considerably strengthened by the formation of blood vessels. The wound is then said to be healed by the first intention; and this mode of cure should always, when it appears practicable, be attempted. If the parts cannot be brought into contact, they should be made to approximate as much as possible, as this will, in every instance, expedite the cure.

The advantages of this method of treatment are, that very extensive wounds are very quickly cured, the parts being usually united in the course of five days; a large and often materially injurious discharge is prevented; the free motion of parts that would otherwise be lost is
often

often preserved; the scar produced is very small; and the wounded parts are well covered by sound skin.

The means of drawing and preserving divided parts in contact, are, bandages, adhesive plasters, and futures. With respect to the first, although the uniting bandage may be used in longitudinal wounds in the extremities and head, yet it seldom keeps the parts smooth and even, when used alone, and in transverse wounds it can be of no benefit at all. It may, however, be often serviceable in aiding the effects of adhesive plasters: These should always be preferred to any other remedies in wounds that do not penetrate much deeper than the cellular membrane; and where the loss of substance prevents the edges from coming together, the plasters are to be applied in such a manner as to bring them as close as possible.* But in all wounds that penetrate to any considerable depth, when their lips can be brought into contact, the twisted future is the best means of retaining them.—(See chapter on Sutures.) The interrupted future which is most frequently employed, does not support the parts so well; the ligatures are apt to tear or cut the parts; and they frequently leave disagreeable marks.

It is of consequence to observe, that where the use of futures or adhesive plasters has been neglected at the first, they may be employed with advantage during any stage of the fore, as the parts will unite at any time very readily; and it will expedite the cure very much to bring the edges of the ulcer into contact whenever it can be done.

The good effects of futures and plasters will be much aided by a proper posture of the patient; and indeed without this be attended to, they will be of little advantage.

When the parts are brought together in the manner directed, in order to prevent the access of air, it will be better

* The form and size of the plasters must be regulated by the judgment of the surgeon.

ter to cover them with lint spread either with mucilage of some mild gum or some unctuous substance.

If the patient is low and emaciated, it will be proper to allow him a light nourishing diet; but if he is plethoric, or liable to inflammatory complaints, he should be confined to a strict antiphlogistic course, in order to prevent too great a degree of subsequent inflammation.

Should the symptoms of pain and inflammation continue moderate, the dressings should never be removed till the cure be completed; but whenever the pain in the wound becomes severe, as it will, if not properly attended to, be productive of so much inflammation as to frustrate our intention, the dressings should be removed, and the parts gently, and for some time, rubbed or bathed with some emollient oil. If this proves insufficient, general and topical bleeding, and opiates, must be employed, according to the circumstances of the case. These will generally remove the inflammation; but if they should not have this effect, it will be necessary to take away the ligatures or plasters entirely, and accomplish a cure in the ordinary way.

In general, even in very large wounds, the futures or plasters may be removed about the fifth or sixth day, as a union will by that time have been produced, and they may then be disadvantageous.

It has been objected to the method we have advised, that where arteries are tied, the ligatures will prevent the union of the divided parts, and that sinuses are very apt to be formed, and produce the same effect: but when the cure has been properly conducted, I have never found these circumstances to occur in such degree as to afford any valid ground of objection.

When wounds do not admit of a union by the first intention, the most effectual method of preventing the occurrence of bad symptoms, is to promote a speedy and plentiful

ful suppuration, by the remedies formerly recommended for this purpose, viz. poultices and fomentations. These should be applied immediately when the pain is very great; but when this is moderate, we had better defer the use of them until the effusion necessary for the formation of pus has taken place, which will probably be in the course of a day or two, lest the inflammation should be prevented from arising to the necessary degree. The use of these remedies should be omitted as soon as the pain and inflammation have subsided, and a free suppuration has taken place; because a longer continuance of them would do injury by relaxing the parts to too great a degree; and the sore is then to be treated in the manner formerly advised, in the chapter on Ulcers.

The immediate applications to recent wounds should always be mild; dry lint or sponge are very commonly recommended, but lint spread with a mild ointment is less irritating, and in my opinion, of consequence more proper.

The first dressings of wounds should be removed as soon as they appear to be covered with matter: this will generally happen about the fourth or fifth day; but it must necessarily depend on the health of the patient, and other circumstances. The application of poultices above the dressings after the second day, puts it into our power to remove them sooner than we otherwise could, by softening them, and promoting the suppuration. The nature of the subsequent dressings must depend upon the particular nature and appearances of the sore. See chapter on Ulcers.

The symptoms which more particularly require attention in wounds, are, pain, inflammation, and convulsive affections. The first of these usually goes off in a short time; but when it continues very violent and for a longer time than usual, it will be necessary, in the first place, to try the effects of opiates: Should not these give permanent relief, we should carefully search for the cause. This will sometimes

sometimes be found to consist in extraneous substances lodged in the wound; these should therefore be searched for, and removed, either by the fingers, injections of warm water, or by immersing the parts in warm water or milk for a considerable time, by which they may be dissolved and washed out.

If these trials do not remove the pain, it will often be found to originate from inflammation. This is to be removed in the usual way; but particularly by the application of leeches to the edges of the wound, and by scari-fying the periosteum, if the inflammation appears to be seated there. There is not so much danger of inducing exfoliation of the bone by this proceeding, as by suffering the inflammation to continue, and perhaps terminate in the formation of matter.

When the pain appears to be deep seated, and does not seem to originate from either of the causes already mentioned, it may with some reason be attributed to a partial division of a nerve or tendon. In this case, although putting the part in a relaxed position may afford some ease, no effectual relief will be given by any remedy, but an entire division of the injured nerve or tendon. This being made, the limb should be relaxed, and the part affected covered by an emollient poultice. If this should fail, either from the division being made incompletely, or from its having been too long deferred, there will be great reason to fear the patient will die convulsed, notwithstanding the use of opiates, and every other remedy.

In some instances, the pain instead of being deep seated, is found to originate from a peculiar degree of irritability of the nerves on the surface of the injured parts. It is not then usually severe, but it often prevents the patient from sleeping, and occasions a thin acrid discharge. In these cases, large doses of opium give the most certain relief; and a weak solution of opium, or of saccharum saturni, are

are the best external applications. Poultices often increase instead of relieving the complaint.

Subsultus tendinum, and other slight spasmodic affections are frequent consequences of wounds; these are particularly apt to occur after amputation, and then produce very disagreeable and sometimes dangerous consequences. They are evidently the effect of pain and irritation from the wound, and are often relieved considerably or entirely, by putting the whole body, and particularly the part wounded, into an easy relaxed posture. If this fails, opiates will commonly succeed: and these should always be given in small quantities, frequently repeated; for large doses are very apt to nauseate or puke, and to be productive of an increase of the spasms after their immediate effects are over.

The most alarming convulsive affections consequent to wounds, are the locked-jaw and tetanus. These are most apt to occur in warm countries, but occasionally are met with in every variety of climate. They are frequently the effects of trifling injuries; a small scratch, for instance, which does not penetrate to a greater depth than the skin will sometimes induce them: and when they happen as the consequences of large wounds, they do not commonly make their appearance until the fore seems nearly healed.

Upon the first symptoms of these affections, the patient should be immersed in a bath of warm water as long as he can bear it, or what will perhaps be preferable, a bath of warm milk, or of water impregnated with oil; in fat broth, e. g.

As the warm bath has often failed, some practitioners have had recourse to cold bathing; but although this has proved frequently useful in tetanus, it is still doubtful whether it can be equally serviceable in trismus, or locked jaw, the most dangerous species of these affections.

Opium appears to be the most useful internal medicine, and it seems more proper to give it in moderate doses, as

above

above directed, so as to keep the system constantly under its effects, than to exhibit it in very large quantities at a time; as this last method appears to induce that state of the body which it was meant to prevent, when the immediate effects of the medicine are gone off, viz. a great degree of irritability. *Æther* and musk have been joined with opium, but they have not been productive of any important benefit.

As external applications, emollient animal oils seem to be those that we may expect to be most serviceable; such as the oil obtained by boiling recent bones in water, and that afforded by fowls. Mercurial ointment seems chiefly useful as an emollient. Opium moistened with spirit or water, or in the form of laudanum, has been rubbed or applied on the contracted parts with benefit.*

At the same time that these remedies are employed, the patient should be supported by mild nourishment given by the mouth, when this can be done; and by clysters of strong broths, if the contraction of the jaws prevents the exhibition of food by the mouth. In order to avoid this
last

* Dr. Rush, professor of the theory and practice of medicine in the college of Philadelphia, in wounds of nervous and tendinous parts, as preventatives of these spasmodic affections, advises dilatation, and dressing with spirits of turpentine, or some other stimulant substance; and tells us, that where this plan has been properly followed, so as to excite an inflammation of the part, he has never seen them produced. The Doctor believes tetanus to be founded in relaxation, and that in order to remove the affection, it is necessary not only to restore the natural vigour, but to excite something like inflammatory diathesis in the system. Agreeably to this idea, besides the cold bath, *oleum succini*, Barbadoes tar, mercury, and the other tonics and stimulants which have heretofore been recommended, he employs wine, bark, and blisters, together with the topical remedies above mentioned. Electricity, as suggested by the Doctor has lately been used with success in New-England, as we learn from a publication of the Medical Society at New-Haven.

The happy effects of Dr. Rush's method, in several instances, seems much in confirmation of his opinion. See *Med. Obs. and Inq.* by Benj. Rush, M. D.

last circumstance, it will be advisable to remove a tooth or two, when the symptoms of trismus seem approaching; or if this is then neglected, to extract them afterwards.

When a locked jaw is the consequence of a wound in the extremities, if it does not yield to the remedies above recommended, it has been advised to amputate the member; but experience has shewn this practice to be not only ineffectual, but in many instances to have increased the disease.

S E C T. III.

Of Punctured Wounds.

A WOUND is said to be punctured when it is made with a small, pointed instrument, such as a small sword; and when the external opening is small and contracted in proportion to its depth.

Injuries of this kind are more dangerous and difficult of management than incised wounds of a much greater extent; from deep seated nerves and other important parts being more apt to be partially hurt; from extraneous bodies being carried to a depth from whence they cannot be easily removed; from the matter afforded being more apt to lodge within them; and from their edges adhering often with difficulty.

In superficial punctures, where we are certain of being able to extract any extraneous matter, and where the inflammation is for the most part moderate, compression may be used, and will seldom fail of effecting a cure. When they are deep, and will admit of a seton being used, I apply emollient poultices until they suppurate freely, and there is no reason to fear that the inflammatory symptoms will afterwards go too far; a cord is then introduced

nearly equal in size to the opening, and being allowed to remain till there is ground to believe that any extraneous matter lodged in the wound is discharged, it is then lessened, and the cure finished by compression alone, as directed in the treatment of sinuous ulcers. When the wound is laid open at both ends, the cord may be easily introduced by means of a seton probe; but when there is but one external opening, a counter-opening must be made, either by cutting with a scalpel, on the end of a blunt probe, or by means of a lancet-pointed needle passed through a canula, and thus introduced into the sinus.

But although a cure of such wounds may be thus accomplished, yet I am well convinced, that wherever the practice is safe, the laying them open immediately after the accident, by means of a probe-pointed bistouri, or a scalpel and director, should be preferred: for by this means, all extraneous bodies are at once brought into view; hemorrhagies are easily restrained; all that pain and trouble which sometimes occur from a partial division of nerves or tendons are directly obviated; the inflammation which so often follows punctured wounds will not be so apt to run high; and much time will be saved.

When the puncture runs deeply among the larger muscles, and especially in such as are contiguous to large blood-vessels or nerves, this practice cannot be fully adopted with safety; and we must be contented to lay open the parts as far as it can be done with propriety, and trust to the consequent suppuration for bringing off any extraneous matters that may be lodged in the wound, and to compression for a completion of the cure. Or, as a seton may in some cases be passed where it might be dangerous to make a deep incision, that practice may be tried.

But it is to be observed, that when a puncture runs in such a direction as not to admit of a counter-opening, a seton can never be employed; and we must trust to a proper application

application of pressure, not merely for preventing any lodgement of matter, but for effecting a cure by producing an adhesion of the divided parts. And when this method, or setons fail, astringent injections, such as lime-water, weak solution of saccharum saturni or of alum, or claret or port wine and water, may be advantageously employed, in order to check too great a discharge of matter, or produce a certain degree of callosity in the sides of the fore: But they should never be used before, as they tend to diminish the proper degree of inflammation, and wash off the pus in too great a degree; and thus prevent the formation of granulations, and the adhesion of the sides of the sinus.

In punctured wounds where setons cannot be employed, it is sometimes difficult to prevent the external opening from closing, long before any tendency to heal appears in the bottom of the fore: and if this be not attended to, much mischief is apt to ensue from matter collecting beneath, and bursting out from time to time. With a view to prevent this occurrence, tents are employed. Those that are hollow are to be preferred to solid tents of any kind: for they admit of a constant and free discharge of the matter that is formed, while solid tents, from preventing any discharge but at the stated dressings, are very apt to make the matter insinuate itself between the different layers of muscles, and thus give time for an absorption of it into the system; on this account, if they are employed at all; they should never fill the aperture entirely. Silver and lead are commonly employed to form hollow tents; the latter is preferable, because it gives least irritation, and may be more easily adapted to the form of the fore. Solid tents may be formed of sponge, gentian, or any other substance that swells with moisture.

Tents should never be employed when their use can be at any rate dispensed with; and as the discharge will commonly

monly preserve the opening of a wound free, they can be very seldom necessary.*

S E C T. IV.

Of Lacerated and Contused Wounds.

A WOUND is said to be lacerated, when the parts are torn asunder, and the edges of the fore are ragged and unequal; and contused, when made by a blunt or obtuse body.

These varieties of wounds, although in fact much more dangerous than simple incised wounds, do not at first exhibit such alarming appearances. For instance, there is seldom much hemorrhagy attending them: a limb has been torn off without any bleeding at all being produced; and indeed the hemorrhagy as well as the pain, generally seems to be in an inverse proportion to the extent of the injury.

The retracted edges of lacerated and contused wounds become almost immediately swelled, from effusion into the cellular membrane. When the injury has not been considerable, the affected parts are generally thrown off in the form of sloughs by a subsequent suppuration, and a cure is readily effected by the means advised in simple incised wounds; but if the texture of the parts is very much destroyed, and particularly if any of the larger arteries have been obliterated, there will be reason to fear that gangrene will be the consequence. When this supervenes, in healthy constitutions, and where the wound is not very extensive, the mortified parts will often separate, and a cure will

* As all tents act more or less as extraneous bodies, they can very rarely, if ever, be employed with propriety, in the healing of sinuous or punctured wounds; free dilatation is the most certain mode of succeeding in such cases.

will be afterwards accomplished; but in opposite circumstances, there will be great reason to expect death may be the consequence. If gangrene does not so immediately follow the injury, yet where this has been very extensive, so great a degree of inflammation often succeeds as ultimately to produce it.

Hence it is obvious, that in these wounds our principal object is to guard against mortification; and that the means by which we effect this must vary according to circumstances. As the violence of the inflammation is the most frequent cause of the gangrene, our attention must be principally directed to obviate this. Blood, therefore, should be taken away in such quantities from the injured vessels, as the nature of the affection may indicate, and the strength of the patient admit: after this, if necessary, the arteries may be tied. The wound is then to be cleared of all extraneous substances as formerly directed, and the parts placed as much as possible in their natural situation; but no kind of future should be employed. If the violence has been considerable, and especially if the patient complains of much pain, it will be still necessary to take away blood cautiously according to the strength of the patient; and particularly by leeches applied as near as possible to the edges of the fore.

The parts affected should then be dressed with pledgits of some emollient ointment, and over this a warm poultice should be applied. The poultice, together with warm fomentations, should be renewed three or four times a-day, in order to promote a speedy suppuration; which is the best means of removing all the bad symptoms, and of preventing gangrene. When pus begins to be freely formed, the parts that have been much injured, gradually separate; and as soon as they have come away, the edges of the wound may be brought together by plasters or bandages,

or

or the fore may be treated as a common ulcer, according to circumstances.

When notwithstanding the means made use of, gangrene actually comes on, the mode of treatment must be entirely changed, and we are to depend on the remedies recommended in the section on mortification.

S E C T. V.

Of Wounds in the Veins.

WOUNDS in the veins heal with much more ease, and are attended by much less danger than wounds of the arteries, both on account of their having less muscular substance on them, and the less degree of force with which the blood is moved in them, and because the obliteration even of the largest external veins, is of little consequence, the anastomosing branches readily supplying the want of them.

A longitudinal wound will generally heal if covered by a piece of lint, or soft linen; or at any rate if dried sponge or agaric is applied to it, and secured by moderate pressure. But in transverse cuts, when compression cannot be used, or is insufficient to restrain the hemorrhagy, the vessel should be tied by the tenaculum or needle, as directed in the case of wounded arteries.

S E C T. VI.

Of Wounds in the Lymphatics.

LYMPHATICS are sometimes cut in blood-letting, in extirpating tumors, and in opening buboes and other glandular collections of matter. When the smaller branches only are injured, they readily heal with the rest of the wound; but when the vessel is large, and does not heal so soon as the other parts, but continues to pour out its contents, producing inconveniency, and debilitating the patient, we should put a stop to the discharge. If this cannot be effected by compression, the vessel should be secured by a ligature. This is a much more certain method than the application of astringents, dried sponge, agaric, puff ball, or cauteries, recommended by some.

S E C T. VII.

Of Wounds in the Nerves, and Tendons, and of Ruptures of the Tendons.

WITH respect to wounds of the nerves and tendons, we must refer to what has been said on the subject, in the chapter on blood-letting, and in section 2. of this chapter.

In cases of ruptured tendons, it was formerly the practice to bring the ends into contact, and retain them by sutures; but it is now very well established by experience, that this is unnecessary, and that if they can be brought nearly together, they will contract such adhesions to the neighbouring parts, that the use of the limbs will be very perfectly

perfectly restored ; and by this means a great deal of trouble to the surgeon, and pain to the patient may be prevented.

Wherever a wounded tendon is situated, or even when the tendon alone is ruptured, without any injury being done to the external parts, the limb should be placed in such a position as will most readily admit of the retracted ends being brought nearly together ; the muscles of the whole limb must then be tied down with a roller, applied moderately tight ; so as to prevent them entirely from moving during the cure, and the parts placed in the most easy and relaxed posture. Thus, when the tendon of the rectus femoris is the seat of the injury, the leg should be kept stretched out, while the thigh should be somewhat bent ; and when the tendo achillis is affected, the knee should be constantly bent, and the foot stretched out.

In ruptures of the tendo achillis, in order to keep the divided parts in their proper situation, the patient should wear a slipper, connected to a broad piece of quilted ticken laced round the upper part of the leg, by a quilted strap. The slipper should be open at the end, in order to admit of a free motion of the toes.

When the patient is able to go abroad, which may be the case in about two weeks, he should wear a very high-heeled shoe, to the back part of which a strap should be fixed, long enough to be fastened to the garter.

The patient should wear this for several months at least, and be very careful to avoid any violent exercise, for a long time, for fear of again rupturing the newly healed parts.

S E C T. VIII.

Of Wounds in the Ligaments.

OUR observations on this subject are chiefly applicable to wounds of the capsular ligaments; as the ligaments situated far from the surface of the body are not much exposed to external violence, and are out of the reach of applications.

The ligaments are rendered extremely sensible by disease, and wounds of them are often productive of very alarming consequences. For although, in some instances, lacerations, by the heads of bones being pushed through them, and wounds of them, have readily healed; yet in general, the symptoms which ensue from injuries to them are very severe and hazardous. Nothing alarming appears perhaps at first, or for several days after the accident; but at length the patient feels an uneasiness and stiffness of the joint; these gradually increase; and the parts soon become swelled, tense, and inflamed.—The pain now grows excessive; a sense of tightness around the articulation comes on; and the inflammation spreads all over the limb.

If the wound in the ligament is large, the synovia is often immediately discharged in considerable quantities; but the subsequent swelling gradually stops the flow of it, and the fore becomes dry and sloughy. In a few days, however, extensive suppurations begin to form in the joint; and if these are laid open, synovia is discharged with the pus. This relieves the tension and pain; but a succession of abscesses is apt to take place, which at length materially injure the patient's health.

These effects almost always result from wounds in the large joints, if they are not healed very quickly, and almost without the formation of matter. They seem to be

chiefly the result of the admission of air to the internal parts of the joints ; and on this account, in incised wounds, where it is practicable, as soon as extraneous substances that may have been carried into the cavity have been removed, the skin should be pulled over the wound, so that the cut in that and in the ligament may not correspond, and the divided parts of it connected by adhesive plaster, or futures. As futures are too apt to excite inflammation, the plasters should in general be preferred : These should be aided by the application of a flannel roller around the joint. The patient should be in bed when the dressings are applied, that he may not be obliged to move the limb soon ; and the limb should be placed on a pillow in such a situation, as will most effectually relax the integuments : If the wound is on the anterior part of the joint of the knee, for instance, the leg must be extended, and if on the back part, it must be bent.

In order to prevent inflammation, the patient should be put on a low diet ; laxatives should be used ; moderate perspiration should be excited ; and he should lose some blood.

By this treatment I have known many of these wounds to heal very readily ; but when it has been neglected, or is not effectual, and inflammation has taken place, local blood-letting is the most beneficial remedy. In robust habits, eighteen or twenty leeches should be applied as near to the parts affected as possible ; and this should be daily repeated as long as the continuance of the inflammation may render it proper. The wound may be dressed with some simple ointment ; but one of the best applications to the joint is the steam of warm vinegar. Fomenting the part with decoction of white poppy heads will be sometimes very useful in lessening the pain : but in general it will be necessary to employ large doses of opiates.

These means properly employed will often remove the inflammation; but when they do not, it terminates in large abscesses, partly within the joint, partly in the substance of the ligament, and in part in the cellular substance contiguous. All that can be done then, is to promote the formation of these when they have begun, and to discharge the matter as soon as suppuration is completed, by openings in the most dependant parts of the tumors. If notwithstanding this treatment, the disease continues until the patient becomes hectic, and much debilitated, as any farther attempt to save the limb will be hazardous, amputation should be had recourse to. See chapter on Amputation.

S E C T. IX.

Of Wounds in the Face.

IN injuries of this kind, it is an object of importance to prevent deformity. To effect this, the divided parts should be laid as exactly together as possible; and if the wound is in the direction of the fibres of the injured part, or is superficial in any direction, they may be kept in contact by adhesive plasters; but whenever the wounded parts retract much, it will be necessary to employ sutures. The twisted suture, particularly for the lip, is to be preferred to any other. See section on Hare-lip.

When wounds penetrate the salivary ducts, the treatment directed in chapter xxxiii. must be employed.

In the fore-head, wounds are apt to be attended with troublesome hemorrhagy; and when this cannot be restrained by compression, or the artery cannot be readily tied, which will happen sometimes, if it lies in the bone, a part of the external lamella, or if necessary of the whole substance of the

the

the bone, may be removed, in order to enable us to apply a ligature to the vessel.

S E C T. X.

Of Wounds in the Trachea and Oesophagus.

THESE wounds are most frequently the consequence of an attempt to effect suicide.

When the trachea is divided longitudinally, adhesive plasters will be found adequate to the retention of the separated parts in contact. They will also be sufficient in slight transverse wounds, if aided by a proper posture of the head: Indeed in all wounds of this kind, it is absolutely necessary to the cure, that the head be kept bent as much as possible down upon the breast; this will be most certainly effected by connecting a night-cap placed on the head, with a roller carried round the body.

In all deep transverse wounds of the trachea, it will be necessary to employ the interrupted suture. But as the ligatures, if carried into the trachea, are apt to excite coughing, which has in some instances torn out the stitches, I have in different instances succeeded very well by passing them merely through the integuments, in the following manner; a flat needle with a slight curvature, and threaded with a broad flat ligature, being inserted at the wound, and passed slowly up for the space of an inch as close as possible to the trachea, it is then to be pushed out with the ligature; and the other end of the thread being armed with a needle, must in like manner be passed through the teguments of the opposite side. After a sufficient number of ligatures are passed, they should be secured with running knots, that they may be easily untied if necessary; adhesive plasters should then be applied over the whole.

I have not yet had an opportunity of ascertaining whether this method will succeed, when the wind-pipe is entirely cut through; but it is probable it will. If however, it is thought necessary to sitch the trachea itself, we should carry the needle from within outwards, for fear of doing mischief. Three ligatures will generally be found sufficient; one anteriorly, and the others at the sides.

Wounds in the œsophagus are to be managed nearly in the same manner with those of the trachea, but they are more dangerous; as well on account of the greater difficulty of reaching the part injured, from its depth, and the lower part of it being apt to be drawn below the sternum; as from the difficulty of conveying nourishment to the stomach which they produce; and from the vicinity of the recurrent nerves, the carotid arteries, and jugular veins.

Our first object in divisions of the trachea and œsophagus must be to stop the hemorrhagy; not only on account of the loss of blood, but to obviate the cough and nausea, which are very injurious, and which are the consequences of the blood getting into the lungs and stomach. All the divided arteries and veins should therefore be secured immediately. A wound of the carotid artery is usually immediately fatal: if the surgeon is called in time he should however make a ligature on both ends of it. Should the jugular vein be partially divided, we may attempt to effect a cure by compression, made either by a common bandage, or where much pressure is required, by a machine which does not interrupt the respiration; but if it be cut through, it must be tied.

As soon as the bleeding is stopped, the œsophagus must be sitched in the manner advised for the re-union of the trachea; and in order to effect this more readily, the external wound should be enlarged without hesitation when it is judged necessary.

Longitudinal wounds in the gullet might very probably be cured merely by adhesive plasters.

S E C T. XI.

Of Wounds in the Thorax.§ I. *General Remarks.*

WOUNDS in the thorax are in general dangerous in proportion to their depth: Those which affect the integuments only, if properly treated, are seldom productive of any important consequences; but the smallest wounds penetrating the cavity of the chest, will, in some instances, be attended by the most alarming symptoms, particularly if the contained viscera are injured.

The first object in these wounds is to ascertain whether they have entered the thorax: This may be generally done; by putting the patient into a proper position, and then carefully examining the wound by means of the fingers, or a probe; by ascertaining the form of the instrument with which the wound was inflicted, and the length to which it seemed to be pushed; by liquids injected returning immediately, or lodging in the wound; by air being discharged from the wound; by an emphysematous swelling of the contiguous teguments; by the quantity of blood discharged from the wound; by the appearance of the blood; by blood being discharged from the mouth; and by the state of the pulse and respiration.

1. The patient should always be placed as nearly as possible in the posture he was when he received the wound, during the examination; for it must be obvious, that in some postures, from the mobility of the muscles and ribs, a wound, in reality deep, may be made to appear very superficial.

2. The depth of the wound may, in some instances, be ascertained by the eye; but when this cannot be done,

nor the fingers employed to discover it, on account of the opening being very small, a bougie should be employed: This gives less pain, and is less apt to do injury than a metallic probe. But the examination should be very cautiously made, and soon desisted from, if we cannot ascertain the extent of the injury very readily; because the patient may suffer from the attempt, and the symptoms which follow will soon determine the matter.

3. The size and form of the instrument, the direction it appeared to take, and the depth to which it was pushed, should always be ascertained with as much exactness as possible, as these circumstances may undoubtedly assist us in forming a judgment of the depth of the wound.

4. When these means do not enable us to form an opinion, the injection of some mild liquid, as warm water, may be tried. If this returns immediately, the wound is probably not deep; if it remains altogether, or in great part, without producing any external swelling, we cannot doubt of its having penetrated the chest.

5. If air passes out at the wound during inspiration, there will be reason to suspect that the lungs are injured. However, in cases where there is no adhesion between the lungs and the pleura, this appearance may be produced from the admission of air, by the wound, into the cavity: The patient should therefore be directed to make several full inspirations, in order to discharge the air that may thus be collected; and at the end of each, the skin should be drawn over the wound to prevent more from getting in: The whole will thus soon be evacuated; and then if air still rushes out during inspiration, we may conclude with certainty that the lungs are wounded.

6. Emphysematous swellings, produced by the air from the lungs insinuating itself into the cellular membrane, are more apt to be the consequence of punctured than of extensive wounds, and especially of those which run oblique-

ly. It is to be observed however, that emphysema may also be produced from the admission of external air by the wound.

7. When the quantity of blood discharged is very considerable, and particularly if it is not stopped by compressing the intercostal artery, we may with certainty conclude that some of the thoracic viscera are wounded. That the lungs are injured may be inferred from the frothy and very red appearance of the blood; and particularly if the patient discharges blood by the mouth.

Lastly, When wounds do not penetrate deeper than the teguments, the pulse and breathing are not at all affected at first; but when they enter the thorax, and particularly if they affect the lungs, or any other part of its contents, an immediate change in the state of the pulse and respiration is produced. The wound may, however, pass to a considerable depth, if it is inflicted where there is an adhesion between the lungs and pleura, without producing any extravasation, and consequently without injuring the state of the pulse or breathing; but when either blood or air gets into the cavity of the chest, the breathing immediately becomes difficult, and the pulse feeble, oppressed, and intermitting.

§ 2. *Of Wounds in the external Teguments of the Thorax.*

WOUNDS which do not go deeper than the cellular membrane, heal as readily in these parts as in any other situation; but those that reach the intercostal muscles, and particularly punctured wounds of considerable extent, are very apt to penetrate the cavity of the thorax at length, if great attention is not paid to the timely evacuation of the matter formed. When these kinds of wounds are not very extensive, the best method of treatment is to lay them entirely open with a scalpel and director, and then heal them

them carefully from the bottom ; but when the puncture is of considerable length, the cure by seton is to be preferred. Some advise, instead of a seton, to employ compression ; but this cannot be used to a sufficient degree without impeding the respiration ; and besides this bad effect, it would endanger an insinuation of the matter produced into the cavity of the thorax.

It is particularly necessary in wounds of this kind to avoid exercise, especially of the chest ; hence coughing, laughing, and even talking, should as much as possible be avoided. The patient should be kept on a low cooling regimen ; the bowels should be gently opened ; and, if necessary, bleeding should be employed.

§ 3. *Of Wounds which penetrate the Cavity of the Thorax.*

THESE are often productive of alarming consequences ; chiefly from the admission of the external air by them, and from extravasation of blood between the lungs and pleura. The latter circumstance generally arises from a wound of the intercostal artery : As this vessel is of a considerable size, it should always be secured as soon as possible. This may generally be done, by drawing it out from the groove in which it is situated, by means of a tenaculum somewhat more bent at the point than usual, after dilating the wound ; but when this cannot be executed, from the ribs being much covered with fat, or any other cause, a broad flat ligature may be readily passed round the rib, and a small doffel of lint tied by means of it upon the bleeding artery. This, if done with care, may be performed with the greatest safety.

When the surgeon is called in time, he may thus prevent any considerable quantity of blood from being discharged into the chest ; and as soon as the hemorrhagy is stopped, he may then proceed to expel the air in the manner directed

in § 1. of this section. The wound may afterwards be secured by adhesive plasters, a napkin, and scapulary bandage.

If however, blood is extravasated in such quantities, or such a formation of pus is consequent, as produces a considerable oppression of breathing, the paracentesis must be employed as directed in the chapter on that subject. But it should be particularly observed, that as instances have occurred in which absorption of small quantities of blood or other fluids has taken place, the operation should never be advised unless the violence of the symptoms render it absolutely necessary; and we should rather trust to the chance of the first, than run the risk of the last.

§ 4. *Of Wounds of the Lungs.*

WOUNDS in the lungs require the same general treatment with those which merely penetrate the cavity of the chest; but as they are more hazardous, they demand a more particular attention. The danger of them arises from the hemorrhagy, or a subsequent suppuration in the lungs.

The hemorrhagy is most effectually checked by copious bleeding, so as to induce fainting; by keeping the patient in a cool apartment, and perfectly at rest; by cooling laxatives; and by a low diet. It is also of the greatest consequence to keep the lungs as free from action as possible: Hence coughing, laughing, much speaking, and even the making deep inspirations, should be carefully avoided.

Notwithstanding all our efforts, however, the patient will sometimes die from the hemorrhagy; or the extravasation of blood will obstruct the breathing materially; or abscesses will be formed in the substance of the lungs. The latter circumstance only remains to be considered.

Collections of matter in the lungs may be discharged either by the mouth, by the wound, or into the cavity of the chest. We are in this place to pay attention only to those cases in which the abscess formed bursts into the wound, or at least is discovered pointing towards it. As soon as this is known by an oozing of pus, or by introducing the finger between the ribs, an opening should be made into the abscess as in other cases. By doing this, we avoid the hazard of immediate death, which often happens from the matter being discharged in great quantities into the bronchiæ, and at the same time prevent the pus from passing into the chest, which might render another operation necessary. In cases of this dangerous kind, when the stoppage of a previous discharge of matter has taken place, and all the usual symptoms of a fresh collection have come on, I would even advise the external wound to be enlarged to the extent of two or three inches, in order to discover the seat of the abscess, and when this is ascertained, to make an opening into it, by the careful introduction of a bistouri along the finger, at whatever depth it be seated. I have used this practice in two instances; and in both of them was obliged to go nearly the length of my finger into the substance of the lungs: the patients were instantaneously relieved, and are now in good health.

In the subsequent treatment of these abscesses, we must be careful that the sore heals from the bottom; and this will be most effectually accomplished by the use of a hollow oval tent. See section on Punctured Wounds.

When any part of the lungs protrudes from a wound in the chest, it should be immediately replaced; but if this is neglected until a part of them becomes gangrenous, this should be cautiously removed, and the rest replaced. If the incision be confined to the mortified part, no hemorrhagy, or other bad consequence will arise from it.

§. 5. *Of Wounds of the Heart, of the large Vessels connected with it, and of the Thoracic Duct.*

THE slightest wounds of the heart are probably always ultimately fatal; for the weakness induced by them on a particular part, will necessarily be productive of aneurism, which always perhaps has a rapidly fatal termination. The most probable method of preventing this, or at least of delaying it is, to lessen the action of the heart by copious blood-letting, low diet, laxatives, and avoiding fatigue of every kind.

The same observations apply to wounds of the large blood-vessels about the heart.

We may judge the thoracic duct to be wounded, when the instrument has penetrated to the part in which it is situated; when the discharge is altogether white like chyle, or mixed with a considerable quantity of it; and when the patient becomes daily weaker from it, than he would become from a wound of the same size in any other part.

In order to prevent the diameter of the duct from being distended, which at the same time will tend to lessen the extent of the wound, the patient should be kept upon a cooling and very spare diet, and should take his food and drink in very small quantities at a time; the bowels should be kept open; and bodily exertion of every kind, and particularly that which affects the breathing to considerable degree, should be avoided.

§. 6. *Of Wounds of the Diaphragm, Mediastinum, and Pericardium.*

WOUNDS in the diaphragm are known by the situation of the injury, and by the concomitant symptoms. The breathing is rendered difficult; and pain is produced all over

over the parts to which the diaphragm is connected, and in the region of the stomach; sickness, vomiting, and hiccup, take place; and pains in the shoulders sometimes occur, together with cough, delirium, a quick hard pulse, and other symptoms indicating inflammation, and fever. Involuntary laughter is said to take place in some instances.

It is a common opinion, that wounds of the tendinous part of the diaphragm are more dangerous than those which affect the muscle itself; but this opinion is not established by experience: patients seldom recover from the effects of either.

In order to obviate the inflammation and irritation, blood-letting is chiefly to be depended on; and together with this we should employ gentle laxatives; large doses of opium joined with musk; and warm fomentations to the thorax and abdomen; and enjoin rest, and a low diet.

These wounds, if small at first, soon become enlarged by the constant action of the diaphragm; and some of the abdominal viscera then usually pass into the chest, and increase the danger.

The circumstances most to be feared from wounds of the mediastinum, are extravasation of blood into the chest, and inflammation, with its consequences. And wounds of the pericardium prove sometimes dangerous by preventing the collection of the lymph necessary to the easy motion of the heart, and by allowing this fluid to spread through the cavity of the chest. The general observations on the management of wounds penetrating the thorax, will apply to that of injuries of both mediastinum and pericardium.

In every wound which enters the thorax, where a cure is not effected without the formation of matter, the cure is apt to be tedious, and a discharge of matter to take place for a long time, perhaps for life. But it is much better to suffer the inconveniency thus produced, than to attempt its removal by the use of astringent or other injections; as
these

these are often productive of inflammation, and other bad consequences, but never of good effects, at least according to my observation.

S E C T. XII.

Of Wounds of the Abdomen.

§. 1. *Of Wounds of the Teguments and Muscles of the Abdomen.*

WOUNDS of this kind merit particular attention, on account of the danger there is of their effects being communicated to the contiguous viscera.

It must be our first object in all wounds in the region of the abdomen, to determine whether or not they penetrate the cavity. When their extent is not evident to the sight, it may commonly be ascertained; by a proper examination with the fingers or probe, after putting the patient into the posture in which he received the wound; by ascertaining the form and size of the instrument, the depth to which it went, and the direction it appeared to take; by the quantity of blood discharged; by the attending symptoms; and by the matter discharged by the wound.

When the wound will admit the finger, we may always determine with certainty the extent of it; but probes should not be depended on in these cases, because they readily pass among the parts, in almost any direction, with a very little force. Injections are of no service to determine this matter, because they are so very apt to spread among the muscles and cellular substance.

The size of the instrument, its direction and the appa-
rent

rent depth to which it entered, should also be considered, and may assist us in our judgment.

When the quantity of blood discharged is very great, we may conclude almost with certainty, that some of the large internal vessels are injured, for there is no external artery but the epigastric that can afford much discharge, and it may be soon ascertained whether this is wounded. It is to be observed however, that even the largest internal artery may be cut, and still no external discharge of blood take place. The internal hemorrhagy will, however, soon be evidenced; by the patient becoming weak and faint; by a weakness of pulse, and cold sweats; and if the discharge does not soon stop, by every other symptom of approaching death.

A discharge of fæces, of bile, of the pancreatic juice, and even of chyle, sometimes appear, and determine with certainty that some of the abdominal contents are wounded. This is also ascertained, if large quantities of blood are thrown up from the stomach, or discharged by stool. Urine may be discharged by a wound which does not penetrate the cavity of the abdomen, because the kidneys and ureters are situated behind the peritonæum.

When none of the symptoms which we have described as indicative of wounded viscera appear, and the pain is not in violent degree, we may conclude it very probable, that the wound has not reached the cavity of the belly.

Our principal view in that case, as in similar wounds of the thorax, is to prevent inflammation, and the lodgement of matter, by bleeding, low diet, laxatives, rest, and a proper attention to the wound, as recommended in the last section. It will however, be necessary to observe, that as any weakness of a part of the abdominal parietes, will be apt to induce a protrusion of some of the viscera, it will be proper, in order to prevent this, that the patient be kept as much as possible in a horizontal position, and when he attempts

tempts to sit or walk, that the debilitated part be supported by a flannel bandage, passed two or three times around the body: And it will be advisable to continue the use of this roller for a considerable time after the wound is healed.

§ 2. *Of Wounds which penetrate the Cavity of the Abdomen without injuring its Contents.*

WE may in general conclude, that a wound penetrating to the cavity of the belly, has not injured any of its contained parts, if the abdomen does not become tense and painful, if the pulse continues soft, and if the heat of the body is not increased.

Wounds of this kind are never devoid of danger; for those which at first show no alarming symptoms whatever, sometimes at last terminate fatally. This seems to arise, either from the admission of air to the cavity of the abdomen, which induces inflammation of some of the viscera, or from the formation of pus, which not finding a vent, collects in the peritonæum.

In these wounds therefore, after securing any blood-vessels of the muscles or teguments which may be cut, and which should be done as soon as they are discovered, our next object should be, to prevent as much as possible the access of the air. In small wounds, this may be done by the use of adhesive plasters, a compress and bandage: And the same attention to the prevention of inflammation, by bleeding, laxatives, and rest, as recommended in § 1. of this section, should be employed. If notwithstanding this treatment they continue open for some time, they should be dressed as seldom, and as expeditiously as possible. Should inflammation supervene, the usual remedies must be had recourse to; and if this terminates in gangrene, the treatment proper for gangrene in general, will
be

be applicable. When the inflammation ends in suppuration, and the quantity of matter collected is productive of disagreeable symptoms, it should be discharged by the trocar introduced obliquely. But this operation should not be advised until we can clearly ascertain the case, and the patient suffers inconveniency from the matter formed; because it is attended with some danger, and small quantities of matter will often be absorbed. By the use of a trocar, and particularly by an oblique introduction of it, less chance will be given for the admission of air to the viscera than if a scalpel is used. I have employed this practice in two cases with success; while two patients in similar circumstances died after the use of the scalpel.

Wounds penetrating the abdomen may prove dangerous by admitting of a protrusion of some of the viscera contained in it. In such cases the prolapsed parts should be returned as speedily as possible into the belly, provided they are not actually gangrenous; in which case, the parts of the intestine at which the mortification terminates, must be connected to the external wound by suture, in order there to form an artificial anus. If however, the protruded parts are covered with sand, dust, or any other extraneous matters, these should be carefully washed off, by bathing the parts in warm milk and water before they are reduced.

In performing the reduction of the intestines some address is requisite. The patient should be put into the posture that will most effectually relax the parts in which the wound is seated, with his head and chest somewhat lower than the belly and buttocks. The surgeon having his fingers dipped in warm oil, or covered with soft oiled linen, should then endeavour to replace the parts, by beginning his pressure at one of the ends of the gut, and continuing it along the doubling to the other. If the intestine contains much air, he should endeavour to make this pass in-

to the part within the belly by gentle compression; and if this is ineffectual, or the intestine cannot otherwise be readily returned, as must happen sometimes when the wound is small, the external opening must be enlarged. In order to make the enlargement in the safest manner, an incision should be carried in a cautious and gradual manner with a scalpel through the integuments and muscles; and as soon as the peritonæum is bared, a probe-pointed bistouri should be introduced between this and the gut, with which the membrane is to be cut until the finger can be introduced, and this serving as a director, the opening may then be enlarged to as great an extent as may appear necessary. The incision should always begin at the lower part of the wound, be carried downwards, and in the direction of the muscular fibres.

In order to remove the air from the protruded intestine, we have by some been advised to puncture the gut with a needle; but this must certainly be considered as a very dangerous practice.

Small wounds of the abdomen may be healed by keeping the patient in a proper posture, with his head and buttocks elevated; by preventing costiveness; and by the use of a flannel roller: but extensive wounds must always be closed either by the interrupted or the quilled suture. See ch. iii. This operation is termed gastroraphy. In performing it, the patient should be laid in an easy relaxed posture; the fore-finger should be introduced to guard the abdominal viscera from the needle; and the needle should be entered at the wound and brought out at the distance of an inch from the edge of it. The sutures should not be more than three quarters of an inch from each other, and the first and last should be made within half an inch of the extremities of the wound. The wound should afterwards be covered with some unctuous substance spread upon lint, in order the more effectually to prevent the access of air; and that a
subsequent

subsequent protrusion of any of the contents of the belly may be more effectually guarded against, a roller should be passed several times around the body. The patient is afterwards to be treated according to the symptoms which ensue.

We are commonly advised to leave an opening in the inferior part of the wound for the evacuation of any matter that may be formed: but as this cannot possibly answer the intended purpose, unless the injury affects the lower part of the abdomen; as it can only be preserved by the use of a tent, the irritation of which may be very injurious; and as the ready access thus afforded to the external air must necessarily be productive of very bad consequences in many instances; I have no doubt of the propriety of closing the whole wound in the manner above directed; and that it will be better to trust to the absorption of any matter which may be afterwards formed, or even to its evacuation by the trocar, than to confide in this precarious mode of treatment.

In favourable circumstances the wound will unite in six or seven days; but when the ligatures give much pain, and especially when the abdomen becomes very tense, the knots should be untied, until by bleeding, fomentations, and gentle laxatives, these symptoms are removed; and the parts may then be again drawn together and secured as before.

§ 4. *Of Wounds of the Intestines.*

WOUNDS of the intestines are commonly attended by nausea, violent pains in the belly, cold sweats, and faintings; and by the discharge of blood by the mouth and anus, and of foetid air by the wound.

In these cases, where the injured part is not protruded, we are directed by some authors to enlarge the wound
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and search for it ; but more mischief would probably be done by the extent of the cut that would thus be necessary, and from the exposure of the intestines to the air, than would be compensated by the benefit from the discovery. The practice therefore should not be attempted ; especially as there have been instances of recoveries from wounds of the intestines which could not be reached.

When the wounded part of the intestines is prolapsed, it should undoubtedly be sewed up, in order to prevent the effusion of fæces into the abdomen : This is best effected by the glover's stitch. In making this, a small, fine, round needle should be used, and armed with silk ; and in order the more effectually to guard against producing a diminution of the cavity of the intestines, the needle should be inserted from within.* The stitches are all to be in a connected series, and the needle always entered in opposite places of the lips of the wound ; by this means it will go in a diagonal line from one side of the wound to the other ; and the stitches should be made at about the distance of two-tenths of an inch from each other. Both ends of the thread are to be secured by knots.

We are commonly advised to leave the end of the thread hanging out at the wound, that the whole may be withdrawn at the proper time ; but when more than one or two stitches are taken, this must be a matter of some difficulty, and less injury would probably be done by leaving it within, in which case it will chiefly pass into the cavity of the gut probably, than by an attempt to draw it out.

When the intestine is cut entirely through, and both ends protrude at the wound, the best practice perhaps, is to stitch them to the peritonæum and abdominal muscles, exactly opposite and contiguous to each other ; to dress them
lightly,

* In the common method of performing this operation, both sides of the gut are perforated at the same time. B.

lightly, keep the wound clean, and trust to nature to effect a cure. The fæces must necessarily for some time be discharged by the fore, but there are instances of the ends of the intestine becoming firmly united in a very little time.

Another method of treatment, is to insert a tube of thin parchment or of paper, or rather a piece of tallow made of the diameter of the intestine, into the upper end of it, and afterwards to carry this, with the substance used with it, into the lower portion of the gut about an inch; and then connect them with a fine needle and thread all round, either at the end of the inferior part only, or there, and likewise just above the extremity of the superior portion of the intestine. Tallow should be preferred to parchment or paper, because it will soon melt and come off with the fæces. The upper part of the gut may be distinguished from the lower by the peristaltic motion in it being more remarkable, and by the discharge of chyle instead of fæces from it.

When only one end of a divided intestine hangs out at the wound, we are usually advised to connect it to the peritonæum and other parts contiguous to the wound, and if this happens to be the superior portion, and not to be near to the upper part of the small guts, it is said the patient may live, under the inconvenience of an artificial anus; but I am clearly of opinion that as the other end of the intestine is probably not far from the wound, the incision should always be enlarged so as to admit of the introduction of the fingers to search for it; for this will not add much to the danger; and should the protruded part be the lower end, the patient will inevitably die in a short time, if the other is not found and connected in the manner above directed.

In case of gangrene of the gut, whether complicated
with

with a wound or not, the treatment should be the same. Vide § 3.

Wounds of the intestines are always hazardous: but it does not appear, from experience, that the difference of the part injured makes any difference in the degree of danger.

§. 5. *Of Wounds of the Stomach.*

WOUNDS of the stomach are known by vomiting of blood; by nausea to a violent degree; by languor and hic-cough; and by the food and drink being evacuated at the wound soon after they are swallowed. Deep wounds in the left hypochondrium or in the epigastrium must necessarily enter the stomach; but those which are inflicted obliquely in any part of the abdomen may reach it: and wounds may penetrate this organ when it is full, which would not extend to it when empty.

There are many instances upon record of wounds of the stomach being cured; but they are always to be considered as dangerous.

Wounds of the stomach require the same treatment as those of the intestines. They are more readily discovered; and when the part injured does not protrude it should be searched for, stitched and replaced: It may always be reached except it be the posterior portion.

In order to prevent inflammation and distention of the stomach, the patient should be put upon as low a diet as his strength will bear; and his food should not be given in greater quantities at a time than a couple of spoonfuls. Indeed we might venture here, as well as in wounds of the upper part of the small intestines, to trust altogether to nutritious clysters, at least for a few days; but in wounds of the larger intestines the injection might pass more easily

ly into the cavity of the belly than if the food was given by the mouth.

§ 6. *Of Wounds of the Omentum and Mesentery.*

WHEN any part of the omentum is nearly separated from the rest, or has become cold, so as to induce a danger of gangrene, it should be immediately taken off; but when these circumstances do not occur, it should be returned as soon as possible into the abdomen. See chap. on *Herniæ*.

In wounds of the mesentery, when any of its vessels are divided they should be tied, in order to prevent the effusion of blood or chyle into the cavity of the abdomen; and the ends of the ligatures should be left hanging out at the wound, that these may be removed as soon as they separate.

§. 7. *Of Wounds of the Liver and Gall-Bladder.*

THE liver may be injured by any wound that penetrates the right hypochondrium or epigastrium: if the cut in it is not deep, it often heals as readily as it would in any other part of the body, but when it passes to a considerable depth, it is always dangerous, from the risk of injuring some of the numerous blood-vessels of this organ; from the interruption it may give to the secretion of bile; and from admitting the bile to be poured into the cavity of the abdomen.

That the liver is wounded may be inferred from the quantity of blood discharged being more considerable than could probably proceed from the vessels of the teguments and muscles; from bile being mixed with this blood; from bile, tinged with blood, being discharged by the stomach and anus; from swelling and tension of the abdomen; and from pain on the top of the shoulder.

All that can be done in cafes of this kind, is to guard againft a profufe difcharge of blood by the ufual remedies; and to difcharge collections that may take place in the abdomen by proper openings.

Wounds of the gall-bladder are more dangerous than thofe of the liver, becaufe they heal with more difficulty, and are more certainly productive of effufion of bile into the abdomen. In fome instances, the bile being obftruded in its flow to the duodenum, has accumulated in the gall-bladder, and produced a very large fwelling; an adhefion has taken place between the bladder and the parietes of the abdomen; the fwelling has burft, and the wound has at length healed; but in general thefe cafes terminate unfavourably:—All that we can do is to procure as free a vent to the bile as poffible, and to difcharge it by an opening when it collects in the abdomen.

§. 9. *Of Wounds in the Spleen, Pancreas, and Receptaculum Chyli.*

WHEN the fpleen is laid bare we can eafily afcertain whether it is wounded or not; but unlefs this is the cafe we have no certain teft to difcover it. Except that wounds in this vifcus are not fo dangerous as thofe in the liver, the fame general obfervations apply to both.

Wounds of the pancreas can feldom be difcovered on account of its fituation;* but a divifion of its duct, by difcharging the pancreatic juice into the abdomen, may do material injury to the conftitution by injuring digeftion; and the collection thus made may ultimately require the aid of furgery.

Wounds

* A man who had received a wound in the abdomen with a fhoe-maker's broad paring knife, had a portion of the pancreas protruded at the orifice, which was cut off clofe to the integuments, and the reft being returned into the cavity, the man recovered.

Wounds of the receptaculum chyli must always be very dangerous, by depriving the patient of nourishment. Nothing more can be done in such cases than to discharge any collection formed, by an operation, when this appears to be necessary.

§. 9. *Of Wounds of the Kidneys and Ureters.*

THE external coverings of the kidneys may be hurt, without any symptom of importance being produced; but if the pelvis renum, or ureters are wounded, some or all of the following symptoms are occasioned: pain over the whole loins, in the groin, yard, and testicles; nausea and vomiting; and bloody urine, passed with pain and difficulty; and the wound commonly terminates in a fistula, which remains during life.

When the wound is inflicted anteriorly, the urine is apt to be extravasated into the cavity of the abdomen; but when it is given from behind, or from the side, the urine will either pass out at the opening, or will spread through the contiguous cellular substance. In the first case, the danger will be very great; but in the latter, if the patient survives the hemorrhagy, he may escape with the inconvenience of a fistulous opening, through which the urine will be discharged. All that we can attempt is to prevent the urine from lodging; and if the wound acquires callous edges, to remove these by the knife or caustic, so as to give them some chance of at last uniting.

§. 10. *Of Wounds of the Bladder.*

WOUNDS of the bladder are in general readily enough distinguished by the urine coming away by the wound, and by that which passes through the urethra being tinged with blood.

Injuries of the upper part of the bladder prove more

hazardous than those of the part covered by the peritonæum: in the first case, the urine is chiefly extravasated into the belly, by which the most dangerous symptoms are commonly produced; and in the last, it is evacuated by the wound.

When the under part of the bladder is wounded, mild dressings should be applied; and we must obviate inflammation by bleeding, laxatives, and a low diet, and particularly by warm bathing and fomentations. If the upper part is injured, the edges of the wound might be connected by the glover's stitch, as advised in wounds of the intestines; but some have proposed to connect the opening in the bladder to the external wound; this however would be apt, for obvious reasons, to do more harm than good, except when the anterior part of the bladder was wounded. In every case I would prefer the first method.

§. 11. *Of Wounds of the Uterus, and its appendages.*

It is obvious, that in judging whether a wound has penetrated the uterus, our opinion must be in some measure influenced by the particular state of that organ at the time, as the extent of it depends entirely on the circumstance of its being impregnated or not; and if impregnated, on the period of the pregnancy. In the case of unimpregnation a wound of that part will not be attended by any peculiar symptoms; but during pregnancy, it will either produce abortion, or the quantity of blood discharged externally, or into the abdomen, will be considerable.

Where symptoms of abortion come on, nothing should be done to remove them; but where they do not take place, and there is reason to suppose the patient may suffer from the hemorrhagy, the delivery should, if possible, be effected in the natural way; if this cannot be done, the wound should be enlarged and the child taken out through it.

it. In other circumstances these wounds require no peculiarity of treatment.

Wounds of the larger blood-vessels of the abdomen and pelvis always prove very soon fatal, because they lie out of the reach of chirurgical assistance; and wounds of the larger nerves of these parts are followed by a palsy, for which we know no remedy.

S E C T. XIII.

Of Poisoned Wounds.

THE stings of wasps, bees, and other insects, of this climate, although sometimes productive of a good deal of pain, seldom induce any other bad consequence. The application of vinegar or spirit of wine immediately after the injury, often prevents the inflammation which would otherwise follow; but when this actually comes on, cold water seems the best remedy. For the sting of a scorpion, as well as of the wasp and other insects in warm climates, the same remedies have succeeded.

The bite of a viper always merits great attention; for although it does not appear that the poison is in general thrown out unless the animal is much irritated, yet as this cannot be certainly determined immediately, we should constantly proceed upon the supposition of the wound being poisoned.

This poison generally operates on the system in the course of twelve or fourteen hours. The patient at first complains of a violent burning pain in the injured part; this soon begins to swell; inflammation succeeds, and is often extended over the whole body: The patient becomes languid and faint, and the pulse low and feeble; he complains of giddiness, nausea and vomiting; and of a
fixed

fixed pain in the region of the heart: The whole surface of the body becomes yellow; and this as well as the yellowness of the urine which occurs, is evidently the consequence of the diffusion of bile; cold sweats, and convulsive twitches come on; and if relief is not obtained, death is speedily the consequence.

In order to prevent these symptoms, the only certain method is, either to cut out the injured part immediately, or to destroy it with the actual or potential cautery: And this may probably be done with good effect while no bad symptom has come on; but the sooner it is put in practice, the greater chance will there be of its proving effectual. Suction, either by the mouth, or by instruments, should never be trusted to.

After the operation, a plentiful suppuration should be excited, either by stimulating ointments, or by emollient poultices, according to the state of the wound, with respect to inflammation.

When the poison has entered the system, the rubbing the body all over with warm olive oil, and giving about an ounce of it every hour, has been said to obviate its bad effects in many instances. But the efficacy of this remedy is rendered very doubtful by late observations; and it would seem that the supporting a plentiful perspiration is more to be depended on. For this purpose, eau de luce has been particularly recommended; but it is probable, that the common form of volatile alkali would be equally useful. Theriaca, and many other remedies, have been highly extolled, but none of these appear to merit confidence.

With respect to the bites of mad animals, when their effects are extended to the system, so as to produce hydrophobia, we cannot depend on any remedy with which we are at present acquainted for their removal. As a preventative of these, the most probable means is to remove the injured part by cutting it out, or destroying it, by means of
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the actual or potential cautery, and exciting a plentiful supuration afterwards. As the effects of the bite are seldom communicated to the system for several weeks, and sometimes not for six months, this treatment would probably succeed, if employed at any period before these come on. The fore should afterwards be kept running for a considerable length of time.

Sea-bathing and frictions, with mercurial ointment, together with its application to the fore, have been much depended on by some as preventatives. When the hydrophobia actually makes its appearance, it will almost always be fatal; the treatment proper to be then directed, belongs to the province of medicine.

When wounds are poisoned by the matter of diseases, as sometimes happens to surgeons in dressing cancerous and venereal ulcers, the most effectual remedy is, to cut out or destroy the part. This must also be the best practice when sores are infected with vegetable poisons. With respect to metallic poisons, they seem only hurtful by irritating or corroding the edges of sores; and require no peculiarity of treatment.

S E C T. XIV.

Of Gun-shot Wounds.

As gun-shot wounds exhibit the same appearances, except that they are usually in more violent degree, and require the same general treatment with contused wounds from other causes,* it is not necessary here to enter very particularly into the consideration of them.

Our first object in these cases should be to prevent inflammation; for from the supervention of this, gangrene, or extensive

* See Section on Contused Wounds.

extensive suppurations, which are the consequences most to be dreaded, almost always originate. Hence, above all other remedies, blood-letting should be freely employed.

The very beneficial effects of bleeding in general, but more particularly of the abstraction of blood from the injured parts themselves,* in wounds of this kind is very clearly evidenced by this fact, that some of the most remarkable cures have occurred among those patients who, after an engagement, are left some time upon the field; by which means they always lose a great quantity of blood.

With respect to the extraction of extraneous substances, which is next to be attended to, the same general directions are to be observed as in the case of punctured wounds.

When a ball cannot readily be extracted by the wound, or by a counter opening, it should be suffered to remain, unless it is lodged within a bone, when it should always be removed, if this can be done without danger to the patient; because in such a situation it is productive generally of great inflammation, swelling, and pain, of all the contiguous parts. In taking out balls, or other substances, we should be very cautious in the introduction of forceps and other instruments. Where they can be seen, forceps may be used; but unless this be the case, it will be generally better to effect their removal by making a counter opening, so as to admit of their being laid hold of by the fingers.

When the wound is of little extent, instead of this practice, whether the ball is lodged or no, if it can be done safely, it will be better to lay the wound entirely open; by this the ball is more easily extracted, and the cure will be expedited. The dressings should be some emollient ointment spread on lint, and over this a poultice of bread and milk. To these applications the lead ointments may sometimes

* See Section on Contused Wounds.

times be substituted with advantage. An opiate should then be given, and the patient laid to rest in an easy relaxed posture.

The general treatment afterwards coincides very exactly with that formerly recommended in wounds attended with contusion: Suppuration should be promoted, and the matter which forms, discharged by a proper position of the patient, and by opening every collection which appears; while at the same time the patient's strength is kept up by tonics and a nutritious diet.

When a long continued and excessive discharge affords room for supposing that some extraneous body, or pieces of bone may still remain in the fore, a careful examination should be made, and they should be removed. When none of these can be discovered, as some substance, such as cloth, may still be there, though it cannot be felt, if a seton can be used, it should be immediately introduced; and often after a considerable length of time, the drawing of the cord has brought out such substances, and a cure in consequence has been soon effected.

Opium is particularly serviceable to abate pain and irritation in every stage of these complaints, and should be given liberally.

Hemorrhagies are sometimes apt to take place upon the separation of the sloughs which are produced in gun-shot wounds; and as they are often preceded by heat and throbbing pain in the parts, they may frequently be prevented by copious bleeding, particularly from the contiguous parts by leeches; but when the bleeding actually comes on, if the vessels are of any considerable size, they must be tied in the usual way. When there is any danger of considerable hemorrhagy in these cases, the patient should always be provided with a tourniquet, that he may restrain the discharge until assistance can be procured.

Scarification of gun-shot wounds, and even dilatation of them

them, except in the circumstances and manner we have already directed, does not appear to be at all necessary or useful.*

When from the situation or direction of the wound a seton cannot be used in the manner directed in punctured wounds, which should undoubtedly be done in sinuous ulcers

* The following facts respecting gun-shot wounds are inserted in the Medical Journal for 1790. They are communicated by a Dr. Jackson, and tend to shew, that the practice of dilating gun-shot wounds in the first instance so generally recommended hitherto, except where it is absolutely necessary for the removal of pieces of bone, or extraneous substances, instead of expediting their cure, often tends to retard it by the additional pain and inflammation it generally excites.

In 1779, a number of militia-men were wounded in Georgia, where they could receive no surgical assistance. Their wounds were merely bound up with rags; and they appeared to heal much more readily than those in similar circumstances that were treated by surgeons in the usual mode. After another engagement, a part of the wounded were conveyed to hospitals; some remained in the woods without any medical aid. The latter, (the circumstances of the wounds being alike,) healed with nearly twice the rapidity with which the others did. In 1781, after the battle of the Cowpens, in South-Carolina, those who received surgical assistance, neither got well so soon, nor with so little trouble as those who cured themselves. The whole were lodged in country huts.

Dr. Jackson further tells us, that in the warm climates of South-Carolina and Georgia, he always found warm poultices and fomentations injurious; and that he derived much benefit from the application of laudanum and spirituous liquors, and more particularly from pouring cold water on the wounded limbs.

From the Doctor's observation it would also seem to appear, that rest, in flesh wounds, is not only unnecessary, but often injurious. After the battle of Guilford, North-Carolina, all the wounded who could be carried off, were either conveyed in litters, in waggons, or on horseback: while they were in motion the progress to healing was rapid; when they halted for a few days, this was retarded; and when they stopped altogether, it was in some degree retrograde. The latter circumstance was probably owing to the more free access to spirituous liquors, which was then obtained.

cers from this cause, compression should be employed as in other similar cases.

With respect to the treatment of gangrene from gunshot wounds, and to the propriety of amputation in them from that and other causes, we must refer to the section on mortification, and chapter on amputation.

C H A P. XL.

Of Burns.

BURNS vary in appearance, according to their degree of violence, and to the manner in which they are produced. Those which do not destroy the cuticle, and which merely irritate the skin, operate like cantharides, by exciting an increased action in the exhaling vessels of the part, by which vesications are formed, in extent and number proportioned to the violence of the cause: but when the skin or subjacent parts are destroyed, no vesicles are produced; a black gangrenous slough is first observed, and when this separates, an ulcer is left of a depth proportioned to the extent of the burnt part.

The pain in burns is generally considerable; but it is in common greater where the skin has been merely irritated, than when it has been entirely destroyed. The irritation and pain are indeed in some cases of extensive burns, so violent as to induce a very high inflammation and fever; and such a degree of torpor sometimes comes on, that it at

last ends in death. This fatal termination is, in some instances, induced by an extensive mortification taking place soon after the accident.

In the treatment of burns, our first object is to procure ease as speedily as possible. Where the skin is not destroyed this can be accomplished by immersing the part in cold water, or suddenly plunging it into boiling water, or any other fluid, nearly of the same heat. Emollients sometimes procure immediate relief; but in general, astringents are more beneficial, such as brandy or other ardent spirits. In these the parts may be immersed; or when this cannot be done, they may be covered with linen soaked in them. These applications give a momentary increase of pain at first; but this is soon succeeded by a very agreeable soothing sensation. Strong lead water, a strong solution of alum, or common ink, are also very effectual remedies. None of these applications seem chiefly useful by preventing vesications, which they do when early employed, because they are more effectual in abating pain after these are formed. Whatever is made use of should be continued until the pain goes off.

Together with the external applications, opium should be liberally taken internally, according to the degree of pain and irritation. Besides removing these, it seems to be the best remedy for that drowsiness which often occurs.

I am of opinion, that the vesications which occur in burns, should not be opened until the pain has gone off; because the admission of air always gives an increase of this; but as soon as the irritation induced has subsided, they may be opened with advantage; as the lodgment of the serum upon the skin may probably render it tender, and perhaps even produce ulcerations. In order to prevent any bad effects from the admission of air, small punctures should be made in preference to incisions. A liniment of wax, oil,
and

and saccharum saturni is the easiest application after the discharge of the serum.

When the inflammatory symptoms run high, bleeding, laxatives, and other remedies suited to inflammation in general become necessary; and the ulcerations which succeed must be treated in the usual way. See Chapter on Ulcers.

When burns occasion a loss of substance, it will perhaps be better to expose them to the air for a day or two, as the slightest covering produces pain, and to apply either a liniment composed of equal parts of lime water and linseed oil, Goulard's cerate, the unguentum nutritum, or weak lead water. The first is generally to be preferred. As soon as the pain and irritation have thus been removed, the sore is to be dressed as in other cases.

In burns from the explosion of gun-powder, some of the grains of the powder are apt to be forced into the skin. If these are not removed they will increase the irritation, and perhaps produce permanent marks. They may most readily be removed by a needle or some other small instrument; if these do not take them all away, an emollient poultice will complete their removal; this indeed is the best application in injuries of this kind, for a few days, not only for this purpose, but to prevent subsequent inflammation. There are some parts, such as the fingers, toes, nostrils, and palpebræ, which will be apt to adhere together when burnt, if attention is not given to prevent it. This will be effectually done by the interposition of some parts of the dressings.

Ulcers from burns are very apt to become fungous: when this is observed, the fungus is to be removed by leaving off the use of emollients, and employing gentle astringents, and compression; and if these do not succeed, by the use of caustics.

C H A P. XLI.

Of Tumors.

S E C T. I.

Of Tumors in general.

EVERY preternatural enlargement, in whatever part of the body it is seated, may be termed a tumor.

Tumors may with great propriety be divided into those which from the beginning are attended with inflammation, and those which are not evidently accompanied by this affection: the first may be termed acute or inflammatory, and the last chronic or indolent. Phlegmon and angina are instances of the former; aneurism and polypus of the latter. Such of these as have not been already treated of, or will not be with more propriety considered in some other chapter, we shall now proceed to speak of.

S E C T. II.

Of Acute or Inflammatory Tumors.

As we have already treated of inflammation in general, we shall in this place merely take notice of those circumstances which, from the peculiar situation of the tumors, we
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are about to pay attention to, or some other cause, require some peculiarity of treatment.

§ 1. *Of Erysipelas.*

Erysipelas is a variety of external inflammation distinguished from phlegmon, (See chap. i. sect. 1.) by the colour of the inflamed part not being of so bright a red, but having a more dark copper-like appearance; and by the swelling being not very evident in any particular place, but rather diffused, and ending as it were imperceptibly, upon the surrounding parts.

Erysipelas seldom penetrates deeper than the skin; and any effusion with which it is attended, is commonly thin and acrid, and not often convertible into pus. As the ulcerations which this effusion sometimes produces are always difficult to heal, it should be our first object to prevent it from taking place. The supposed risk attending this practice, and of attempting the discussion of erysipelatous affections, appears from experience to be totally founded in prejudice.

The most common applications in the first stage of erysipelas, and perhaps the best, are fine flour, starch, and hair-powder. These commonly give considerable relief; but I believe they effect this rather by soothing that uneasy sensation which usually accompanies erysipelas, and lessening the increased action of the vessels which occasions the effusion, than by absorbing the matter when poured out. Unctuous and moist applications of every kind are generally supposed to be injurious; nevertheless, in some cases which were not benefited by the remedies abovementioned, I have experienced immediate relief from exposure of the part affected to the air, and wetting it now and then with a weak solution of saccharum saturni, without any subsequent disadvantage being occasioned by the practice.

Experience also establishes the utility of bleeding according to the circumstances of the case. Topical blood-letting, however, being apt to be productive of troublesome sores, must not be used. Gentle laxatives, and mild sudorifics, should also be employed, and a cooling regimen observed.

By these means, most erysipelatous affections may be discussed; when however, they terminate in effusion to any considerable degree, an opening should be made in the most depending part of the collection, and some of the saturnine ointments used as a dressing to the sore.

§ 2. *Of Inflammation of the Ear.*

INFLAMMATION seated in the membrane of the meatus auditorius, is commonly very painful, from the part affected not readily yielding to the increased quantity of fluid propelled into it.

The treatment must be determined by the stage of the complaint. If the inflammation has continued so long as to give reason for supposing it will terminate in suppuration, the ear should be frequently bathed with warm emollient steams, and warm poultices should be applied over it. But in the beginning of the affection, we should generally try to prevent suppuration; because the discharge of matter which ensues will be apt to continue a considerable time, and perhaps terminate in deafness. Resolution will be most effectually promoted by the application of a blister behind the ear; and by dropping a little laudanum, or spirit of lavender, mixed with oil, into the passage, we may generally abate the pain and irritation, and consequently promote the resolution very much.

We will often be unable to prevent the formation of matter; and when this has taken place, we should endeavor

your to assist its evacuation by bathing the ear in warm water, or by injecting warm water into it. These will often stop the discharge; but when they do not, lime water, or a weak solution of sacch. saturni, may be employed, and will seldom fail, if the soft parts alone are affected. When the bones are diseased, which will be known by the foetor, and black or brown colour of the discharge, all that should be done, is to keep the passage clear by injections.

§. 3. *Of Angina.*

IN inflammatory angina or quinsy, besides the general remedies of bleeding, purgatives, &c. topical bleeding is found to be more particularly beneficial. In pl. viii. fig. 1. an instrument is delineated for scarifying the throat; and when this is timely and freely employed, it will commonly prevent suppuration very effectually: Should this occur, however, the same instrument will be proper to discharge the matter collected. To promote the formation of pus, nothing is more beneficial than inspiring the steams of warm milk, or any other emollient decoction, by means of the machine represented in pl. viii. fig. 3.

§. 4. *Of Inflammation of the Liver.*

WHEN notwithstanding the employment of the remedies of internal inflammation in general, and of mercury, which has been found so particularly beneficial in hepatitis, the disease terminates in suppuration, the aid of surgery often becomes necessary.

When the abscess is seated on the convex part of the liver, and is of considerable size, it will readily be discovered by the touch. But when this is not the case, a continuance of the pain in the right shoulder and neck; an appearance of swelling in the region of the liver; an
oedematous

œdematous affection of the integuments in this part ; but particularly the occurrence of frequent shivering fits, will pretty certainly denote that suppuration has taken place.

Abcesses of the liver have been known to burst through the diaphragm, so as to be emptied into the thorax : in some few cases, the matter has been carried into the duodenum, by the ductus communis, choledochus ; and sometimes by the great arch of the colon adhering to the liver, a communication has been formed between them, by which the pus has been evacuated ; but for the most part, when it is not discharged by an external opening, it bursts into the cavity of the abdomen. In order to prevent such a fatal termination, as soon as we have reason to suppose that matter is collected, even if it should not probably have yet been converted into pus, an incision should be made with a scalpel through the teguments, in the most depending part of the tumor, and on reaching the abscess, it may either be opened with the scalpel or with a lancet ; but a trocar would perhaps be preferable to either, as by means of that we have it in our power to evacuate the matter gradually, which is a point of consequence in all large collections. With a view to prevent this opening from closing before the cyst collapses sufficiently to hinder a farther collection of matter, it should be afterwards somewhat enlarged. A pledgit of lint, dipped in oil, or spread with some emollient ointment, should then be insinuated between the edges of the wound, so as to prevent them from uniting until the ulcer heals from the bottom ; a process which will be much hastened by the use of compression, applied by means of a roller carried round the body.

Ulcers in the liver heal sooner, and with less trouble than in any other part of the body. But when they do not readily fill up, which will very seldom be the case,

it will be proper to introduce a canula, in order to preserve a free discharge of the matter which forms.

A free use of bark, and a nutritious regimen will always be very necessary and useful in the suppuratory stage of this disease.

Practitioners are generally of opinion, that unless the collection of matter takes place in the convex part of the liver, no attempt to discharge it by an external opening can with propriety be made; but wherever it is situated a vent should certainly be procured for the matter; for if it is not evacuated externally, it will most probably be emptied into the abdomen, and inevitably occasion death. When the matter is poured into the abdomen or chest, the only chance of saving the patient will be by drawing it off by the operation of the paracentesis, as soon as possible.

§. 5. *Of Inflammation and Abscesses in the Breasts of Women.*

INFLAMMATION in the breast may be produced by any cause which occasions it in other parts of the body; but it is more particularly apt to be occasioned in nurses by an obstructed flow of milk from a sudden or imprudent exposure to cold. The breast becomes stiff, swelled and painful; the milk runs off in small quantities; and the patient is seized with restlessness and fever.

This complaint, in my opinion, should always be treated in the manner advised for inflammation in general. In order to effect the resolution of the tumor, the patient should be bled according to her strength; have purgatives given; and be kept upon a low cooling diet: And as the pain is usually very considerable, opium should be given freely to alleviate it. In order to remove the tension, the breast should be gently rubbed with althæa ointment or oil; but the applications most to be confided in are those

of a cooling astringent nature, such as a solution of sal ammoniac in vinegar and water, spiritus mindereri, and the saturnine preparations. Cloths dipped in these should be constantly applied; by which, and the other remedies advised above, almost every case of this kind may be removed.

But instead of this method of treatment, when the inflammation has been of long continuance, and the pain and tension accompanying it are very considerable, it will be better to endeavour to bring the tumor to suppuration, by warm poultices and fomentations; and when matter appears to be formed, to discharge it by an opening in the most depending part of the collection; at least an opening should be made whenever the matter appears to be pointing at an improper part.

As I have always found drawing off the milk to give relief, I constantly advise it to be done; and when the child cannot lay hold of the nipple, nipple glasses must be employed.

§ 6. *Of the Inflammation of the Testes.*

INFLAMMATION of the testes may be induced by cold, external violence, or by any other cause of inflammation in general: but it is most frequently occasioned by violent gonorrhœa. In this case it appears to be produced by an extension of the inflammation from the urethra along the vasa deferentia; and is commonly the consequence of a stoppage of the running from the use of irritating injections, or other causes. This circumstance is very generally attended by an increase of inflammation; to abate which nothing is more effectual than a return of the discharge. This is the most probable manner of accounting for the relief which a return of the running, in such instances, gives to the testes.

This disease rarely terminates in suppuration. The most effectual remedy for its removal is blood-letting; and particularly by means of leeches applied to the part affected. The swelling should afterwards be kept constantly wet with a solution of sacchar. saturni; the scrotum and testes should be suspended; the bowels should be kept moderately open; a low diet should be ordered; and the patient should be confined to a horizontal posture. If the case is venereal, it will be absolutely necessary to employ mercury; and when the disease is the consequence of a sudden stoppage of the discharge, we should endeavour to produce a return of this by bathing the penis in warm water; by injecting warm oil into the urethra; or by the use of bougies.

If the swelling should suppurate, which will very rarely happen, an opening should be made in the most depending part of the collection, and the fore afterwards dressed in the manner advised in other cases of abscess.

§. 7. *Of Venereal Buboës.*

SWELLINGS in the lymphatic glands from the absorption of the venereal virus, are termed Venereal Buboës. They may appear in any gland seated between a venereal sore and the heart; but they are most frequent in the groin, in consequence of chancres on the penis. In some instances they occur from the matter of a gonorrhœa; and in some others they arise without any previous ulceration or discharge from the penis, the matter appearing to be absorbed without any erosion of the skin.

As it is now very well known, that the quantity of venereal matter is increased by buboës being brought to suppuration, and that the sores produced by them are often very difficult to heal, few doubt of the propriety of endeavouring to remove them by resolution.

In order to effect this, the patient should be put upon an antiphlogistic regimen; his bowels should be kept open by purgatives; leeches should be applied to the gland; and it should be kept constantly wet with a strong solution of saccharum saturni. And along with these mercury should be employed in as large quantities as may appear necessary; and it will be most beneficial if made to pass through the diseased gland, by rubbing the mercurial ointment into some part where it may be absorbed by the lymphatics that go to the part affected; thus in inguinal buboes, it should be applied on the leg or thigh.

By these remedies, buboes, if taken in time, may generally be dissolved; but when this cannot be done, either from the disease having subsisted too long, or from a complication with scrophula, scurvy, erysipelas, or phlegmon, the use of the mercury should be intermitted for some time, until, by a change of diet and other circumstances, we may give a chance of making a second trial of it more successful.

When a bubo seems proceeding to suppuration, this should be promoted by the use of fomentations and poultices as in other cases; and as soon as matter is formed it should be discharged. There have been various methods of effecting this. Some advise a small puncture with a lancet; others an incision, the whole length of the swelling: some again, recommend it to be accomplished by the application of a caustic; while others are advocates for leaving the bubo to form an opening of itself. Either of these methods may succeed in simple venereal buboes, provided a sufficient quantity of mercury is given; and each of them may occasionally be followed by sores difficult to heal.

The local treatment here should be nearly similar to that advised in collections of matter in other parts. In general, an opening should be made merely sufficient for giving vent to the matter. In very large buboes indeed,
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the teguments are often rendered so lax, and their texture is so much destroyed, that it will be advisable to remove part of them by caustic; but in common it will be sufficient to make an opening from the middle of the tumor, where it usually points, to the most depending part. In small buboes a mere puncture will often answer the purpose; or they may even be allowed to burst, but this should never be depended on in large collections. When the integuments remain unusually firm, I have sometimes succeeded by the introduction of a small cord. And lastly, from having observed buboes which discharged the matter contained in them by a number of small openings to heal very readily in general, I have in several instances imitated the process by making several small punctures with a lancet, and with very good effects. I attribute the success in such instances to the exclusion of the external air, which must be the consequence of this method.

The patient should continue the use of mercury constantly, for if he intermits it, the sore will not heal so readily. The ulcer, however, often proves tedious, even where we are convinced that a sufficient quantity of mercury has been given to eradicate the syphilitic virus. The edges become hard and thin; the matter discharged, thin, acrid, and foetid; and the sore gradually becomes more extensive; or if it heals in some parts it breaks out in others, giving a honey-comb appearance to all the under part of the abdomen, and upper parts of the thigh. The patient suffers a great deal of pain; becomes hectic; loses his rest and appetite; and becomes very much emaciated.

In such cases, we must first be certain that the patient has taken a sufficiency of mercury, and that no sinuses are left in which matter can be lodged. In these instances, I have known cicuta very beneficial: I have seen ulcers healed by mixing the juice of the fresh herb with a common poultice, which had resisted all the common applications; when
given

given internally, the fresh juice has been more effectual than any other form of it. The belladonna and hyoscyamus, have never appeared to me to produce any material advantage. And neither sarsaparilla nor guaiacum have been useful; but mezereon has alone evidently cured some patients in whom all the usual remedies had failed. A drachm and an half may be boiled with ʒij of liquorice-root, in three pints of water to a quart; and that quantity of the decoction drank daily.

But the most effectual course that I have tried is, the application of caustic all round the edges and hardened parts of the sore, at the same time that opium in considerable quantity is given internally. On those days in which the caustic is not applied, red precipitate should be used to the sores, either sprinkled over them, or applied in an ointment. The first few applications of these commonly give pain, but this soon subsides, and the discharge seldom fails to alter from a thin sharp sanies to a thick well digested pus.

Opium alone has been lately given in very large quantities for the *cure* of the venereal disease;—to the extent of half a drachm or more three times a day. I have seen no proof of its curing any *venereal* affection; but I have seen several instances of such sores as we have above described, completely cured by the use of it. It does not however appear that it is more effectual when given in very large quantities, than when so much only is exhibited as is necessary to alleviate or remove the pain. Its utility seems to me to depend entirely on its narcotic or anodyne powers; by these it removes that state of irritability with which these sores are affected, and thus destroys the disposition of the vessels to form that kind of matter, which by its acrimony seems to perpetuate itself; and this being done, and other circumstances being favourable, nature alone will seldom fail in accomplishing a cure.

§ 8. *Of Lumbar Abscesses.*

EVERY collection of matter seated on the loins may be termed a Lumbar Abscess: but at present we mean to confine our observations to that variety of the disease which originates about the superior part of the os sacrum, and in which the matter is contained in a cyst lodged on the anterior surface of the internal iliac and psoas muscles.

These abscesses are always preceded by tension over the loins, and a pain, which often shoots up along the course of the spine, and down towards the thighs, and frequently by some difficulty of standing erect. In some cases these symptoms are suspected to be nephritic; but for the most part they give an appearance of lumbago. When suppuration takes place, shivering fits are apt to occur; but the pain which was at first acute, becoming dull and less perceptible, the patient is made to believe that he is getting better, until the matter, after falling gradually down behind the peritonæum, is observed to point externally, either at or near the anus, or on the upper and fore part of the thigh, where the large blood-vessels pass out beneath poupart's ligament from the abdomen. In the latter case, which most frequently occurs, the matter being beneath the tendinous fascia of the thigh, instead of pointing at any particular part, falls gradually lower, until, in some cases, it reaches almost to the knee.

The tumor is seldom attended with more pain than might be expected to occur from the distension of the fascia and contiguous parts by the matter beneath; there is no discolouration of the skin, which often retains its natural appearance to the last; and a fluctuation of a fluid is evidently discovered through the whole extent of the tumor, particularly when the patient is erect; for in this posture

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the swelling is always more tense than when the patient is lying horizontally, because a considerable part of the matter then runs along the sac towards its origin in the loins.

When the matter passes down towards the anus, this complaint may be mistaken for a common phlegmon; and no inconvenience will arise from treating it as such. But when it falls down beneath Poupart's ligament, its appearances are so similar to those of a crural hernia, that the one has often been unfortunately mistaken for the other. This however, can only have arisen from a want of proper attention to the characteristic symptoms of each. Besides the other distinguishing marks, whenever the lumbar abscess extends low down, in an erect posture the part of the cyst at the top of the thigh exhibits no appearance of swelling. And should the diseases be combined, which must very rarely be the case, as the matter of the abscess and the protruded abdominal viscera or viscera will be contained in separate sacs, the complication will be easily detected.

This disease seems, in general, to be induced by a bruise, twist, or some other injury to the small of the back; in such cases, whenever the pain produced is considerable, blood-letting should be immediately advised, and every part of the antiphlogistic regimen observed. Cupping, with deep scarifications, seems to be the most effectual remedy, and I have no doubt, would often prevent the formation of this disagreeable complaint, if early employed to a proper extent: It almost always gives relief to the pain, however violent it may be. Blisters, opiates, and gentle purgatives, should also be occasionally made use of.

In some instances these remedies will fail; and in others we are not called in until suppuration has taken place. When this is the case, I have no doubt of the propriety of discharging the matter collected by an opening with a tro-

car, when the case is well ascertained, and by cautious dissection, when there is any doubt of its nature. A canula may afterwards be introduced to give a more free exit to the matter; and if the discharge does not diminish considerably in the course of two or three weeks, lime-water or some other moderate astringent may be injected, to put a stop to it. But if this should never happen, it will be better for the patient to submit to the inconveniency than to risk the discharge of the matter into the abdomen, or the corrosion of the bones adjacent, by suffering the abscess to remain unopened.

§. 9. *Of the Paronychia or Whitlow.*

THE paronychia is a painful inflammatory swelling, occupying the extremities of the fingers under the nails.

All the varieties of this complaint distinguished by different writers, may be comprehended under the three following, and even these differ only in point of depth of situation.

In the first, the patient complains of an uneasy burning sensation for several days over the end of the finger; the part becomes tender and painful to the touch; a slight degree of swelling takes place, but with little or no discoloration; and if the inflammation is not removed by resolution, an effusion is at last produced between the skin and the parts beneath this, which if discharged, appears to consist in a thin, clear, and acrid serum; and its removal generally gives immediate relief.

In the second species, the same symptoms occur in a more violent degree; the pain is more severe, and is attended by uneasiness over the whole hand. The effusion is not so perceptible, and is found to lie beneath the muscles, or between these and the periosteum of the finger.

And in the third variety, the pain in the end of the finger is still greater; and the whole extremity becomes stiff, swelled, and painful: The lymphatics leading from the finger, and even the glands in the arm-pit, become swelled and inflamed; and an incision being made, discovers the effusion to be seated between the periosteum and bone, the whole phalanx being in general carious.

These swellings are often the effects of external violence, and particularly of punctures, and contusions; but they happen more frequently from some cause with which we are unacquainted.

I always treat paronychia upon the same plan that I employ in the removal of other inflammations. In the early stage of it, I endeavour to discuss the swelling: First, By the application of leeches to the pained part of the finger, and by general blood-letting in the more extensive species of the complaint. The leeches often remove the most violent pain almost immediately. After these have been used, immersion of the pained parts in strong brandy, or even in spirit of wine, is one of the best remedies; and when the wounds made by the leeches are somewhat healed, or when these animals have not been applied, spirit of turpentine, or strong vinegar, may be employed in the same manner. Opiates should also be used in quantities proportioned to the violence of the pain.

When an effusion has taken place, an opening should be made to it; because there is no chance of converting it into pus, and as long as it remains it gives the patient exquisite pain, and because it is apt to injure the contiguous parts. When the collection is superficial, it may be discharged by a puncture with a lancet; but when it is deep-seated, care must be taken to avoid injuring the tendons of the finger by the incision which will then be necessary.

If the matter lies above the periosteum, the wound made is to be treated as a sore from any other cause; but when it

it is beneath the periosteum, as the bone is always found to be more or less carious, I am clearly of opinion, that the best practice is to remove the whole phalanx immediately. This may be done with the greatest ease, and saves much time and trouble both to the patient and surgeon. The fore afterwards heals without difficulty; care being taken that it fills up from the bottom; and little disadvantage is experienced from the loss of bone. The nail which is commonly lost, is in general soon reproduced.

If the common method of treatment by poultices, fomentations, &c. is pursued, and the bone is left to come out of itself, when diseased, matter is apt to lodge beneath the nail, troublesome fungous excrescences to arise, and the process is usually painful and tedious.

It does not appear, that more than the last phalanx of the finger suffers in this complaint; but when from improper management, the surrounding soft parts become inflamed, swelled, and ulcerated, it often is at last necessary to amputate the finger, in order to prevent the disease from spreading to the hand.

§ 10. *Of Chilblains.*

THESE are painful inflammatory swellings, to which the fingers, toes, heels, and other extreme parts of the body are liable, on being much exposed to severe cold. The swelling is generally of a deep purple, or somewhat of a leaden colour; the pain is not constant, but acute and shooting; and for the most part there is an intolerable degree of itching all over the swelling. In some cases, the skin cracks, and discharges a thin, somewhat foetid matter. And when the degree of cold has been very great, or it has been very long applied, all the affected parts are very apt to gangrene and slough off, leaving a very foul ill-conditioned ulcer.

Delicate children, and old people, are most subject to chilblains; and it is observed that they are particularly apt to be severe in scrophulous habits.

The best mode of preventing them, is to avoid exposure to cold and moisture; and especially to snow, which seems particularly injurious; and when a person has once been affected, as they are very liable to return, he should be careful to keep the injured parts warmly covered during the winter. Cold bathing has also been useful.

Every precaution that can be taken will, however, not always be successful in preventing this complaint. But it may often be mitigated by bringing the affected parts gradually to their natural heat, instead of warming them very quickly. The patient should be put into a cold room; and the frost-bitten parts should be well rubbed with snow, and afterwards immersed in very cold water; he should keep at a distance from the fire for a considerable time; and during this, the parts may be rubbed with salt, or immersed in warm wine.

A person much benumbed with cold should not have warm cordials given to him immediately. A glass of cold wine may be at first allowed: Afterwards warm wine may be given, either alone or mixed with some of the warmer spices; or ardent spirits may be used.

These remedies are however only necessary in the more severe affections of this kind. In common cases of chilblains, it will be sufficient to rub the parts with spirit of turpentine, or camphorated spirit of wine; and to keep rags moistened with these constantly applied to the parts.

When chilblains ulcerate or crack, poultices may be applied for a few days, to induce a proper suppuration; but if they are continued for any length of time they render the fores fungous and difficult to heal. The daily application of caustic to the edges, and of precipitate ointment to the rest of the sore, after the poultices are discontinued,

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seems the best method of treating them. The diachylon simplex is also a good application.

§ II. *Of Sprains and Contusions.*

CONTUSIONS of the softer parts of the body, and sprains of the tendons and ligaments of joints, are usually productive of immediate painful inflammatory swellings, and which, when in considerable degree, require a great deal of care and attention.

The swelling is chiefly produced by the effusion of blood or of serum, from the vessels ruptured by the injury. When the serum only is poured out, the skin retains its natural colour for some time; but when blood is extravasated, the skin is of a deep red, or of a leaden colour from the first.

In the treatment of these affections, our views must be first directed to prevent the swelling, and afterwards to prevent or remove inflammation.

Swellings of this kind, when confined to the integuments or muscles, are often removed in a little time by absorption; but those which affect the tendons, or ligaments, if not properly attended to, are very apt to continue a great while, and prove very troublesome: On this account they should have a careful attention. Astringents are the best applications to prevent the swelling; such as lees of red wine, ardent spirits, and vinegar, or even cold water if these cannot immediately be had, either in its usual state, or rendered colder by art. In one or other of these the part should be immersed for about an hour.

These remedies fortunately happen to be equally adapted to the prevention of the effusion, and the inflammation which is so apt to occur. But in considerable injuries of this kind, after the use of them as above directed, it will be proper further to endeavour to obviate the latter symptom
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by the application of leeches, or if the muscular parts only are hurt, by cupping and scarification. Blood should thus be repeatedly drawn as long as the inflammation continues. This seems equally effectual, whether the parts affected be deep-seated or near the surface.

If the fever induced is very considerable, it will also be proper to use general bleeding; and for obviating the pain, to exhibit opiates. Any other remedies of inflammation in general which may seem indicated, should likewise be employed.

After bleeding, the best application to the part for a few days is a solution of saccharum saturni; and to remove the thickening of the tendons which sometimes follows sprains, pouring warm water upon the part for a quarter of an hour at a time, three or four times a day, is frequently very useful. Salt water, or the water of some of the mineral springs, seem to be more beneficial than common water. The rubbing the parts frequently with warm emollients has also a good effect.

During the cure of a contusion or sprain, it is very necessary to keep the part in an easy relaxed posture.

When the swelling and pain are nearly removed, and the parts remain weak and relaxed, pouring cold water from some height, or dashing it upon them once or twice daily, is the most beneficial remedy. A flannel roller applied moderately and equally tight over the whole extremity, is also very useful for preventing or removing the œdema which is apt to follow in these cases, from the debility induced; and likewise as a preventative of rheumatic pains, sometimes consequent to these affections.

S E C T. III.

*Of Chronic or Indolent Tumors.**§. I. *Of Encysted Tumors.*

UNDER this term we usually comprehend all those swellings that are contained in cysts of a preternatural formation; and these as well as various tumors of the sarcomatous kind, are in common language termed wens.

All the varieties of encysted tumors seem to be induced either by an accumulation of serous matter, or of the fat, which is deposited in the cellular membrane, from a defective absorption, or too great a deposition of them, in a particular part, which by some cause has had its communication with the rest of the membrane destroyed.

When the contents are of the consistence of honey, the tumor has been termed meliceris; when of a soft cheesy consistence, or resembling dough, it is called an atheroma; and steatoma, when it is formed of fat. But there are various degrees of consistence in each of them. Thus the steatoma is sometimes soft like butter, and at other times as firm as suet; and the contents of the atheroma and meliceris are sometimes equal in hardness to new cheese, and at other times are not firmer than the thinnest honey.

The matter forming steatomatous tumors we conclude to be of an oily or fatty nature; and that their different degrees of consistence will depend upon the remora of their contents, and upon the quantity of the thinner parts

* Although chronic tumors, as has already been mentioned, are not primarily and necessarily attended by inflammation, yet it is to be observed, that any variety of them, by the distention they give the skin, may eventually produce it. B.

parts of them that have been absorbed. And we think it probable, that the atheromatous and melicerous tumors are originally formed by a deposition of serum, with perhaps a considerable proportion of coagulable lymph; and that their degrees of consistence will depend upon the quantity of lymph contained in them, their duration, and particularly upon their having been inflamed, and the degree of the inflammation.

In general, an experienced practitioner will be able to distinguish the nature of these tumors before they are opened: thus the steatoma is usually of a firm consistence, loose, and rolls under the skin more readily than the others; and its surface is apt to be unequal: the atheroma is soft and compressible, but no fluctuation is observed in it; and in the meliceris, the fluctuation of a fluid is in general very distinctly perceived. But, in some instances, from the circumstances mentioned in the last paragraph but one, it must be evident, that we may be sometimes mistaken in our judgment of the nature of these tumors; and their combination will contribute likewise to deceive us. The steatoma is very rarely joined with either of the others; but the atheroma and meliceris are more frequently combined. It is to be observed also, that the first species is rarely found where fat is not usually deposited in a state of health; thus I have never met with it on the head, where the other species frequently occur. None of them are often seated on the abdomen; probably owing to the parietes of the abdomen being soft and yielding, and consequently not so liable to ill effects from pressure, as the soft parts which lie contiguous to bone.

These tumors appear small at first, and increase in size very slowly. They are of very different shapes and sizes: On the head they are commonly round and smooth, and seldom grow larger than an egg, probably from the teguments not being so capable of much distention

on as in other parts, where they have arrived sometimes to such an enormous size as to weigh forty pounds.

They are never painful at first; and the skin for a considerable time retains its natural colour. But when they become large, the veins of the skin, as well as those of the face, become large and varicose; and the prominent part of the swelling acquires a clear shining red colour. Even now the tumor is not painful, unless it be injured by external violence, which will very readily excite inflammation in the skin. It then becomes tender and painful, and soon bursts, if not prevented by an artificial opening.

From the same cause which influences the size of these affections, their progress seems rendered more or less rapid: hence they sooner terminate on the head than in any other situation.

The firmness with which they are attached to the contiguous parts seems to depend on the parts with which they are covered, and their having been inflamed or not, and the degree to which the inflammation, when they have been seized with it, has extended. They are sometimes quite loose and moveable, particularly while they continue small; and at other times they are firmly fixed, and in some instances from the beginning.

It was formerly the practice to attempt the discussion of encysted tumors by the application of mercurial ointment, mercurial and gum plasters, and a variety of other things; but experience has now proved, that nothing but a surgical operation can be depended on for their removal.

The meliceris should be treated as a common abscess. If small, its contents may be discharged by an incision with a lancet, and then it may be dressed in the ordinary way until it fills up or adheres from the bottom. But if it is large, to prevent the admission of air which would be injurious, a seton should be employed in the manner directed in the

section on suppuration. This is the most effectual mode of treatment I have ever seen employed.

When the contents of the tumor are too firm to be discharged in this manner, it becomes necessary either to empty the cyst by an extensive incision, or to dissect it, with its contents, entirely out. If the bag adheres very firmly to the contiguous parts, it will be better to lay it entirely open, and only take away those parts of it which are loose. By this, we may effectually remove its contents; and the cure may be afterwards accomplished with equal certainty, by preserving the wound open until it heals from the bottom, or by drawing the edges together, and trusting to moderate pressure, and the common effects of inflammation for producing a re-union. It is usually thought necessary to remove the whole of the cyst; but experience disproves this. When it is to be done, however, it will contribute much to the facility of the operation, to make a longitudinal incision through the tumor, and remove its contents before we begin to dissect it out. After its removal the teguments should be laid together, and secured by adhesive plasters or futures, and an equable compression then made over them, in order to produce a cure by the first intention.*

If any arteries of considerable size are cut in the operation, they should be immediately secured by means of the tenaculum; and the ligatures should be left hanging out at the wound. The trifling impediment that this will give to the cure, will be much more than compensated by the security from hemorrhagy, that is derived from the practice;

* Though many of the encysted tumors, which Mr. Bell describes as successfully treated by a simple dilatation, or the use of the seton, may have been radically cured, yet instances enough occur of their filling again, where the whole or greater part of the sac has been left, to put young surgeons on their guard in tumors of any considerable size, where the safest way is to remove the sac entirely.

tice; for should the bleeding be even very trifling, it might considerably retard the cure. The ligatures may generally be taken away readily and with safety at the second or third dressing.

In common cases it is not necessary to remove any portion of the skin, for although it may appear too extensive at first, it usually contracts so much in a little time as merely to cover the parts beneath. But in large tumors, where the skin is in very large quantity, or where it has become excessively thin, or ulcerated, it will be proper to remove a part of it. This will be best effected by two semilunar incisions, including as much of the skin as ought to be taken away, and then dissecting it off with the cyst. The subsequent treatment is to be the same as if no part of it was removed. In such cases we are advised by some to employ caustic for the removal of the skin; this should, however, never be done except the patient will not admit the use of the scalpel.

§ 2. *Of Ganglions.*

By the term ganglion, we mean an indolent, moveable tumor, formed upon the tendons in different parts of the body, but most frequently on the back part of the hand, and joint of the wrist.

These swellings are distinguished from the encysted by their elasticity. They seldom become large, or painful; and for the most part the skin above them retains its natural aspect. If laid open, they are found to contain a tough, viscid, transparent fluid, resembling the white of an egg.

Ganglia may be generally removed, if early attended to, either by moderate and frequent friction, or by compressing them by means of thin plates of lead, or any other ductile metal. We should be careful not to use these
remedies

remedies in such a manner as to inflame the parts; as troublesome sores may be the consequence.

If these means fail, and the tumors become troublesome by impeding the motion of the joint or in any other way, but not otherwise, they may be removed, either by a mere incision into them, or if they do not adhere firmly to the tendons, by cutting them entirely out, in the manner advised in the case of encysted tumors. The sore thus produced is to be kept open until it heals from the bottom; which will commonly happen without much difficulty.

§ 3. *Of Swellings of the Bursa Mucosa.*

THE bursa mucosa are small membranous bags, seated upon, or contiguous to all the larger joints, containing a thin, transparent and gelatinous fluid, which seems intended to lubricate the parts upon which the tendons move that pass over the joints. A preternatural accumulation of this fluid, produced more particularly by sprains, contusion, and rheumatism, constitutes the disease we are now to treat of.

This species of swelling is seldom attended with much pain; it yields to pressure, but is much more elastic than a tumor from pus; at first it is always confined to one part of a joint, but in some cases it at length extends almost round it; and the skin always retains its colour, unless it becomes inflamed. When rheumatism produces the swelling, its contents are commonly very like the synovia; but when it is the consequence of sprains, together with this fluid there is usually a considerable quantity of pretty firm concretions. In some few instances, however, these concretions are soft.—Their consistency may generally be ascertained by the touch.

When these tumors are the effects of rheumatism, they may perhaps be always dispersed in time, by keeping the parts

parts warm with flannel; by frequent frictions; by frequently pumping warm water upon them; or by the application of blisters. But if they originate from sprains, although they may long remain stationary, they can seldom be discussed. An operation then becomes necessary for their removal whenever they become troublesome.

This consists in forming an opening to discharge the contents of the tumor, and preserving the wound open until it fills with granulations from below.* When the sac cannot be opened through its whole length, on account of the contiguity of tendons, it will be best to lay it open at each end, and after pressing out the contents, to pass a small seton through it.

These operations should be done with a great deal of care; and when the seton is used, it should be introduced with a blunt probe, and suffered to remain no longer than till a slight degree of inflammation is excited, on account of the contiguity of the joint; and when it is withdrawn, the cure is to be completed by gentle pressure with a roller.†

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* A great deal of difficulty has sometimes happened in consequence of a dilatation or removal of these tumors, particularly where they do not heal by the first intention. The most successful mode of opening them is by drawing up the external skin, then puncturing the tumor with a lancet, and when the fluid is entirely discharged suffering the external to pass beyond the internal orifice. A compress, dipped in lead water, is then to be applied, and retained with a moderately tight bandage, enjoining perfect rest and quiet for several days.

† Dr. A. Monro, of Edinburgh, has lately published a valuable work on the subject of the *bursæ mucosæ*, or as he is disposed to term them, the *vesicæ unguinosæ*; and as it is very probable, that collections in these have often been mistaken for affections of a very different nature, it may perhaps be useful to add some observations from this treatise, to what Mr. Bell has said on the subject.

The Doctor tells us, that he has discovered one hundred and forty

bursæ

A considerable stiffness of the joint usually remains after the removal of these tumors. The best remedies for this, are frictions with emollient ointments, and the application of warm steams.

§. 4. *Of Collections within the Capsular Ligaments.*

THESE collections may consist of blood; of matter from a previous inflammation; or of serum, forming what are usually termed dropical swellings of the joints.

They may be distinguished from collections in the *burfæ mucosæ*, by the contained fluid passing readily from one side of the joint to the other: by its being diffused over
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burfæ mucosæ in all; thirty-three in each of the superior, and thirty-seven in each of the inferior extremities. Many of them are placed on the inner sides of the tendons, between these and the bones. Many others cover not only the inner, but the outer side of the tendons, or are interposed between the tendons and external parts, as well as between those and the bones. Some are situated between the tendons and the external parts only, or chiefly; some between contiguous tendons, or between the tendons and the ligaments of the joints. A few are interposed where the processes of bones play upon the ligaments, or where one bone plays upon another. Some of the *burfæ* communicate with each other; some with the cavities of the joints. In the latter case the communication seems sometimes to be formed by long friction; and particularly occurs in the joints of the shoulder and knee; and especially just below the inferior part of the first, and immediately above the superior part of the last. This connection does not seem to be productive of bad effects, even when it is not formed originally.

The Dr. has proved very satisfactorily the similarity between the structure of these sacs and that of the capsular ligaments, as well from an examination of their structure and uses in a healthy state, as from the effects of diseases upon them. With respect to the latter, he finds that they are rendered exquisitely sensible by inflammation; and that either depositions of fluid matters, or the formation of solid substances of different kinds, occur not only from rheumatism,
but

the whole of it; and by being generally painful: and from abscesses in the cellular membrane, by the matter in the latter being superficial, and extending beyond the boundaries of the capsular ligaments.

The nature of the fluid collected in these swellings may be ascertained by the circumstances preceding them, and by the symptoms with which they are accompanied. Thus when a violent bruise of a joint is immediately succeeded by a large effusion within the capsular ligament, it will probably be found to consist chiefly of blood. Of this I have seen a remarkable case. When inflammation of a joint terminates in effusion, it will probably consist of a serous matter, with some tendency to purulency. And if the tumor succeeds to rheumatic affections, there will be reason to suppose, that it is produced entirely from serum.

The species of this affection which is consequent to rheumatism, may generally be discussed by the remedies of similar collections in the bursa mucosæ; or, if these fail, by the use of a laced stocking or roller, applied as tight as can be borne. But if this should be unsuccessful, the patient had better submit to the inconveniency occasioned by the disease, than run the risk of the inflammation so apt to follow an opening made in the ligament for its discharge. When, however, any matter is collected in the joint, which may do mischief by remaining in it, or which
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but also from gout and serophula. In one instance, the Dr. has found not less than fifty cartilaginous bodies within the bursa situated behind the tendon of the flexor pollicis longus. He is of opinion, from some facts, that all solid substances in these sacs consist in excrescences from them, and that they are always nourished by peduncles connecting them to the sacs; and hence, if these peduncles are any how broken, the excrescences never afterwards increase in size.

Dr. Monro seems to be of opinion, that when an operation becomes necessary in these affections, it should be either similar to that advised in § 4. or to the one recommended in § 5. of this section, according as the substance to be removed is fluid or solid.

cannot be readily absorbed, an opening should be made to remove it. This is the case when blood, or matter formed by inflammation, is effused.

As the danger which attends this operation, seems to depend greatly on the admission of air into the joint; it should be conducted in such a manner as to prevent this as much as possible. For which purpose a trocar should be employed, and the skin being previously drawn tightly to the upper part of the swelling as soon as all the fluid is evacuated, it should be returned to its place. The wound should then be closed by adhesive plaster, and the joint moderately compressed by a roller, or a laced stocking: And in order to guard more effectually against inflammation, if the patient is plethoric, he should be bled; and a strict antiphlogistic regimen should be observed.*

§ 5. *Of Concretions and Excrescencies with the capsular Ligaments.*

THESE affections induce a great deal of pain in some instances, and always impede more or less the motion of the joint. In some cases, the offending substances are small and loose, and as firm as cartilage; and in others, they are of a soft membranous nature, sprouting from an eroded surface of one of the bones forming the joint, or from the inner surface of the capsular ligament.

In the latter, which remain fixed nearly in the same situation, the pain is constant, but it is seldom severe; but in the former, it is only felt in particular situations, perhaps when the connecting membrane gets between the ends of the bones, but it is then often excessively violent, and sometimes so excruciating as to produce fainting.

These substances can only be removed by an operation; but as this, altho' sometimes followed by no bad consequences, has

* All these remedies will fail, if the patient does not observe the most perfect rest and quiet.

has in many instances produced such a violent inflammation in the ligament and adjacent parts, and other bad effects, as to render the amputation of the limb ultimately necessary, it should be advised with great caution. From a good deal of experience, I am of opinion, that where the concretions appear, on examination, to be perfectly loose and detached, if the pain which they excite is very severe, rather than submit to a long continuance of it, we should venture to take them out; but whenever there is reason to suppose they are connected with any part of the joint, the patient should be advised to suffer the pain, which may in general be rendered moderate by avoiding exercise, rather than to run the risk attending the extirpation of them. If, indeed, the pain, notwithstanding every means employed to mitigate it, becomes insupportable, amputation of the limb should be recommended, as less hazardous than the excision of the tumor when attached to the capsular ligaments.

The operation for the removal of loose bodies may thus be performed: If the joint of the knee or ankle is affected, the patient should be laid upon a table or bed; but if the joints of the arm are to be opened, he may sit; and the limb should be firmly secured in the most convenient posture. The surgeon should then endeavour to fix the substance with the left hand towards the upper part of the joint, that the synovia may not escape by the wound to be made, the skin being previously drawn up as much as possible from the part to be divided. An incision is now to be made with a scalpel through the teguments and ligament, directly upon the substance, of such a size as will admit of its being easily taken out; which may be done either with the finger, or with a blunt probe passed beneath it. If it is found to be connected by small filaments either to the ligaments or cartilages of the joint, these should be cautiously divided with a probe-pointed bistouri, or probe-pointed scissars, after drawing out the substance itself as far as possible with

small forceps, or a small hook, when the texture of it will admit of the use of this. If there are several concretions, they should, if possible, be all removed at the same opening; but where this is not practicable, on account of their lying on opposite sides of the joints, after allowing the first incision to heal, a second opening must be made.

After the concretion is removed, the skin should be immediately drawn over the wound in the ligament, and the incision of the skin should be closed by adhesive plaster. The limb should be kept as much as possible in one posture until the wound is healed; and a strict antiphlogistic regimen should be observed. For the farther treatment of such cases, we must refer to the section on wounds of the ligaments.

§. 6. *Of Anasarca or Oedema.*

THESE terms are applied to dropsy in the cellular substance; which is known in common by coldness and paleness of the part affected, and by its retaining the mark of the finger when pressed. These swellings are generally connected with some systematical affection; but they sometimes occur in particular parts, and from causes which affect those parts only. Thus they are induced by contusions or sprains of the legs or arms; by tumors pressing upon the larger lymphatics; and by some of the lymphatics of a limb being by some means divided.

In cases of local swellings of this kind, if they are induced by tumors, the removal of these will alone effect a cure; if they are the consequence of debility in a limb, from sprains or bruises, the best mode of cure will be to support the parts by means of a flannel roller, or laced stocking, until they recover their tone from the use of cold bathing and frictions; and when they are occasioned by a lymphatic being cut, as sometimes happens in extirpating glands
from

from the arm-pit, small punctures in the lower part of the limb give immediate and the only relief.

In those swellings of the feet and legs which occur in general dropsy, all that a surgeon can with propriety do, is to discharge the fluid by punctures with a lancet.* This gives temporary ease, and I think ought to be employed earlier than it usually is, in order to prevent the loss of tone in the cellular membrane which must necessarily be the consequence of much distention. See chap. ix. sect. 2.

§ 7. *Of the Spina Bifida.*

THE term spina bifida is applied to those soft small swellings which sometimes appear on the spine, in new-born children, most frequently between the two last lumbar vertebræ. A fluctuation is perceived in them, and the fluid they contain can in part be pressed into an opening which occurs between the spinous processes of the two vertebræ in which they are seated. This opening is found to depend either on a deficiency of bone, or merely on a separation of the processes. The disease always proceeds from serum deposited within the coverings of the spinal marrow; and is for the most part local; though in a few instances it has been found connected with hydrocephalus.

In some cases children have lived under this disease for two or three years; but in general they die in the space of a few months. All the assistance that art has hitherto been able to afford, has been to support the tumor by a bandage; and thus to retard its increase. Opening it has always been followed by death, either immediately, or within a few hours.

Proceeding upon the supposition, that the want of the necessary support to the membranes of the spinal marrow
from

* We are commonly advised, as one means of lessening the chance of gangrene in these cases, not to make the punctures in the *most depending* part of the limb.

from the deficiency of bone, may be the *cause* of this disease, and not the *effect*, as has been generally supposed, might not some advantage be derived from a ligature applied round the base of the tumor so as not only to remove it, but to draw the bottom of the cyst together, and thus give a proper support to the parts beneath? And as an additional help, as soon as the tumor drops off, a firm stuffed pad might be applied over the opening in the vertebræ, and secured by a proper bandage.

A swelling of the same appearance, in similar circumstances, and probably of the same nature with spina bifida, appears sometimes on the head; death is also the consequence of opening it.

§ 8. *Of Scrophulous Tumors.*

FOR a description of scrophulous swellings, and the general remedies for them, we must refer to what was said on these subjects in chap. ii. sect. 12.

With respect to the surgical treatment of scrophulous swellings, I have never observed any good effects from the use of any applications hitherto recommended, but have repeatedly seen some of them, and particularly those of a relaxing quality detrimental; and hence I am convinced that the best practice is to trust them to nature through their whole course, except when they are seated over the cavities of the thorax or abdomen, or any of the larger joints, when they should be opened as soon as a fluctuation of fluid is perceived in them, either by means of a seton or trocar, or of a scalpel or lancet, according as the collection is large or small. With respect to the subsequent treatment, see section on Scrophulous Ulcers.

When these swellings are deeply seated in the breast, they are more firm than they usually are in other situations, and have probably sometimes been mistaken for real schirri; but a careful attention to the characteristic symptoms

toms of the different diseases, will always enable us with certainty to discriminate between them. The circumstance of the first being connected with symptoms of a general disease, is alone sufficient for this purpose.

§. 9. *Of the Bronchocle.*

EVERY tumor of an indolent nature, occupying the fore part of the neck, is commonly termed bronchocle.

The various affections of this kind are,

1. Aneurisms of the carotid artery. These do not frequently occur; they are usually the immediate consequence of some violent exertion, such as laughing or coughing, and are to be known by the marks of aneurism in general.

2. Encysted tumors, particularly of the melicerous kind. These frequently are met with on the course of the trachea, and often extend from one ear to the other. They are seated in the cellular membrane, and are distinguished by the general signs of meliceris.

3. Tumors formed by the membrane lining the trachea being forced out between two of the cartilages by violent sneezing, coughing, or laughing. In these cases the swelling will be at first small; and although soft and compressible, no fluctuation will be perceived in it.

4. Swellings of the lymphatic glands of the neck from scrophula. These are sometimes of such a size as to extend over the whole course of the trachea. They are known by the usual symptoms of tumors of this kind.

5. Enlargements of the thyroid gland, constituting the disease which is mentioned as so common among the inhabitants of the Alps,* and which is supposed to arise from the use of snow-water. This tumor has been known to extend all across the throat, from one angle of the jaw to the other. At first it is usually soft; no fluctuation is perceived

* Gouëtre.

ceived in it; the skin is unaltered in its appearance; and it is not painful. As the swelling increases in size it becomes firm or elastic in some parts, and perfectly soft in others; the skin acquires a copper colour, and the veins of the neck grow varicose; the face then becomes flushed, and the patient complains of frequent head-achs, and of stinging pains through the body of the tumor.

6. Swellings that appear to be formed chiefly of condensed cellular substance with effusions of a viscid matter in different parts of them. Of these I have seen two instances. In both, the tumor was supposed to originate in the thyroid gland; but on dissection this was found much diminished in size. In one case, the disease was chiefly on one side the neck; but in the other it reached from ear to ear, and from the sternum to the chin. In both cases, the tumor subsisted for a great number of years; and it was fatal but in one of them. At first it was soft and compressible, no fluctuation was perceived in it, and the skin was unchanged; but as it enlarged, it became hard in some parts, very elastic in others, and soft and fluctuating in other parts; the superficial veins became turgid, and the face of a livid colour, from the obstruction to the passage of the blood. In one case, the patient complained much of giddiness; and in both, the breathing was much obstructed.

In the aneurismal bronchocele, it must be evident that the only chance the patient can have, must be derived from the common operation for aneurism; and this must necessarily be in some instances very hazardous.

When the disease arises from encysted tumors, the treatment applicable in other situations, will be equally proper in the neck. And however large the *stratoma* may here be, it is in general so slightly connected with the contiguous parts, that its removal may always be safely attempted. A large opening in the lower part will be sufficient for athe-roma,

roma; and the meliceris may be cured either by incision, or by a seton.

Where the swelling is formed by a hernia of the tracheal membrane, gentle compression, and attention to avoid laughter, coughing, or any other exertion which might have any effect in increasing the complaint, is all that can be done. In scrophulous bronchocele we must depend chiefly on the general remedies of scrophula; and to remove the compression of the trachea or veins of the throat which they may give, as soon as their contents are found to be fluid, they should be evacuated.

In an enlargement of the thyroid gland, frequent frictions, and saponaceous and mercurial plasters, have been useful in the beginning of the complaint; but when it has arrived to any considerable size, no internal or external medicine with which we are at present acquainted is of any material service; and an attempt to extirpate the offending part must always be very hazardous, and has we are told, proved fatal; but in cases where it has not grown large, and is constantly increasing, and the usual remedies fail, I think it would be very proper to attempt the relief of the patient by cutting out the swelling. As we are, however, seldom applied to in the beginning of the disease, we must, in common, be content with palliating the most urgent symptoms as they arise.

In the last species, mercurial ointment rubbed on the part has proved useful in the first stage; blisters appeared also in one case to retard the progress of the complaint; but in the latter stage, as the tumor extends to a great depth, and to attempt its removal would be dangerous, and as it is in great part solid, no considerable advantage could be expected from merely laying it open, and the sore thus produced might perhaps degenerate into cancer: we are therefore reduced to the necessity of employing nothing but palliatives.

§ 10. *Of Nævi Materni.*

NÆVI MATERNI are those marks which are found on different parts of the body at birth; and which are by some supposed to originate from impressions made on the mind of the mother during pregnancy. They are of various forms, but their colour is in general a deep red. Those which rise more or less above the skin, are alone the objects of surgery.

These tumors remain sometimes stationary for a long time, or perhaps during life; but in other cases, they increase in size very rapidly. I once saw a tumor of this kind in a child of a year old, of the size of a goose egg, which at birth was not larger than a pea. They feel firm and fleshy; and in common have broad bases; though in some cases they are pendulous, and hang by very slender attachments to the contiguous parts.

Nævi materni seem to differ only from other farcomata, in being more plentifully supplied with blood-vessels; and they require the same treatment. They should always be extirpated when they appear to be increasing in size. In doing this, the whole tumor is to be dissected off with a scalpel, and the arteries being secured, the edges of the remaining skin are to be drawn as near together as possible, and retained by adhesive plasters or sutures, and the cure afterwards conducted in the usual way. When the swelling is connected merely by a narrow neck to the contiguous parts, a ligature should be employed instead of the knife.

§ 11. *Of Warts.*

WARTS appear to be produced from the cutis and cuticle: If left to themselves they generally waste away, or fall off; and it is only when they grow so large, or in such situations as to become very troublesome, that they should be
removed

removed by art. When they have a narrow base, they may be taken off by a ligature; but if their base be broad, it will be necessary to employ caustics, or the scalpel, for their removal. The former are usually preferred.

As caustics, the lapis infernalis, the lunar caustic, a solution of quicksilver in an equal quantity of nitrous acid, pulvis sabinæ, oleum tartari per deliquium, or spirits of hartshorn, will either of them be effectual; but as most of them are apt to excite too much inflammation, they should be used very cautiously. The best remedy I have tried, is rubbing them with sal ammoniac crud. moistened, two or three times a day. It excites neither inflammation nor pain, and seldom fails, except in the very hard species.

Warts frequently appear upon the penis in the venereal disease, and often continue long after the virus is eradicated. Mercury in such cases is of no benefit; and if the parts are kept clean, or when they produce matter, washed with some gentle astringent, such as lime water, they will generally disappear of themselves after some time. When, however, it is determined to remove them, either the scalpel or caustic may be employed. After the use of the former, in order the more effectually to prevent their return, the parts may be touched with lunar caustic.

It must be particularly observed, that no application should be repeated which produces inflammation; and when the scalpel is used, we should rather take off some of the sound skin, than run the risk of injuring the wart itself, or of leaving any part of it; for, from want of attention to these circumstances, a great deal of mischief may be produced: a necessity for the amputation of a limb has been the consequence of a neglect of the last.

§ 12. *Of Flefhy Excrefcencies.*

No part of the body is exempted from the formation of flefhy excrefcencies. They are of various fizes; are generally fomewhat more red than the healthy fkin; have about the fame degree of firmnefs that the lips poffefs; and are feldom painful. They have the appearance of mufcle, when laid open; but, on a clofe examination, appear to confift chiefly of cellular fubftance, in which are a great number of blood-veffels, very much ramified.

Escharotics are feldom effectual in removing thefe tumors, and are very apt to irritate and excite inflammation in them. We fhould, therefore, never truft to remedies of this kind, and always make ufe of the fcalpel, or a ligature. The latter fhould be employed when the excrefcence is pendulous by a fmall neck: and the fcalpel, when the bafe of the tumor is broad. After carefully diffefting out the tumor, the fkin fhould be brought to cover the wound, and the cure conducted as in other cafes.

§ 13. *Of Corns.*

CORNS appear in different parts of the body, but more particularly on the toes and foles of the feet. In fome cafes they appear to be of a horny inorganic nature; but in others, they are evidently fupplied with blood-veffels and nerves. They are commonly feated in the fkin, but they fometimes reach to the periosteum, and are in that cafe apt to be productive of pain and inflammation, and particularly when they are feated on the joints, or parts thinly covered with flefh.

The beft preventative of corns is to avoid preffure on the parts liable to be affected. The moft effectual method of removing them feems to be to pare off all the inorganic
part

part, after bathing them for half an hour or so in warm water, and immediately afterwards to apply the emplastrum gummofum over them, spread on soft leather. By repeating this occasionally, the corns will be kept easy, the hard knots will often come away, and the vacancy thus produced will be supplied by cellular substance.

§ 14. *Of a simple Exostosis, Venereal Nodes, and Spina Ventosa.*

AN exostosis is an indolent hard tumor originating from a bone. In some cases it is altogether a local affection, produced by a superabundance of callus in fractures, by a deep wound of a bone, or by an erosion of the substance of a bone from an ulcer. In others, it is symptomatic of some general disease, particularly of syphilis and scrophula. In the first case it is termed a venereal node; and when it appears as a symptom of scrophula, which it frequently does, it is usually denominated a spina ventosa.

Exostoses, when proceeding from external injuries, are seldom attended with pain; and after attaining a certain size, commonly remain stationary. But when they originate from an internal cause, they are generally painful from the first; probably from the difficulty with which the periosteum admits of distention; and they continue to increase until they ulcerate, or until the constitutional affection is eradicated.

In venereal nodes, the periosteum is often found inflamed and much thickened; and in some cases, a small quantity of a thin acrid serum is effused between it and the bones, which makes the swelling appear larger in the bone than it really is. This has given rise to the supposition that the periosteum is the original seat of the complaint; but it seems more probable that the bones are primarily affected, from the disease occurring only in the advanced stages

stages of syphilis, and generally seizing the hardest parts of them.

The spina ventosa affects the whole substance of bones, but more particularly the extremities of those forming the joints of the knee, ankle, elbow and wrist. A pain is the first symptom of it; and it appears to the patient to be seated in the very centre of the bone. This is sometimes the only sign for a few days; but in general there is likewise some fulness observed in the part.

When these swellings occur in the middle part of bones, as sometimes happens in the hands and feet, they are apt to advance rapidly; and when the soft parts ulcerate, a thin, ill-conditioned matter is discharged, and the bones on examination will be found carious. But where the larger joints are affected, the disease arrives to this state in a much more gradual manner; and then lays the foundation for a species of white swelling. See chap. on White Swellings.

When the tumors terminate in sores, the softer parts of the bones are found dissolved; and on the matter which they produce being discharged, the remaining cavities have the appearance of being formed by all the interior part of the bone being scooped out, nothing being left but the hard external lamella. The bone in this state exhibits appearances very similar to those of scrophulous sores in the softer parts; and as the spina ventosa is, in one stage or another, almost always accompanied by other signs of scrophula, I am clearly of opinion that it should be considered as a scrophulous affection.

In exostoses from a local cause, nothing but a surgical operation will effect a cure; this may therefore be employed whenever they become so large as to prove troublesome or painful.

The patient being placed upon a table, and secured by assistants, if there is any risk of cutting large arteries, a tourniquet

tourniquet should be applied above the disease; an incision should now be made through the teguments above the tumor, and carried, if the parts will admit of it, an inch or more beyond each end of it. It is afterwards to be continued down to the bone, taking great care to avoid cutting the contiguous muscles, tendons, veins, arteries, and nerves. If the diseased part is merely a small knob that can be admitted into the head of a trepan, it may be taken off by that instrument; but when it is too large for this, a common amputating saw may be employed to remove it; and after taking away all the spiculæ, the divided parts may be brought into contact, and retained by adhesive plaster. They may thus heal by the first intention; but even if this should be frustrated by pieces of bone coming away, or if exfoliation should take place some time after the healing of the wound, it will still be better than to treat the case from the first as an open fore.

When an exostosis is found to surround a bone entirely, it will be necessary to take out that portion on which the disease is seated, when it can be done with propriety. As this, however, cannot well be executed when the bones of the hands or feet are affected, it will be better to take out the whole bone. But in the long bones, as those of the thigh, leg, or arm, we may safely venture to perform this operation; and trust to nature for supplying the deficiency: for there are many instances of whole bones being regenerated in people of healthy constitutions. When a part of a bone is to be removed, after laying it bare, a piece of pasteboard, or a thin sheet of lead should be passed beneath it, in order to protect the parts below from the saw.

As soon as the bone is taken off, a pledgit of lint, spread with common cerate, or dipped in oil, should be insinuated between the lips of the wound, and the manifold bandage may then be applied. As the free discharge of matter is of consequence, this should be carefully attended to,

not

not only in the after position of the limb, but also in making the incision.

When there is but one bone in the part operated upon, the arm for instance, it will be necessary to pay particular attention to keeping it of its natural length during the cure.

Machines have been invented for this purpose; but they are unnecessary if the patient is attentive to the proper management of the part, and when employed, they are very apt to be productive of inflammation and other inconveniencies.

During the cure, the chief object is to prevent matter from lodging between the contiguous sound parts. If this is accomplished, and the wound dressed lightly, it will soon fill up and heal. The granulations between the ends of the bone will gradually become hard, and if the health continues good, the limb will become equally useful as before.

Exostoses wherever seated are to be always treated in the same manner.

Venereal nodes are in the beginning relieved by the use of mercury alone. Mercury should not, however, be applied to the tumors; for I have reason to believe it has often been injurious; but they should be bathed in a solution of saccharum saturni, or some other mild sedative should be applied to them; and these, by tending to remove inflammation, may assist in the discussion of the tumor. When the system is properly charged with mercury, if the disease still increases, I have sometimes relieved the pain immediately by leeches applied over the tumor. When these have failed, blisters have, in some cases, been effectual.

Should these means, however, have been too long neglected, should the tumor advance with rapidity, or should acrid matter be confined within the periosteum, an incision down to the bone, along the tumor, will often give immediate

diate ease. The matter thus evacuated is frequently a thin brown sanies, and sometimes a viscid transparent mucus.

The incision heals very readily by the ordinary treatment, in some cases, even where the bone is considerably enlarged: The tumor indeed will often remain during life, but without producing any inconveniency; and unless it occasions considerable deformity should never be meddled with. But if, notwithstanding the use of mercury to a proper extent, the wound shews no tendency to heal, it will be better, for some time at least, to try the effects of a discontinuation of it. Should the body be contaminated by some other disease, the removal of this will often effect a cure. And when there appears a tendency to exfoliation in the bone, as this process alone will remove the complaint, such remedies should be employed as will expedite it as much as possible. See Sect. on Carious Ulcer.

After all the diseased part of the bone is removed, the sore will usually heal without difficulty. But when the cure is retarded by a thickening of the periosteum and other parts, in consequence of a long continuance of the complaint, the sore should be dressed with strong precipitate or verdegris ointment; or if these are not powerful enough, it should be touched with the common or lunar caustic, once in two or three days. These will produce a separation of the slough, and in consequence, probably soon heal the ulcer.

In some instances, venereal nodes are mere swellings of the periosteum; and in that case they give little uneasiness, and often subside merely from the use of mercury, or of a blister, and no advantage is derived from cutting into them. But when they consist in an affection of the bone itself, they are always more or less painful, are very hard, advance slowly, and are never removed but by an exfoliation.

With respect to the cure of spina ventosa, when it appears in different parts of the body at the same time, all

that

that can be attempted, is to support the constitution with a proper diet ; to advise bark and cold bathing as the best tonics ; and when the pain is severe, to moderate it by the use of opium. But when it is confined to one part, as often happens in the knee and other large joints in cases of white swelling, it becomes frequently advisable to remove the part affected by an operation. See chap. on Amputation, sect. last. When the complaint affects the middle of the bones, the diseased part only may be removed, or the whole bone taken out, as above directed, in cases of exostosis.

C H A P. XLII.

Of Fractures.

S E C T. I.

General Observations.

A FRACTURE may be defined a solution of continuity in a bone, produced by external violence.

This affection receives various appellations, derived either from its direction, or from the symptoms with which it is accompanied: Thus it may be transverse, oblique, longitudinal, or simple, if there is a mere division of a bone; or compound, when there is an external wound of the soft parts, leading to the injured bone.

This

This is the only distinction of fractures, that is useful or necessary.

The existence of a fracture is in general easily discovered by manual examination. It is only in simple fractures that a difficulty can occur; and more particularly, if the contiguous parts have become inflamed and painful. In such cases we must be directed in our opinion, by a careful attention to the age and habit of the patient; the site of the supposed fracture; the situation of the limb when the injury was received; and to the attending symptoms.

1. Thus the bones are much more brittle in old age than early in life, and consequently are much more readily broken. In infancy the bones bend very much instead of breaking, upon the application of a moderate force.

Different diseases also induce a brittleness of the bones. Lues venerea has this effect to such a degree, that the bones are sometimes broken by the action of the muscles alone. Scurvy has the same effect; and likewise what is termed *mollities ossium*.

2. Bones are more apt to be fractured in those parts of them which are firmest, and consequently least flexible as in the middle; and, those which are thickly covered with soft parts are much less liable to be broken, than those which lie near the surface; thus the thigh-bone is not so frequently fractured as the bones of the arm and leg.

3. With respect to the situation of the part injured, it is evident, that a bone lying on an unequal surface may readily be fractured by an inconsiderable force, while, if equally supported, it will bear a very heavy weight without injury.

And lastly, The concomitant symptoms are to be attended to. Those of fracture are generally, pain, swelling, and tension of the contiguous parts; a more or less crooked and distorted state of the limb; a crackling or grating noise

on the parts being handled; and loss of power to a certain extent in the injured limb.

Pain in fractures chiefly arises from the ends of the displaced portions of bone irritating the soft parts, and from the injury to the latter by the accident. It is seldom very great; but in some cases it is so violent, as to be productive of spasmodic affections of the muscles of the limb, great degree of inflammation and fever, subfultus tendinum, general convulsions, and delirium; and if the cause is not soon removed, death very commonly succeeds. This is usually preceded by gangrene of the parts contiguous to the fracture; but in some instances it seems to be occasioned merely by the violence of the fever. It must be obvious, that these symptoms will be most readily induced by an oblique fracture.

A grating noise on handling the part, and distortion and loss of power in the limb, almost always attend fractures: When they are longitudinal, which seldom happens, they cannot indeed occur.

But besides these leading symptoms which immediately take place, there is often a great degree of ecchymosis produced by the ends of the bone wounding an artery or vein; and a wound of the teguments in compound fractures.

The most important consequences of fractures are, stiffness and immobility of the injured limb; distortion of the parts chiefly affected, either from a fulness or thickness remaining in the contiguous muscles or ligaments; an exuberancy of callus; a contracted state of the contiguous joints; or a marasmus or wasting of the limb itself. All these will be considered hereafter.

In judging of the event of a fracture, we are to consider, 1. The age and habit of body of the patient; thus bones unite much sooner in youth, and particularly in infancy, than in old age. Indeed it has been said, that it is often impossible to procure the re-union of bones in advanced age; but I never have met with an instance of this kind.

Lues venerea and scurvy, are often considerable obstacles to the cure of fractures, and sometimes prevent it entirely.

2. The situation and part of a bone that is injured. Thus we know that fractures of the small bones of the arms, hands, legs, and feet, and of the chest, heal much more readily than those of the humerus and thigh-bone. The difficulty in the thigh often arises chiefly from our not being able to retain the ends of the bone in contact. And when any of the larger bones are fractured near to their extremities, we find the danger to be greater, and the prospect of a complete cure much less than when they are broken near the middle; for here the shortness of one end of the bone makes the retention difficult; and the symptoms which ensue are apt to be severe, on account of the contiguity of the capsular ligaments, and tendons, which may be more or less injured. And as the ends of the bones are more spongy, they do not unite equably and soon; and collections of matter and exfoliations are very apt to take place. These fractures are frequently productive of stiff joints, pains and swellings, which often continue a long time, and sometimes during life. Such troublesome circumstances seem to originate more from the nature of the injury in most cases, than from the mismanagement either of the patient or surgeon.

3. The degree of the symptoms: for the prognosis must obviously be favourable, or otherwise, according as these are mild or violent.

4. The concomitant circumstances: thus the fracture may be accompanied by contusion, laceration, or dislocation of the contiguous parts; according to the degree of which will be the danger.

5. The kind of fracture. It very commonly happens that simple fractures are unattended by bad symptoms, and are soon cured; but in general, although there are many instances

instances to the contrary, the smallest external wound communicating with the injury in the bone, will be productive of danger.

The indications in the cure of fractures are, 1. To replace the deranged parts of the bone. 2. To retain them in this situation as long as necessary. And, 3. To obviate symptoms which occur during the cure.

When bones are fractured directly across, they are either not moved out of their natural situation, or the displacement is so inconsiderable that they are easily reduced; but when the fracture is oblique, the ends of the broken bones are apt to pass each other so as to produce much deformity and pain.

Previous to attempting the reduction of a fracture, the limb or part should be put into such a position that all its muscles will be as much as possible relaxed. When this is done, the surgeon may commonly replace the bones himself; but when assistance is necessary, the upper part of the limb should be held firm, while the lower part is gently extended, still keeping the muscles relaxed as much as possible. The displaced portions of bone should then be gently reduced, so as to render the limb as similar as possible to the sound one, in order to ascertain which, they should be brought as near together as convenient.

The bones are to be retained in their proper situation by compresses and bandages, and by keeping the limb in an easy posture, and as much fixed as possible. The applications should be made with no greater degree of tightness than is absolutely necessary for retaining the bones in their situation.

The time required for rendering the re-union of bones sufficiently firm, must depend upon the age and habit of body, the violence of the injury, attention of the patient, and other circumstances; but in general, in healthy middle aged people, and in favourable circumstances, a
fracture

fracture of the femur, or bones of the leg will get well in two months; an os humeri, or bone of the fore-arm, in six weeks; and any of the bones of the hands, fingers, feet, and toes, in three weeks. In infancy and childhood, fractures heal more quickly; and in old age they require a much longer time.

In simple fractures, to which these observations more particularly apply, the inflammation and other attending symptoms usually subside in a few days, if the bones are kept in their places; but in some cases they constantly increase from their first appearance. To obviate these, it will be always advisable to make use of some astringent application, such as a solution of sacchar. saturni, of sal ammon. cr. or sp. mind. and when this has not the desired effect, to employ topical bleeding, by leeches. These have a most happy effect in removing the inflammation, and thus preventing greater part of the bad consequences of fractures, formerly enumerated. If the swelling and pain in a fractured limb have continued long, the most effectual relief is obtained from frictions with emollient oils, and from warm bathing, particularly in the medicinal waters.

To check an overgrowth of callus, the application of astringents, and of moderate compression with a thin plate of lead, retained by a roller, are useful; but these will not be always successful.

The ends of fractured bones sometimes remain loose and unconnected long after they should, according to the common progress of cures in such cases, have been united; this may originate: from some constitutional disease, as lues venerea, scurvy or rickets; from the ends of the bones not having been constantly in contact; from a portion of a muscle, a tendon, or ligament falling in between the divided parts; and from the bone being broken in different parts, and in small pieces. This circumstance has also
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been observed to happen more peculiarly during pregnancy.

When the want of re-union depends on some general disease, the proper remedy of such disease becomes necessary to a cure; and indeed it will be always prudent to attend to this when the fracture is first produced.

If the defect of union arises from the bones not being in contact, it will accomplish a cure, in recent cases, to appose them: But when the osseous matter which should have joined the bones has become smooth and hard, as in long continued instances of this kind, and they move freely on each other without giving pain, it will answer no good purpose to bring them together; and the only mode of relief will be to lay their ends bare by an incision, and by removing a small portion of each, with a trepan or a common saw, reduce them to the state of a simple fracture. This operation should always be advised when the injury affects the large bones of the extremities; but in the bones of the fingers and toes, of the metacarpus and metatarsus, the clavicles and ribs, where no great disadvantage is experienced from it, it will be advisable rather to submit to the inconveniency.

This operation is painful and tedious; as the incision must be pretty extensive, and must be made with great caution in order to avoid the large blood-vessels; but it is perfectly safe, and has been followed with complete success, nature supplying fully the place of the removed portion of bone.

In compound fractures, all detached portions of the bone that will not probably unite with the larger parts should be immediately removed; but in simple fractures where the skin remains entire, as we cannot judge of the nature of the injury to the bone with any exactness, we must always proceed as formerly directed, at first; and when the union seems to be prevented in the usual time by
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any detached pieces of bone, an incision should be made down to them, and they should then be removed by the fingers or forceps.

Another cause preventing the re-union of bones, is a portion of muscle, or some other soft part passing between them. This is to be supposed when the pain and tension of the injured part have been more severe than usual from the first; when particular motions of the limb give severe pain and twitchings of the muscles that move it; and when the ends of the bone do not unite at the usual time. In this case we should endeavour to remove the interposed substance, by putting the limb into a variety of positions. As this, however, will seldom succeed, it will be commonly necessary to make an incision down to the affected parts: If the callus is found soft, a cure may be effected merely by bringing the bones into contact; but if it has become hard, it will be absolutely necessary to remove a small portion of it as above directed.

Effusion of blood around the injured bone sometimes prevents a re-union of it. When a large vessel is wounded by the bone, the extravasation of blood is in some cases so considerable, and the limb becomes so much swelled, that it will be necessary to lay it open, and tie the vessel; but when the swelling does not arrive to an alarming height, we are rather to trust to the contractility of the artery for stopping the hemorrhagy, and to the absorbents for removing the blood already effused. In some such cases, where the blood has remained long in contact with the bone, the periosteum becomes separated for a considerable space, no callus is produced, no union takes place, and a foetid sanies is commonly discharged from the sore: A cure cannot then be effected until the denuded parts of the bone exfoliate. As the exfoliation is a very tedious process, it will render the cure more speedy and certain to
remove

remove those parts of the bone from which the periosteum is separated, by means of a saw.

S E C T. II.

Of Fractures of the Nose.

FRACTURES in the bones of the nose require very particular attention, because they are apt to impede respiration, to affect speaking, and the sense of smelling; and in some cases, to produce polypi, and tedious ulcers; and because of the contiguity of the brain.

When any part of the bones have been raised above the rest, it must be pressed into its place by the fingers; and such parts as are forced into the nostrils must be elevated with the end of a spatula, or some such instrument. If any portion is either very nearly or entirely separated from the rest, it should be removed.

When the reduction is properly made, the bones will generally remain in their situations of themselves—If there is a wound it must be dressed in the usual way: And inflammation must be obviated by saturnine applications, or if necessary by local bleeding.

If, however, the bones will not remain firmly in their places of themselves, it will either be necessary to introduce small tubes adapted to the size of the nostrils, previously covered with cerate spread on lint, and secured by tape passed around the head, or to apply a compress and roller over the nose, according as the bones fall into the nares, or are raised too high. By this treatment we may commonly accomplish a cure, unless the bones have been very much broken, when if they cannot be re-united, all the detached pieces must be removed, and the wound healed as well as possible.

S E C T. III.

Of Fractures of the superior Maxillary, and Cheek Bones.

THE vicinity of these bones to the eye, by which they are apt to induce ophthalmia, and the situation of the antrum maxillare, a removal of a part of the bone forming which is apt to induce deformity, and render a cure tedious, make fractures of them important

The displaced parts of the bones must therefore be very carefully reduced to their natural situations, either with the fingers, or with a narrow spatula. When the parts are laid open, the wound should be dressed in such a manner as will most probably prevent subsequent deformity; and a piece of adhesive plaster should be employed to retain the dressings. Blood-letting, and an antiphlogistic regimen, must be advised to obviate inflammation which might ensue.

If the antrum is injured, as the matter formed cannot be readily evacuated from the prominent part of the cheek, it will be necessary, in order to effect a cure of the ulcers produced, to make an opening in the most depending part of the cavity in the manner advised in chap. xxxiii. sect. 5.

S E C T. IV.

Of Fractures of the inferior Maxillary Bones.

FRACTURES in the lower jaw bone may be always readily discovered.

In reducing them the patient should have his head firmly secured in a proper light, and the surgeon should then replace the parts deranged, by introducing one hand within the mouth, and pressing on the other part of the jaw

with the other. If a tooth is seated in the course of the fracture, which is the case very generally, as it may retard the cure, by acting as an extraneous substance, it should be removed; but when any of the teeth not in the site of the fracture, are forced out, they should be replaced, and tied to the contiguous firm teeth.

The fractured parts may be very well kept in their situations, by a thick linen compress applied along the jaw from ear to ear, retained by a four-head linen roller. See chapter on Bandages.

During the cure, the patient should be kept quiet; he should avoid speaking and laughing, or the use of the jaw in any manner, as much as possible; and he should be fed entirely on spoon meat. When the bandage is removed, which must be done as seldom as the nature of the case will admit of, an assistant should support the parts with his hands during the dressing. The management of the fracture of one or both sides of the jaw bone is exactly similar. In the first case, the patient may be allowed to eat meat, and speak in about three weeks; but in the latter not in less than five.

S E C T. V.

Of Fractures of the Clavicles and Ribs.

THE clavicles and ribs, from their structure and situation are more liable to fractures than any other bones of the body.

A fracture of the clavicle is in common very easily known by the usual symptoms of fracture. The end of the bone connected with the shoulder is generally pulled to some distance from the other, and below it, by the weight of the arm; and the motion of the arm is impeded. This fracture may be reduced merely by raising the arm

to a proper height; and the ends of the bone may be retained in their natural situations, by affording a proper support to the arm; this is usually done by a sling hung round the neck, adapted to the length of the arm, and equably applied to it; but it is much more effectually accomplished by the machine, pl. xii. fig. 3.

The position of the head and shoulders must be varied in different cases; sometimes the ends of the clavicle are best retained when they are raised; and at other times when the head is bent forward.

In other circumstances, these fractures are to be treated as similar injuries in other parts. The inflammation will, in general, be sufficiently moderated by the common saturnine applications. And when the bone is splintered, which must always be dangerous on account of the vicinity of the subclavian artery, the loose parts must be removed with great care, and the wound dressed in the usual way.

In general, where circumstances are favourable, the fractured parts will unite in a fortnight; but the corresponding arm should not be freely used for three or four weeks.

Fractures of the ribs are in common very easily discovered by the touch. For the most part the symptoms they induce are very trifling; but in some cases, the pain is very severe; the breathing becomes difficult, attended by cough, and perhaps a spitting of blood; and the pulse becomes quick, full, and sometimes oppressed.

These symptoms are the consequence of the fractured ends of the rib being pressed in upon, and tearing the pleura and lungs. The injury to the latter, in some cases, produces emphysema; (chap. xxv.) and a wound of the intercostal artery, an effusion of blood into the cavity of the chest.

It will always be the safest practice, in every case of fractured rib, to discharge as much blood as the strength of the patient will admit of, to have him kept quiet, and upon a low regimen. If the ends of the bone are not in contact, they

they should be brought together if possible; and to retain them, a broad leathern belt, lined with quilted cotton or flannel, should be tightly applied around the body, and worn for several weeks.

When a difficulty of breathing is kept up by air escaping from a wound in the lungs, or by blood escaping into the cavity of the chest, or when the pain is kept up by the rib pressing upon the pleura, it will be necessary to make an opening with a scalpel. In the latter case, this should be done directly upon the injured part; and, on the rib being laid bare, the depressed portion of it should be raised, either with the fingers, forceps, or spatula. When the oppressed respiration is occasioned by effused air or blood, the operation of the paracentesis becomes necessary.

S E C T. VI.

Of Fractures of the Sternum.

A SIMPLE fracture of the sternum requires a treatment similar to that of a fractured rib. More danger, however, may arise from a part of this bone being forced into the chest, on account of the vicinity of large blood-vessels; but the pain of the part, and other symptoms induced are the same.

When the pain, cough, oppressed breathing, and other symptoms do not yield to bleeding and an antiphlogistic course, the only effectual method of affording relief will be, to make an incision upon the injured part large enough to admit a free examination of the bone, and then to raise the depressed piece, either by means of a scalpel or levator, if the opening will admit them, or when this is not the case, with a trepan, in the manner advised in a fractured skull; and the sore produced may afterwards be treated in the usual way.

This operation may be done with safety, and should undoubtedly be tried: No other mode of cure yet proposed, gives any chance of success.

S E C T. VII.

Of Fractures of the Vertebrae, os Sacrum, Coccyx, and ossa Innominata.

FRACTURES of the vertebrae may be produced by falls and blows; but they are most frequently met with as the consequences of gun-shot wounds.

The spinous and oblique processes of the vertebrae may be broken without any immediate danger; but, in general, there is such a shock given to the spinal marrow by the cause producing the fracture, that it ultimately ends in the death of the patient; and a fracture extending through the body of the vertebra will probably always prove fatal.

We judge that the vertebrae are fractured, by the touch, by the violence of the injury, and the severity of the pain, and by the parts beneath the injured vertebra becoming paralytic when the spinal marrow is affected.

When any of the external parts of the vertebrae are loose, they may be in general replaced by the fingers; and by confining the patient as much as possible to one posture, and by the use of the napkin and scapulary, and compresses, we may retain them in their situations until they unite with the rest of the bone. When this cannot be done, however, instead of leaving the patient to his fate, according to the common practice, wherever the spinal marrow is compressed, we ought certainly to lay the injured part freely open, that we may get access to the bone, and if possible raise it to its proper situation, or, if necessary remove it. This has been done with such good effect as to relieve a patient entirely

tirely who had been rendered paralytic by a bullet passing into one of the vertebræ. The operation can never increase the danger.

In fractures of the sacrum, the treatment must be nearly similar to that advised for fractured vertebræ, except that where the lower part of the bone is injured, as well as in fractures of the coccyx, and is thrown inwards, we may in some instances replace it by introducing a finger into the anus, while the fingers of the other hand are employed externally.

Where any deep-seated part of the ossa innominata is injured, the patient should be confined as much as possible to an easy position until the bones are probably united; and bleeding and a proper regimen should be employed as preventatives of inflammation.

In more external fractures, the displaced parts may often be reduced to their proper situation; and a bandage adapted to the site of the injury, will retain them until a cure be effected.

S E C T. VIII.

Of Fractures of the Scapula.

A FRACTURE of the scapula does not often occur; but when it does, it is always difficult to cure, and commonly induces a permanently stiff and unwieldy state of the corresponding arm.

Besides the general symptoms of fracture, this injury is attended by stiffness and immobility of the arm; and when a part of the bone is forced in upon the lungs, by an emphysematous swelling.

In reducing this fracture, all the muscles connected with the scapula must be as much as possible relaxed. By raising the

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the head and shoulders, we relax those of the back; and if the humerus be supported at the same time, the deltoid muscle will be so much relaxed that the fractured part may be easily replaced. The keeping all these parts as much as possible in this state, and the application of a roller for the particular retention of the separated part, is all that can be done. And, in order to obviate that violent degree of inflammation which is apt to succeed, blood-letting, and particularly topical evacuation, should be freely employed.

S E C T. IX.

Of Fractures of the Humerus.

FRACTURES of the humerus are in general very easily detected, by the seat of the pain, inability to move the part, and the other general symptoms of fracture.

By bending the elbow moderately and raising the arm nearly to a horizontal direction, in a line with the body, we relax all the muscles of the arm, and the surgeon may then commonly reduce this fracture without assistance; but when this becomes necessary, an extension may be made by one person grasping the arm near the shoulder, and another just above the elbow.

When the bone is reduced, it is to be secured in its situation by a splint, of the kind represented (pl. xii. fig. 1.) laid along the whole outside of the arm, and another along the inside, both covered with soft thin flannel, to prevent them from galling the parts; and while these are secured by one assistant, and the fore-arm supported by another, a flannel roller should be applied moderately tight over the whole.

The fore-arm should be supported by a sling, (pl. xii. fig. 3.) but it will be better, even in bed, that it should be

in a hanging position, so that it may have some effect in pulling the lower part of the humerus gently downwards, and thus prevent the ends of the bone from overlapping each other, than to have it laid on a pillow horizontally.

Unless the arm becomes much swelled and painful, the bandage should not be removed until the seventh or eighth day, when we may cautiously examine whether the bone is perfectly in place or not; and any accidental displacement may then be easily remedied.

Fractures of the humerus heal more readily than those of any other part; all circumstances being favourable, generally in less than four weeks; and, if well managed, are seldom productive either of lameness or distortion.

S E C T. X.

Of Fractures of the Bones of the Fore-Arm.

THESE fractures very frequently occur. When both bones are broken, there is seldom any difficulty in discovering the state of the injury; but when one only is fractured, especially if it be the radius, as the firmness of the other prevents its displacement, it requires some attention to discover it. The seat of the pain, however, points out the part injured.

If a great deal of attention is not given to these fractures, they are very apt to induce a permanent stiffness in the arm, and more particularly when the radius alone is broken; probably from the difficulty of keeping it in its situation, owing to its having a rotatory motion independent of the ulna.

In order to reduce a fracture in the fore-arm, the patient being seated, and the muscles of the arm relaxed by bending the elbow and wrist, the limb should be extended to such a degree, by one assistant grasping it above the

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the fracture, and another beneath it, as will allow the surgeon to replace the bones with exactness. This being done, such a splint as represented plate xii. fig. 1. covered with soft flannel, and so long as to reach from the elbow to the tops of the fingers, and of such a breadth as to go round more than half the arm and hand, should be placed along the ulna. Another splint not quite so broad must be placed along the course of the radius, and both may be secured either with a flannel roller or a twelve-tailed bandage.

The palm of the hand should always be turned towards the breast, as this is not only the most convenient position, but it most effectually prevents the motion of the radius. The arm after being dressed as above directed, should be hung in the sling, plate xii. fig. 3. and allowed to remain in it during the night.

We have directed the splints to be very long, because it is of great consequence to prevent the motion of the fingers; for if this is permitted, it not only tends to support inflammation and pain, but also to displace the bones.

A partial dislocation of the bones of the wrist is a frequent concomitant of a fracture of the radius; by which the risk of a stiff joint, or of a painful permanent swelling of the arm becomes considerable. This should therefore be particularly attended to in the treatment. See chap. on Dislocations, and sect. on Fractures in General.

The olecranon is sometimes fractured without any injury being done to the rest of the ulna, particularly from falls or bruises on the elbow. In this case, in order to keep the fractured parts in contact, the fore-arm must be kept extended by means of a long splint laid along the interior part of it, from the middle of the humerus to the tops of the fingers, secured by a roller. The arm should be

allowed to hang by the patient's side, to which it should be fixed with one or two straps.

But lest a stiffness of the elbow might be the consequence of keeping the arm constantly extended during the cure, the dressings should be removed about the eighth or tenth day, and daily afterwards; and the fore-arm being for some time moved slowly backward and forward, and the joint rubbed with any emollient oil, the arm may then be secured as before.

S E C T. XI.

Of Fractures of the Bones of the Wrist, Hands, and Fingers.

THE bones of the wrist are seldom fractured except by shot from fire-arms, or by some heavy substance passing over them, from their readily giving way to any ordinary force applied to them. Fractures of them do not readily unite, because of their being so small; and on this account, as well as of the vicinity of tendons and ligaments, which induces a considerable degree of inflammation, ankylosis, or stiffness of the joint are very common consequences. After replacing the bones, the most effectual preventative of these effects is copious bleeding from the parts injured. The arm and hand should then be dressed in the manner directed for a fractured fore-arm.

Fractures of the metacarpal bones should be dressed either with a splint of wood or of pasteboard applied on the internal part of the hand and fore-arm, and above these with the splints and bandage advised in the last section.

Fractures of the fingers are frequent, and easily cured. The best splint for them is a piece of firm pasteboard, adapted to the parts by being previously moistened, extending the whole length of the fingers, and secured by

a narrow roller. The more effectually to ensure a perfect cure, a large splint of the kind (Plate xii. fig. 1.) or of firm pasteboard, may be applied to the inside of the hand, and secured by a roller, so as to prevent any of the fingers from being moved; and in order to preserve the mobility of the joints of the fingers, the bandages and splints should be removed about the tenth or twelfth day, and daily afterwards, and the fingers bent and extended several times.

S E C T. XII.

Of Fractures of the Thigh-Bone.

THE os femoris is most frequently broken near the middle; and next to this, its neck is most apt to be fractured.

When the lower part is the seat of the injury, the fracture is in general easily distinguished by the grating noise produced by rubbing the ends of the bones together; by the limb being much shortened, if the fracture be oblique, or if the ends of the bones have been displaced in cases of transverse fracture; by great pain and tension of the injured part; and by the limb being unable to sustain the body.

It is, however, often difficult to distinguish fractures of the neck of the femur from dislocations of this bone. As it is of considerable consequence to make this discrimination, a very careful attention is requisite; and by this the distinction may be commonly made. In nineteen cases out of twenty, the head of the femur when dislocated, is pushed inwards and downwards, owing to the brim of the acetabulum being not so deep internally as in other parts, as well as to the muscles not being so strong; while perhaps in an equal number of fractures in the neck of the femur, the bone is pushed upwards, on account of accidents of
this

this kind happening most frequently from falls upon the knees, or perhaps upon the feet, when the legs are stretched out, by which a very considerable force is necessarily brought to act against the neck of the thigh-bone, where it is least able to give resistance. In such fractures, the leg is much shortened, often several inches; the trochanter is found much higher than that of the other thigh; and the knees and toes are turned inwards. On the contrary, in dislocations the leg is considerably lengthened; the head of the bone and the trochanter are found near the groin, with a corresponding vacancy where the trochanter ought to be; and the toes are turned out.

In fractures, the extremity may be turned with much more ease from side to side, than when the head of the femur is luxated. The tumor formed by the head of the bone and trochanter in the latter case, is also much greater than that produced from the trochanter alone in fractures.

We are very apt to obtain but an imperfect cure in fractures of the thigh, and particularly when the neck of the bone is the part injured. This arises, 1. From the difficulty of ascertaining the direction of the fracture, on account of the bone being so thickly covered. 2. From the impossibility of discovering whether the reduction be properly effected. 3. From the difficulty of retaining the ends of the bone in their proper situations, when they are well reduced: This is particularly the case when the neck of the femur is the part affected, and when the fracture is oblique. The thigh-bone is also more affected by bodily exertions than most others.

In reducing fractures of this bone, the thigh should form an obtuse angle with the body, and the joint of the knee be moderately bent. The ends of the bone may generally be easily brought into contact, if there be not much tension or swelling, while one assistant gently extends the lower part, and another secures the upper part of the thigh

thigh. There is the greatest difficulty when the neck of the bone is broken; but we may commonly succeed, if one assistant secures the body while another makes an extension at the lower part of the thigh.

When this mode fails, it will be necessary to have recourse to extending machines.

There is usually much greater difficulty in retaining the ends of the femur in contact, than in reducing them to their proper situation. In order to accomplish this, a firm splint reaching from the top of the hip-joint to a little below the knee, and broad enough to cover at least one-half of the thigh, should be covered with soft flannel, laid upon a twelve-tailed bandage supported by a pillow, and applied to the outside of the thigh. Another splint long enough to extend from the groin to a little below the knee, and so broad as to cover one-third of the thigh, is to be placed on the inside; the manifold bandage beneath the large splint, must then be applied, so as to make a moderate and equable pressure over the whole limb.

The patient should be placed on a hair matras which will not yield much, on his back, with the body turned toward the affected side, and have the knee moderately bent, and this as well as the leg should be raised somewhat higher than the body.

In order to have the limb more secure from displacement, it will be proper to put a long splint of wood beneath the middle of the pillow, and fix it by two broad straps firmly buckled on the upper part of the thigh: And besides this, to have the pillow connected to the matras by straps. To prevent uneasiness from the weight of the bed-clothes, two or three hoops fixed in a frame should be placed over the thigh.

Left the bones might be accidentally displaced, but especially if pain and swelling should come on, the bandage should be undone, and the upper splint removed in

order

order to admit of an examination of the injured parts. If pain, inflammation, or swelling, have come on, it may be proper, before a renewal of the dressing, to apply leeches and other remedies to the parts affected; but when none of these symptoms have come on, and the bone is in its proper situation, the bandage and splint should be immediately reapplied.

Adults, in favourable circumstances, will generally be cured in six weeks; but all violent exertions should be carefully avoided till after the eighth or tenth week.

In order to prevent rigidity and uneasiness in moving the limb, after the cure, it will be proper, in a fortnight or less after the accident, to permit the patient to lie more on his back, and the knee to be daily bent or extended.

This mode of cure will very commonly succeed very perfectly; but some cases of oblique fracture occasionally occur in which it is almost impossible to prevent the ends of the bones from slipping by each other, and by uniting at their sides, make the limb shorter than it ought to be.

In order to prevent this disagreeable circumstance, various methods have been devised; by these it is intended to keep the limb in a constant state of extension: Some have proposed to fix the body and then extend the leg by an apparatus below; others trust to an extension of the extremity only. But these means can never be employed while any degree of inflammation is present; and even when this does not exist, they give so much uneasiness that they can seldom be made use of. The pain, swelling, &c. sometimes arrive to so great a height, that even a simple bandage cannot be admitted till after their subsidence.

S E C T. XIII.

Of Fractures of the Patella.

FALLS and blows of the knee are the causes productive of fractured patella. The bone is most frequently broken transversely; sometimes longitudinally: and in some instances, into three or four different pieces.

Under proper management, this fracture seldom produces much stiffness of the knee joint, after a few months; and when this does occur, it is hardly in consequence of the callus produced, as this must be in very inconsiderable quantity, but probably originates from the concomitant inflammation of the internal parts of the joint, or from the knee being kept too long in a fixed and extended position.

The patient being placed on a firm bed, and the leg extended, in order to relax the muscles connected with the patella, a firm wooden splint well covered with soft wool, or fine flannel, should be placed beneath the extremity, and reaching from the upper part of the thigh to the end of the leg; to this the limb must be secured by two straps between the ankle and knee, and one or two between the knee and top of the thigh. The different parts of the bone are then to be brought as nearly together as possible by the hand.

In order to prevent the inflammation which probably would succeed to the injury, blood should be drawn from the joint by leeches; and when it actually comes on, saturnine and other astringent applications should be freely employed until it subsides. When this is the case, the bone must be examined: If the parts remain nearly in contact, a large pledgit of Goulard's cerate should be
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laid over them, and a hooped frame should support the bed-clothes above; but if the different parts of the bone are much separated, it will be necessary to replace them, and retain them by bandages, or slips of leather spread with glue or adhesive plaster. When the fracture is longitudinal, this is easily accomplished; but when it is transverse it is a matter of some difficulty.

In cases of the latter kind it will be proper to bring the parts of the bone as nearly into contact as the patient can admit of without pain or uneasiness; but it is not necessary that they be brought to touch, because a very perfect cure has been effected when they could not be brought within an inch of each other. Various methods have been employed to support the parts of the bone in contact; but whatever bandage or machinery is employed to keep them together, should only act on the superior part of the patella, because that alone can resist the reduction.*

The bandages should not be removed until the twelfth or fourteenth day, if pain and inflammation do not render it necessary earlier; and the joint may then, and afterwards every second or third day, be moderately bent, in order to prevent an immobility of it, which would be apt to occur without this precaution.

The rectus muscle is sometimes torn from its insertion into the patella by a fall on the back with the knee bent; a suffi-

* In transverse fractures of the patella, Mr. Sabatier, from much experience, is of opinion that no splints or bandages are at all necessary or useful. He advises the thigh to be moderately bent, and the knee to be in a slight degree of flexion also; and both to be laid upon pillows. Wherever he has employed splints or bandages, or seen them employed, they have been necessarily soon removed, on account of the inflammation and swelling induced by them: It is to obviate these symptoms that he has found the propriety of keeping the knee slightly bent. See *Histoire de Acad. Roy. des Sciences*, pour l'an. 1783.

a sufficiently long continued extension of the limb, together with the general treatment recommended in fractured patella, will remove this complaint.

S E C T. XIV.

Of Fractures of the Bones of the Leg.

WHEN one bone of the leg only is broken, there is sometimes a difficulty in ascertaining the fracture, but when both are broken, which is more commonly the case, it is readily discovered. In the former case, however, as the sound bone generally supports the other in its place, this is of no great consequence; nothing more than confinement, till an union is effected, being necessary.

The leg is most frequently fractured just above the ankle; and particularly when the fibula is the seat of the injury.

In the management of this fracture, the general principles apply which were laid down in the treatment of a fractured thigh. During the reduction, the muscles should be relaxed by bending the knee and slightly extending the foot; and an assistant at the upper end of the limb and one below, will easily extend the leg sufficiently. The limb being laid upon its outside, and the knee slightly bent, the splints, plate XII. fig. 2—7. or those made in the manner of fig. 1. should be applied, and retained by the twelve-tailed bandage: the splint on the outside should always reach from a little above the knee, below the ankle, with a view to prevent the motion of either of these joints, by which the bones are apt to be displaced. If the patient is very restless, or troubled with spasmodic affections of the muscles of the leg, it will be better, as an additional security, to apply a splint of wood of the form, plate XII. fig. 2.

and filled with soft wool, to the outside of the leg, and fasten it by means of a couple of straps. The foot should also be always supported by a strip of linen, connected on each side of the leg to the bandage.

If it is thought proper, instead of lying on his side, the patient may have the leg placed on the frame, plate x. fig. 6. and lie on his back; and this or the side, may be occasionally used in the same patient during the cure, for the sake of ease and variety: No change of posture should however be permitted for the first ten or twelve days. And when the position is altered, the leg should always be kept in the same degree of curvature.

In making the apposition of these bones, our sole object should be to raise the inferior part of the bone; for this is almost always drawn beneath the upper, by the weight of the foot, and the contraction of the muscles on the back part of the leg.

S E C T. XV.

Of Fractures of the Bones of the Foot and Toes.

THE foot is very much exposed to injuries of this kind; they are detected by the signs which denote fractures in general, and require a treatment similar to that of fractured hands. In every case, a large splint should be applied over the sole of the foot; and the foot and ankle should be moved as little as possible during the cure.

S E C T. XVI.

Of Compound Fractures.

COMPOUND fractures are produced by external violence, and frequently by the bones, in cases of simple fractures
being

being pushed through the corresponding integuments. This may happen either from the bone being fractured so obliquely as to terminate in a sharp point, or from the application of a very tight bandage.

Compound fractures are always attended with danger. That the risk in these cases originates chiefly from the admission of air to the bone, is rendered probable from this, that in the worst variety of simple fracture, the patient commonly gets well without the occurrence of any bad symptoms; but if, in the progress of the cure, the end of the bone should by any accident be pushed through the teguments, the pain immediately becomes more violent; the inflammation increases; fever takes place; spasms probably affect the limb; and to these frequently succeed either gangrene, or extensive suppurations.

Our first object in fractures of this kind, is to restrain the hemorrhagy when it is profuse; and our next, to determine whether it will be proper to attempt to save the limb, or to recommend immediate amputation. The former is to be accomplished by the usual means: The latter is a point which has given rise to much dispute. I am clearly of opinion, that in private practice, and in other cases, where the patient can be well attended to in every respect immediately after the accident, and during the whole of the cure, that amputation should never be advised, unless the bones are so much shattered that they cannot reunite, or the texture of the soft parts is completely destroyed: But when proper attention cannot possibly be paid to the patient, as is usually the case in the army and navy, it will be a good general rule to advise the immediate removal of the limb, if the accident affects the bones of the arm, fore-arm, thigh, or leg. This important point will be more particularly considered hereafter in the chapter on Amputation, sect. 1.

Where we attempt to save the limb, all extraneous bodies

dies should be removed, as likewise all portions of bone that are entirely separated, and will not be likely to unite, either by means of the fingers, forceps, cutting pliers, or saw; and if this cannot be easily done without, the wound should be enlarged by the scalpel. But it is to be observed that any piece of separated bone which is broad at the base, and would probably unite if brought into its proper situation, should be replaced.

All the coagulated blood being removed, and any artery that may be cut being secured, the bones should be apposed; the wound should then be covered with a pledgit of lint spread with emollient ointment, and the limb should be laid on a firm splint, and in a relaxed posture.

That we may have free access to the injured part without moving it, the many-tailed bandage should always be preferred to a roller;* and the limb should be fixed on a fracture box; (pl. x. fig. 6.) it may be either bent or straight, as seems most proper.

In order to guard against inflammation, to the violence of which may always be traced the gangrene or abscesses which sometimes supervene, it will be proper, to use general bleeding; to apply leeches to the edges of the fore, when the inflammation becomes considerable; and to employ opiates, saline laxatives, and a low cool regimen. The dressings should be removed once or twice a-day, according to the quantity of matter produced; and pledgits of lint spread with cerate should be applied to the wound.

When inflammation comes on, it will be proper to apply warm emollient poultices frequently, in order to excite a plentiful

* In order to preserve the bandage clean, and thus prevent a necessity for a frequent removal of it, the late Dr. Jones, of this city, always applied a piece of fine oil cloth next to the limb. In all cases of fracture, instead of placing the splints beneath the bandage, many practitioners apply the bandage first, and fix the splints above these, either by means of straps, or pieces of tape. See Jones on Wounds and Fractures.

plentiful suppuration, as this is the best preventative of gangrene; but as soon as the inflammation has subsided, they should be omitted.

When the discharge of matter becomes very great, the fore should be dressed with gentle astringents, such as lint dipped in a solution of sacchar. saturni; and the patient should be supported by a nourishing diet, a free use of wine, Peruvian bark, and elixir of vitriol. If the matter cannot be freely discharged by a proper position of the limb, or cannot be sufficiently absorbed by lint or sponge applied to the fore, a counter opening must be made to give it vent. This excessive discharge will sometimes be occasioned by loose pieces of bone: These should therefore be searched for, by the finger if possible, if not, by the probe, and extracted.

If the inflammation should terminate in gangrene, the treatment formerly recommended, or hereafter to be advised, is to be employed. See section on Gangrene, and chapter on Amputation.

Various machines have been recommended by different authors, for forcibly retaining fractured limbs in their proper situations, but they are in general unnecessary. In particular circumstances, that mentioned in section xi. of this chapter, may be useful for keeping the fractured bones extended; and considerable advantage may be derived from it in keeping the bones steady, when it is necessary to remove the patient from one place to another; but in common practice I have never derived any advantage from any instrument used for this purpose.

C H A P. XLIII.

Of Luxations.

S E C T. I.

General Remarks on Luxations.

A BONE is said to be luxated when that part of it forming a joint is displaced. If the end of the bone is forced entirely out of the cavity in which it is lodged, the dislocation is said to be complete; but where any part of the bone rests upon the edge of the socket, incomplete.

Luxations may be either simple, i. e. unaccompanied by any other affection; compound, when accompanied by a wound, laying open the cavity of a joint; or complicated, when joined with a fracture.

Luxations are usually produced by external violence, applied either in leaping or falling, by blows, and violent twists and distractions of the different bones of a part; but they are also produced by a morbid weakness or relaxation of the muscles and ligaments of a joint, from palsy or rheumatism; and by the pressure of matter collected in a joint, and of sarcomatous tumors and exostoses. Those produced by external violence are chiefly the objects of surgery.

The general symptoms of such dislocations are, inability to move the limb; pain, tension, and deformity of the part injured; and in some cases, inflammation, subsultus tendinum, and fever. In general, the motion of the limb

is impaired in proportion to the extent of the luxation; but in some cases, particularly in the larger joints, the most partial affection renders the joint stiff, and immoveable, and gives the most exquisite pain on every attempt to move it. The deformity must always be proportioned to the extent of the injury; but the inflammation and subsultus are oftener excited to a greater degree by a partial than by a complete dislocation.

The swelling that first takes place in cases of dislocation is always inflammatory, and necessarily consequent to the violence done the parts; and should be carefully distinguished from a secondary swelling, that, in some cases, spreads over all the inferior part of a limb, which is pale and œdematous, and seems to originate from a compression of the lymphatics. This is most commonly an attendant of dislocations of the humerus and thigh: In these a numbness, from compression of the nerves, is also very apt to occur.

There is seldom any difficulty in distinguishing complete dislocations; but it is not always easy to discriminate between contusions or sprains, and subluxations, or incomplete dislocations.

In forming a prognosis in dislocations, we are to consider, the form and structure of the joints; the nature and extent of the affection, together with the degree of violence by which it was produced, and the circumstances with which it may be complicated; and the duration of the injury.

It is chiefly in joints which admit of much motion that dislocations are met with, viz. where the articulations are by ball and socket, and by ginglymus.

It has been supposed that the capsular ligament is always ruptured in luxations: I am, however, of opinion that partial dislocations may happen without any rupture of the ligament; but I believe this is always torn in complete luxations, and sometimes almost entirely from its insertion. Where the disease proceeds from the gradual formation

of a tumor within the joint, and where the ligament is perhaps much relaxed from any cause, no rupture may take place; but when the luxation is produced by external violence, it cannot be supposed that the bone can be forced several inches from its natural situation without lacerating the capsular ligament.

The pain which more particularly attends partial dislocations, probably proceeds from the stretching of the ligament, by the pressure of the displaced bone.

In forming a prognosis in luxation, the distance to which the head of the bone is forced, and the degree of violence producing the affection, are to be particularly attended to. A partial dislocation will be more easily and certainly reduced than where the displacement is complete—And where the violence has not been very considerable, the inflammation, and other symptoms, will not be in great degree, and vice versa.

The complication of fracture with luxation is very unfavourable. When the luxated bone only is broken, and particularly if the fracture is near its neck, it is difficult to reduce it; but when the receiving bone is broken, not only a great degree of inflammation, and its consequences, are apt to follow, but if the injury extends to the socket, there is always a considerable risk of a stiff joint succeeding.

The difficulty of reducing a dislocation is, *cæteris paribus*, proportioned to the duration of the displacement. For in a little time, the head of the bone will form a socket for itself among the muscles, and be firmly grasped by them, and the natural socket will at length be more or less filled by the contiguous soft parts, and perhaps have part of its brim worn off by the action of the muscular fibres passing over it. It does not appear from dissection, that an inspissation of the synovia, which has been said often to take place, ever occurs in these cases.

It is also to be observed, that the patient's age and health
influence

influence the reduction of a bone. Thus, in advanced life, and in delicate constitutions, it is accomplished with much more ease than in the vigour of youth, and in robust habits of body, where the superior strength of the muscles has a considerable influence in counteracting it.

The indications in dislocations are; to reduce the displaced bone into its natural situation, with as much ease and expedition as possible; to retain it in this situation until the injured parts have recovered their tone; and to obviate pain, inflammation, and other symptoms that supervene.

If the soft parts are much contused and inflamed, we should not attempt the reduction, until, by the application of leeches, and of saturnine preparations, by a low regimen, and putting the limb in a relaxed posture, these effects of the injury have subsided. But where the contiguous parts have not suffered in this manner, the sooner we attempt to put the bone into its proper situation the better.

In almost every case of luxation, it is the bone forming the lower part of the joint only that is displaced; hence the only attention we have to give to the upper part, is to keep it firm and steady, while we endeavour to replace the under part of it. In effecting the latter, our chief obstacle consists in the action of the muscles connected with the joint; these not only resist our attempts for reduction, by keeping the bone in the place to which it is pushed, but often draw it out of its natural direction, and fix it firmly in some adjacent cavity; and the trials we make are very apt to stimulate the muscles to stronger action, and thus increase the difficulty of the reduction. Hence the necessity of putting all these muscles as much as possible into a state of relaxation, in order to remove a luxation.

When this is done, we may commonly succeed by the aid of assistants alone; but in some cases, such force is requisite that we are obliged to have recourse to machinery. It should however be very particularly observed, that no more

force ought to be employed, in any case, than is just sufficient to bring the end of the dislodged bone on a line with the end of that to which it is to be apposed; that this force be applied only to the bone displaced; and that it be applied in a very gradual manner, and in such a direction as appears best adapted to that in which the dislocation was made. As soon as the ends of the bones are brought on a line, the ordinary action of the muscles will commonly bring them into their natural situation; but if this is insufficient, a gentle pressure must be employed for the purpose.

There is seldom any difficulty in retaining the bone in its proper situation, after reduction, unless it has been frequently displaced; the surest method is, to put the limb into a relaxed posture, and support the bone with a bandage, until the surrounding soft parts have recovered their tone.

The symptoms that require the greatest attention, both before and after reduction, are, pain, inflammation, and swelling. These commonly abate after the replacement: but while any degree of inflammation continues, it should be carefully attended to, as being the most common source of the other symptoms, as well as of the chronic pains which frequently succeed. See chapter on Contusions.

When luxations are complicated with fractures of the displaced bones, if the fracture is at some distance from the luxated part, it will be no impediment to the reduction; the fracture may then be treated in the usual way; but when it is so near the end of a bone that this cannot be taken hold of, it renders the case difficult and uncertain. In the smaller joints, as those of the fingers and toes, the reduction may sometimes be made; but in the larger, as the hip-joint, and that of the shoulder, we must allow the fracture to be cured before we remove the luxation.

In compound luxations, where there is a wound of the
joint,

joint, the treatment recommended in compound fractures will be applicable after the replacement of the bone, our object being to obviate inflammation, and its consequences.

What we have hitherto said, relates in general to luxations produced by external violence; when they are the consequence of tumors or collections of matter, they are almost always incurable. If the diseased parts can be taken off, it should always be advised; but when this cannot be done, all that art should attempt is, to give as free a discharge as possible to any matter that may form, and to support the body by a proper diet.

When dislocations proceed from a relaxation of the ligaments and tendons which connect the bones, a perfect cure is seldom obtained; all that can be done is to support the limb with a bandage, and to brace the relaxed parts by cold bathing, electricity, and other tonics.

S E C T. II.

Of Luxations of the Bones of the Cranium.

THE bones of the cranium are frequently separated at the futures, in cases of hydrocephalus: If the collection is removed, all that we can do is to support the parts by a bandage.

Openings are also produced by external violence, particularly by falls from great heights. Such accidents are almost always fatal. The only assistance surgery can afford is to support the parts by gentle pressure with a bandage; to direct blood letting, and other remedies, according to the violence of the symptoms; and to keep the patient quiet, and in a proper posture during the cure.

S E C T. III.

Of Luxations of the Bones of the Nose.

THESE accidents seldom occur; but they are always easily known. In reducing them, the patient's head should be supported by an assistant, while the surgeon reduces the bones with the fingers; or more readily, when the luxation is inwards, by introducing a small tube into the nostril. The bone may then be retained by keeping the tube in the passage by means of tapes passed round the head. If the luxation is outwards, it will be necessary to employ a double-headed roller for the retention.

S E C T. IV.

Of Luxations of the Lower Jaw.

A LUXATION of the lower jaw can happen in no other direction than forward and downward: And it is commonly the effect of yawning, by which the condyles are thrown over the anterior boundaries of the cavities with which they are articulated.

This dislocation is discovered, by the chin being thrown forward and downward, while the mouth remains open; and by pain on attempting to shut the mouth. The patient can neither speak distinctly, nor swallow but with much difficulty. If only one side of the jaw is luxated, as sometimes happens, instead of falling directly down, the bone is pushed downwards, and towards the side unaffected. Convulsions, and even death, are, by the ancients, mentioned as consequences of this accident, but I have never seen them occur; and they can only happen, probably, from mismanagement.

With

With proper attention we can seldom fail in reducing this luxation. The patient being seated on a low chair, with his head supported, and the surgeon standing before, with his thumbs properly guarded, should push them as far as possible between the teeth, the lower part being applied to those of the under jaw; the palm of each hand is to be fixed on the outside, while with his fingers he lays a firm hold of the angles of each jaw. The jaw should now be pulled forward until it moves from its situation, and then pressed forcibly down by the thumbs, and moderately backwards by the palms of the hands. The jaw will now commonly slip into its proper situation, and then the thumb should be instantly withdrawn. If but one condyle is thrown out, the only difference of treatment necessary is, that the force used for depressing the jaw, should be chiefly applied to the side dislocated.

The thumbs are very apt to be bitten if they are not well protected, or if they be not instantly withdrawn on the bone's slipping into its place. The end of a handkerchief is usually wrapped round them; but fine leather answers much better; and iron covered with leather would be still preferable.

After the luxation is reduced, as the condyles are very apt to slip out again, for some time, the patient should be very careful to avoid gaping, or any other cause which might have a tendency to produce that effect.

S E C T. V.

Of Luxations of the Head.

THESE luxations are produced by the head being forced with such violence forward, as to stretch or rupture the ligaments by which the tooth-like process of the second
vertebra

vertebra is connected to the occiput: And this commonly happens from falls from great heights, or from horseback.

When the head is luxated, it always falls forward on the breast; the patient is deprived of sensibility instantaneously, and lies as if dead; and soon dies, unless the luxation is speedily reduced.

Dislocations of the head commonly terminate fatally; but as recoveries have sometimes happened from them, there is reason to suppose, that death is frequently the consequence of the want of timely assistance. An attempt for the reduction should always be made, if possible, instantaneously after the accident.

The patient being seated upon the ground, and supported by an assistant, the surgeon standing behind, should raise the head from the breast; and the assistant being desired to press down the shoulders, the head should be gradually pulled straight up till the dislocation is reduced; and if this is not accomplished by moderate extension, the head may be gently moved from side to side. A sudden crack is heard on the reduction taking place; and if the patient be not dead, it is immediately ascertained by a partial, and in some cases, by an entire recovery of all his faculties. These, however, in some instances, always remain impaired.

The patient should be laid in bed immediately after the reduction; the head should be kept raised, and for a considerable time in one posture, by means of a proper bandage; venæsection and laxatives should be employed; and a low regimen advised.

S E C T. VI.

Of Luxations of the Spine, Os Sacrum, and Os Coccygis.

A COMPLETE luxation of any of the vertebræ probably never happens without a concomitant fracture; and is, perhaps, always immediately fatal, from the effects it must necessarily produce on the spinal marrow, and the contents of the thorax or abdomen: It can, therefore, never be an object of surgery.

Partial dislocations may however occur, and the patient may live a long time afterwards; but he will probably seldom entirely recover. These are usually the consequence, of falls from great heights, of violent blows, or of heavy weights passing over the body.

They are distinguished by distortion of the part; by the touch; and by the symptoms they usually induce, such as palsy of the parts below the injury, and either a total suppression of urine, or an involuntary discharge of urine and fæces.

The vertebræ are, in common, luxated either directly forward, or to one side; and hence it is very difficult to accomplish their reduction. The most certain method perhaps, is to bend the body slowly forward, as far as possible, over a cask, or any other cylindrical large substance, and if the luxation is to one side, towards the side affected: No machinery by which much force is employed should ever be used. Whatever means is made use of, however, will be seldom successful when the bone is much displaced.

When any part of the sacrum is dislocated, all that can be done is, to replace it as well as possible by external pressure, and by bending the body forward in the manner we have mentioned.

The coccyx is more frequently luxated than any of these bones, from being more exposed to injuries. It may be thrown either forward or backward. It is apt to be forced outwards in laborious births; and sometimes from large collections of hardened fæces in the rectum.

This injury is known, by pain all over the loins, particularly about the junction of the coccyx with the sacrum, and from actual examination with the fingers.

In luxations inwardly, from falls or blows, the patient complains of pain, and a sensation of some hard body compressing the under part of the rectum; tenesmus comes on, and difficulty in passing the fæces; and, in some instances, a suppression of urine takes place. These luxations are readily detected, by introducing the finger into the anus; and by passing it as far as possible up the rectum, and supporting the external parts with the other hand, they may be easily reduced.

Outward luxations of the coccyx are in common reduced, without much difficulty, merely by external pressure with the fingers; but it is often difficult to retain the bone in its place. This is most effectually done by a compress, and the T bandage.

As dislocations of any of these bones, and particularly those of the coccyx, are very apt to produce inflammation, which often terminates in abscesses difficult to heal, we should employ general and topical bleeding, and laxatives, and direct an easy posture for the patient, and a low regimen, in order, if possible, to prevent it.

S E C T. VII.

Of Luxations of the Clavicles.

LUXATIONS of the clavicles do not happen so frequently as fractures of them and generally take place at the ends next to the sternum. They are easily discovered; and are commonly attended with a considerable degree of stiffness and immobility in the corresponding shoulder.

A dislocation of the clavicle is readily reduced by moderate pressure with the fingers, especially if the arms and shoulders be at the same time drawn back; but it is difficult afterwards to retain the bone in its place. This is usually attempted by bandages; and particularly by a long roller, applied so as to form the figure of eight upon the shoulders and breast; but this, if applied with sufficient tightness to keep the bone in its place, will always impede respiration. The machine represented, (pl. xii. fig. 6.) answers the purpose better than any thing else I have seen; for at the same time that it keeps the shoulders back, and raises the head, the straps which pass over the upper part of the breast act with sufficient force to keep the bone in its situation. The fore-arm should also be moderately supported, to prevent the shoulders from being too much drawn back.

S E C T. VIII.

Of Luxations of the Ribs.

IT has been generally supposed that the ribs cannot be dislocated; but it has been proved by dissections that they are sometimes luxated inwards.

A luxated rib will produce nearly the same symptoms that occur from a fracture; but it may be distinguished, by the pain being most severe at the articulation, and by no part of the bone yielding to pressure except this spot.

In general, a luxated rib will probably return to its natural situation from its own elasticity, when the cause of the injury is removed; but if it does not, the best method of reducing it will be, to bend the body forward over a cask, or some other cylindrical substance, while the vertebræ immediately above and below the rib are pressed inwards with as much force as can with safety be applied to them. After this, a thick compress of linen should be laid over the vertebræ mentioned, and another along the most prominent part of the dislocated rib, and the two immediately contiguous; and a broad roller should then be passed over them, and two or three times around the body, in order to retain the replaced rib and the vertebræ in their situations: And to prevent the roller from moving, a scapular bandage, a strap connected with it behind, carried between the thighs and fixed to it before, should be employed.

For the prevention of inflammation, and other disagreeable effects, which are very apt to ensue from this luxation, bleeding, a low and cooling regimen, and opiates are the best remedies.

S E C T. IX.

Of Dislocations of the Humerus at the Shoulder.

FROM the construction of the joint at the shoulder, dislocations oftener happen there than in all the other joints of the body together. The os humeri is most frequently luxated downwards, from its meeting with least resistance
in

in that direction. It is sometimes pushed downwards and forwards, beneath the pectoral muscle, and between the coracoid process of the scapula, and the middle of the clavicle and lodged on the ribs. In a few cases, it is dislocated downwards and backwards; but it can never be thrown upwards without being accompanied by a fracture of the acromion, of the coracoid process, or of both. But although the direction the bone takes depends in some measure on the resistance it meets with, it also is influenced by the part which is the immediate seat of the injury.

A dislocation of the humerus is evidenced, by inability to move the arm; by severe pain being excited on attempting to bring it near the side; by its being shorter or longer than the other arm; by feeling the head of the bone; and by discovering a vacancy beneath the acromion. In order to ascertain these circumstances, the sound arm should be compared with the other.

In long continued cases, the whole arm is apt to become œdematous, and somewhat insensible from the pressure of the bone on the lymphatics and nerves.

In simple and recent luxations of the humerus, we may in almost every instance accomplish a reduction, without much difficulty; but in long continued cases, all our attempts are frequently rendered abortive, either from the head of the bone having formed a socket among, and becoming firmly connected to, the contiguous parts, or from a diminution of the cavity of the natural socket. In such cases, therefore, no great degree of force should be much persisted in to accomplish a reduction; for besides giving a great deal of pain, it is apt to render the motion of the head of the bone in the artificial socket more stiff than it was before.

It is generally said, that a reduction is more easily effected when the bone is in the axilla, than when it is pushed forward beneath the pectoral muscle; and more easily when

when in this situation, than if it is lodged backward beneath the spine of the scapula. The latter appears to be the case; but in the others, I have found no difference.

I have often reduced a dislocated humerus by pressing back the scapula with one hand, while I extended the arm gently with the other, bending the elbow moderately, and raising the arm nearly to a right angle with the body in such a direction as to prevent either the pectoral or extensor muscles of the arm from being stretched. A greater degree of force than can thus be applied is, however, sometimes necessary. The following is the method by which I have always succeeded in recent cases: The patient is seated on a chair, and his body secured by a long broad belt passed round it, and given to assistants, or tied round a post; a firm band of leather, four or five inches broad, and lined with flannel, as represented in pl. xi. fig. 4. is now to be tied round the arm immediately above the elbow. The three straps or cords connected with this band being given to assistants, they must be desired to extend the arm in the relaxed position we have mentioned, and in a slow, equable manner, while another assistant standing behind is employed in pressing the scapula backwards. The surgeon himself stands most conveniently on the outside of the arm: he is to direct the degree of force to be employed, and to point out the direction in which the arm is to be extended; he may also support the fore-arm, and retain it bent at the elbow, as already mentioned. As soon as the head of the bone is drawn past the brim of the socket, the extending force should be lessened, and the reduction will then in common be accomplished by the action of the muscles of the joint; or it may be effected by moving the arm gently in different directions. A crack is usually heard on the bone slipping in; immediate relief is afforded; and the shoulder resumes its prominence.

The arm must always be extended in that direction which gives the least resistance: when the head of the bone is pushed forward beneath the pectoral muscle, or thrown backward, the arm should be raised to a right angle with the body; but in the most frequent kind of luxation in this part, where the bone is fixed in the arm-pit, the arm should be drawn somewhat obliquely downward. It is to be observed, however, that we should always vary the direction of the extension as soon as ever we meet with any considerable resistance.

The mode of treatment I have just recommended will succeed generally, even in cases of long standing, where a reduction is practicable; but when a greater force is required than can be applied in this manner, the instrument, represented plate iii. fig. 1. invented by Mr. Freke, answers the purpose with more ease and safety than any other I have seen employed. By this machine we can make a gradual extension in any direction. For the mode of applying it, see the plate and explanation.

A great variety of methods, all however much more objectionable than the one we have advised, have been practised in the reduction of a dislocated humerus. 1. The arm being forcibly extended by laying hold of the forearm, the heel of the surgeon is by some directed to be applied to the head of the bone in order to push it up; and sometimes a ball, or some other round substance, is placed between the heel and bone. By this method the elbow and forearm may be unnecessarily injured; the muscles which may, and ought to be relaxed, are kept extended; and the head of the humerus must be often forced up against the neck of the scapula, or other contiguous parts, and thus tend effectually to counteract the extension. 2. Others attempt to reduce the bone, by applying a rolling-pin covered with cloth or flannel, to the head of the bone while an extension is made. This is liable to a
material

material objection just mentioned. And neither this mode nor the first can be applicable when the bone is luxated backward or forward, because they can at any rate only act in raising the bones. 3. It has been a practice with some to have a towel or girth passed round the os humeri near its head, and over the head of the surgeon, in order to raise the bone while the extension is made. This is objectionable for the third reason mentioned in describing the first mode.

In order to increase the powers of extension, when these methods have been fruitless; 4. The ambe of Hippocrates has been used; but this is liable in a very great degree to the objection to the 3d method. 5. The patient has been suddenly suspended, by the dislocated arm, from a ladder or high door. We are told this has often succeeded. 6. The patient has been suspended by two or three men standing on a table; and the bone thus reduced in some instances. 7. The patient has been raised by the arm by means of pulleys fixed in the ceiling of a room. This has also succeeded in cases where other means have failed.

All these modes are, however, liable to great objections; the extension is made in so forcible, sudden, and irregular a manner, that more mischief is often done to the soft parts, although defended by flannel or leather, than can be compensated by the reduction of the bone; and as the arm must always be extended in the same direction, it must obviously in some cases give a great chance of fracturing a rib, the scapula, or the humerus itself.

8. A machine has been invented for conjoining the power of the ambe with the mode just described; this must necessarily be more dangerous than either of those methods separately. And, 9. Ropes and pulleys have been employed to dislodge the displaced bone; by which

as much force as ever can be necessary may be readily applied.

Swelling, inflammation, and pain, when concomitants of luxation, are to be removed by the usual remedies, but chiefly by the application of leeches.

The round head of the biceps cubiti which passes through the shoulder-joint, is apt to be separated from the humerus, and induces pain, stiffness, and unwieldiness of the arm. The most certain method of reducing it is, to move the arm in a variety of directions from time to time; and we know that it is replaced, by an instantaneous removal of the distress.

In order to prevent the humerus from falling out of its place after reduction, the best method is to support it by the sling represented plate XII. fig. 3. until the parts recover their tone: Blisters and the cold bath, have also been useful to restore this.

S E C T. X.

Of Luxations of the Fore-arm at the Joint of the Elbow.

THESE luxations occur more frequently upwards and backwards than in any other direction; they can hardly be produced forward or laterally, without an accompanying fracture of the upper part of the ulna.

Luxations of the fore-arm are readily distinguished, unless the soft parts have become swelled and inflamed. When the luxation is backward, the olecranon is felt on the back part of the arm, and the condyles of the humerus are pushed forward. When the olecranon is broke, and the ulna and radius thrown forward, they are also apt to be drawn upward on the anterior part of the humerus, and the condyles of that bone are discovered behind. A
complete

complete lateral luxation can never occur unless the soft parts are much lacerated. In whatever way the displacement is made, the joint becomes immediately immoveable.

In the reduction of these dislocations, the patient should be seated, and the arm firmly secured by an assistant: When the bones are luxated backward, the fore-arm should be moderately bent, in order to relax the flexor muscles; it should then be gradually extended, and if while this is done, the curvature of the elbow is proportionably increased, we will seldom fail in the reduction. Where the olecranon is broken, and the ends of the ulna and radius pushed forward and drawn up upon the humerus, we must extend the arm while in a straight position; and the extension must be continued until the ends of both bones are pulled somewhat lower than the most depending part of the humerus, when they will soon regain their situation by the action of the muscles, or be easily forced into it.

In lateral dislocations of these bones, the extension must also be continued till they have passed the end of the humerus, and then they may be pushed laterally into their places. In every variety, the extension should be made by assistants grasping the arm just above the wrist; and while this is done, the surgeon should press down the heads of the bones.

After the reduction, the elbow should be kept moderately bent, and the arm as much as possible at rest, until the parts have recovered their tone.

Instances have occurred of the separation of the bones of the arm from each other at both their points of connection; but this has happened more frequently at the wrist than at the elbow. It is known by the motion of the joint being impaired, and the other usual symptoms of dislocation.

In general, the luxated bone is easily reduced, but it is difficult to retain it in its place. The best method of effecting this

is.

is by means of splints, extending from the elbow to the ends of the fingers, and secured by a roller, and by afterwards putting the arm in the sling, represented plate XII. fig. 3.

S E C T. XI.

Of Luxations of the Bones of the Wrist.

THESE bones are most readily dislocated outwardly; and may be displaced either separately or several of them together, and either at their connection with the arm, with the metacarpus, or with each other.

The injury is generally ascertained without difficulty; but in some cases of incomplete dislocation of a single bone, if the parts are not examined with a great deal of attention, the symptoms are very apt to be attributed to a sprain, and the consequence will be a lameness of the limb for life.

We are generally advised to push these bones into their places while the wrist is laid flat upon a table; but it will be better to have it supported by assistants, as we can then have access to both sides of it. They are to be retained by splints and bandages, in the manner advised in the last section; and topical bleeding should be freely used in order to prevent the inflammation which is so apt to come on.

S E C T. XII.

Of Luxations of the Bones of the Metacarpus and Fingers.

DISLOCATIONS of the metacarpal bones, and of those of the fingers, do not so often occur as might be expected; probably from the articulations being so easily moveable that they readily yield to any force applied to them. They are detected without any difficulty in every instance.

When the metacarpal bones are dislocated at the wrist, the best method of replacing them is, to keep the arm fixed, and to push them downward, while the hand is left loose. When the first phalanx of any of the fingers is dislocated at the metacarpus, it is to be reduced by one assistant fixing the hand, while another draws down the dislocated finger by grasping the first phalanx. Dislocations of the other joints of the fingers and thumb are to be managed in a similar manner.

In the reduction of these dislocations it should be observed that the bone should never be pulled down until it be somewhat raised from the bone contiguous; on account of the end of it being larger than the middle, which circumstance might otherwise entirely frustrate the reduction.

S E C T. XIII.

Of Luxations of the Femur at the Hip-Joint.

It has been doubted whether a luxation of the femur at the hip-joint has ever taken place: But I have seen instances in which its existence has been proved by the patient's being instantaneously relieved by the efforts of the surgeon.

The os femoris, it is said, may be luxated either upward
and

and backward, upward and forward, downward and backward, downward and forward, or directly downward. The first and third of these have very seldom been met with; and the most common variety, and the only one I have seen, is that in which the bone is thrown downward and forward, and lodged in the foramen ovale. The reason why this is most frequently met with is, that there is a vacancy in the os innominatum forming the socket on the interior part, which is covered only by a ligament.

When the luxation is upward and backward, the leg will be considerably shorter than the other; the great trochanter will be higher; the knee and foot will be turned inward, and it will give a good deal of pain to attempt to alter their direction.

If the femur is thrown upward and forward, the leg will be shortened; the head of the bone will be felt resting upon the os pubis in the groin; the great trochanter will be on the upper and anterior part of the thigh, and a vacancy will be found in its proper situation; the knee and toes will be turned outwards; and if the dislocation be not soon reduced, pain and inflammation will probably affect the spermatic cord and testis.

If ever the luxation be downward and backwards, the leg will be considerably lengthened; the knee and toes will be turned inwards; and the great trochanter will be lower than it ought to be. When the head of the bone passes directly downwards, the leg will be longer and the trochanter lower, but the knees and toes will retain their natural situation.

In the most frequent species of luxation, the leg appears considerably longer than the other; the knees and toes turn outwards, and cannot be moved inward or outward without pain; all the muscles of the internal part of the thigh are tense and painful; the femur cannot be felt on the outside farther off than the middle of the thigh; a
vacancy

vacancy is felt in the usual place of the great trochanter, which is found farther down and on the anterior part of the thigh, while the head of the bone is felt a little below the groin.

Recent luxations of the os femoris may with proper management be almost always reduced ; but for the reasons mentioned when treating of dislocations in general, those of long duration often baffle all our efforts.

In reducing this luxation, the extension must vary in its direction according to the variety of the affection ; and the head of the bone should always be completely raised above any projecting part of the contiguous bones before any other attempt is made to reduce it : As this will remove the principal impediment to the reduction, if the muscles of the limb be at the same time relaxed, the bone will easily be drawn into the socket, when the dislocation is upward, or pushed into it, when downward.

In the most common luxation of the thigh, where the head of the bone is pushed downward and forward, I have succeeded in the following manner : The patient being laid upon his back across a bed, and firmly secured by an assistant or two, a broad strap, or table-cloth properly folded, is passed between his thighs and over the groin, on the sound side, and given to two other assistants ; a similar strap is passed around the luxated thigh as near as possible to its head, the ends of which must be given to an assistant standing on the opposite side. The belt, plate xi. fig. 4. being previously fixed upon the under part of the thigh, the straps connected with it are given to an assistant or two, while the knee is supported by another assistant with the leg moderately bent. The extension should then be made by the assistants who have the charge of the straps connected to the belt ; but it ought not to be carried farther than is considered necessary for drawing the head of the bone down to the under part of the foramen ovale, which
may

may be effected by a moderate force. The strap round the upper part of the thigh must be firmly pulled, and the thigh drawn upward and inward, the assistants standing somewhat higher than the patient, until the bone has probably cleared the foramen ovale. At this time, the knee should be moved somewhat inward, and the thigh be pushed upward and obliquely outward, by the assistant keeping one hand on the knee, while he holds the foot with the other, keeping the leg moderately bent.

The surgeon may judge that the head of the bone is sufficiently raised when it appears to be about an inch higher than when the force was first applied. If it yields with difficulty, we may suppose that some part of it has become fixed in the upper part of the foramen; in which case the force in the direction recommended must be discontinued, and the assistants at the knee being directed to increase the extension downward, it will afterwards be more easily raised.

When this method fails, and it is judged necessary to employ greater force than can be thus applied, we may have recourse to Mr. Freke's machine, plate III. fig. 1. or to ropes and pullies. But it is to be observed, that no assistance of this kind can be necessary when the dislocation is downward.

The violent distention of the muscles and laceration of the ligaments of the joint with which this affection must be necessarily attended, render a great deal of attention necessary for a long time after the reduction. Bloodletting, topically, should be freely used according to circumstances, and rest should be enjoined until the parts have recovered their tone.

I do not believe that a subluxation of this joint, as mentioned by some, can possibly take place, on account of the roundness of the head of the thigh-bone, and the narrowness of the brim of its socket.

S E C T. XIV.

Of Luxations of the Patella.

THE patella may be luxated partially or completely, upward, downward, inward, or outward; and either by itself, or with the bones of the leg. It cannot, however, be completely luxated in any direction without a rupture of the ligament which connects it to the tibia, or of the tendon of the rectus femoris, which is inserted into the upper part of it, or of both; and it will be most easily dislocated internally.

Luxations of the rotula are easily discovered, unless the parts have become swelled and inflamed; in every case they produce lameness, and pain, on motion of the knee-joint.

During the reduction of this bone, the patient should be placed on a bed or table, and his leg should be kept extended by an assistant. The surgeon should raise the bone somewhat, by pressing down the outward edge of it, previous to an attempt to push it into its place, in order to avoid the condyles of the femur or the tibia. When the luxation is complicated with a displacement of the bones of the leg, these must be replaced before the patella can be reduced.

S E C T. XV.

Of Luxations of the Leg at the Knee-joint.

THE bones of the thigh and leg are so firmly connected, that they are less frequently separated than those forming any other joint of the body: They cannot be completely

pletely luxated, unless the teguments, tendons, and ligaments which tie them together be ruptured. When however a luxation happens, it may be produced nearly with equal ease on either side; but it may occur more readily backward than forward.

There is no difficulty in distinguishing a luxation of the knee. It is to be reduced by fixing the thigh firmly, and extending the leg in as relaxed a position as possible, until the ends of the bones are entirely clear of each other, and then pushing them together.

As inflammation is more particularly apt to supervene to this luxation, the patient should observe a strict antiphlogistic course; local bleeding should be freely used, and repeated according to circumstances; and the limb should be kept a considerable time at perfect rest.

A separation of the fibula from the tibia, at one or both ends, is very apt to be mistaken for a sprain; but an attentive examination will secure us from this. It should be replaced as soon as possible, and retained by a bandage until the parts recover their tone.

S E C T. XVI.

Of Luxations of the Foot at the Ankle-Joint.

THE astragalus may be luxated either backward or forward, or outward or inward, but it is more frequently pushed inward than in any other direction. It cannot be luxated outwardly without breaking the end of the fibula. Dislocations of this joint are in general easily discovered by the pain and lameness they produce, as well as by the obvious alteration which they occasion in the appearance of the foot. They are to be thus reduced: The patient being placed either on a table or a bed, and the leg with the
knee

knee bent, firmly secured by an assistant or two; the foot is then to be extended in a relaxed posture, until the most prominent part of the astragalus has passed the end of the tibia, when it will either slip into its place, or may be easily forced into it.

Besides the usual antiphlogistic course which we have recommended in luxations of all the larger joints, it is particularly necessary here to keep the limb for a considerable time perfectly at rest, especially when the fibula is broken; because if the bone be not retained exactly in its situation till a cure is effected, this important joint may be kept weak during life, or be rendered stiff and very painful. Any weakness remaining after injuries of this kind, is most effectually obviated by a firm thin iron plate applied along the outside of the leg, and connected with the shoe. Mr. Gooch has invented a machine for this purpose.

S E C T. XVII.

Of Luxations of the Os Calcis, and other Bones of the Foot.

THE os calcis is sometimes dislocated laterally, by itself; and at other times, together with the astragalus, is displaced at its junction with the os naviculare and cuboides downward, outward, or inward; but hardly if ever upward.

Luxations of these bones are very readily discovered by the pain and lameness which they always occasion, and by the alteration of shape in the foot which they induce.

A dislocation of the os calcis is more difficult to reduce than that of almost any other bone of the foot: This is to be effected by fixing the leg in a relaxed position, and moderately extending the foot, previous to attempting the coaptation of the bones.

The rest of the bones of the tarsus, as well as those of the metatarsus and toes, are to be replaced when dislocated by the same general treatment that was recommended in luxations of the hand.

C H A P. XLIV.

Of Distorted Limbs.

DISTORTIONS of the limbs may originate either from a diseased state of the bones, or from a contracted state of the muscles, or both. They may occur either from an original mal-conformation, or as the consequence of some disease at an early or later period after birth.

In infancy, as the bones are soft, they may be rendered crooked by children being made to walk too early. There are also some diseases which render them preternaturally soft, so that they readily give way to the ordinary action of the muscles, as well as to the weight of the body, and thus lose their natural direction. But the most frequent cause of distorted limbs is that contraction of the flexor muscles, particularly in the knee and elbow, which is often induced by an inflamed state of the joints, from the patient keeping them constantly bent for a considerable length of time.

When the distortion originates from an adhesion of the bones forming a joint, nothing can give relief but amputa-

tion. (See chap. on Amputation). But when the contracted state of the muscles and tendons is the cause of it, which is most frequently the case, we may in almost every instance afford considerable relief: And, where a limb is crooked from the bone being bent, whether it may have happened from improper management during childhood, or from the effects of the rickets, or any other disease, we may very commonly, by timely attention, either remove it entirely, or render it much less considerable.

In distortions from contracted muscles, by the use of emollients and gradual extension, I have relieved, and sometimes cured, patients who had been lame for several years, and whose cases had been deemed hopeless. As emollients, the animal fats and oils are the best; but whatever is used must be employed for a considerable length of time, and in a very ample manner to be beneficial. All the contracted muscles and tendons, from their origins to their insertions, must be well rubbed with the substance made use of at least half an hour three times a-day; and the limb should be kept constantly moist with, or as it were immersed in the emollient, by being covered with flannel well soaked in it. While the frictions are used, the limb should be slowly, though firmly, extended to as great a degree as the patient can easily bear; and an apparatus should afterwards be applied to prevent the muscles from contracting.

Even where the extension is not necessary, as in joints merely stiff without any distortion, emollients are often very useful.

Where the distortion proceeds from the curvature of a bone, if this is not of long duration, and especially when it occurs in childhood, we may very frequently remove it by making a constant pressure, gradually increased, on the convex side of the limb, until the bone is brought into its natural direction. This deformity is most frequently met with in new-born children, and in ricketty patients; and

and commonly affects the legs. If the bones of the leg are bent outward, it causes the foot to be turned inward; and the foot is turned outward when the leg is bent inward: In the latter case, patients are termed Valgi; and in the former, Vari.

The distortion of the feet in these cases, has by many been attributed to a diseased state of the ankle; but whoever will take the trouble of examining the complaint with attention, will be convinced that it is, at least in common, a mere consequence of the affection of the leg; and therefore, that our views in its removal must be chiefly directed to the latter.

The cure of this variety of distortion can only be effected by a proper application of pressure to the leg-bones. This is most easily and effectually given by a firm splint of iron fixed on the concave side of the leg, and extending from the corresponding condyle of the femur to the foot, secured by one or two broad straps passed round both the leg and the splint. If the splint is covered with soft leather, and properly fitted to the parts, it gives no uneasiness; and by drawing the straps tighter from time to time, the pressure will be gradually increased as above directed.

It is sometimes sufficient to fix the ends of the splint in the shoe; but in other cases, it is necessary to connect it with a frame beneath the shoe, and fixed to it, in order to keep the foot in its proper position.

It is obvious that the treatment of distorted limbs must be varied according to the particular nature of the case: this must be left to the judgment of the surgeon.

C H A P. XLV.

Of Distortions of the Spine.

THE spine may be distorted in various directions; outwardly, inwardly, or laterally; and, in some cases, we meet with it in all these directions at the same time, and in the same person.

This disease arises from external violence; but it is more frequently a symptom of a weakly constitution.

Besides the deformity which these distortions produce, they are very apt to injure the health by compressing the viscera of the abdomen and thorax, and by inducing paralytic affections of the lower extremities from the pressure they make upon the nerves. They appear at all ages; but more frequently about puberty than at any other period, and more commonly in girls than in boys. In general, the effects resulting from them are observed before the cause is suspected.

When distortions of the spine occur in infancy, the patient appears to be suddenly deprived of the use of his limbs; but at more advanced periods, he complains for some time of feebleness, and of want of feeling in the lower extremities. By degrees this insensibility increases; and he is often observed to stumble, and drag his legs in walking; nor can he stand erect for any length of time but with much difficulty. At last the legs become entirely paralytic; and when the spine is thrown much forward, so as to compress the abdominal or thoracic viscera, difficulty of breathing, and complaints in the bowels to a considerable

siderable degree, are induced. In some cases, the paralysis takes place in a few days from the first appearance of the disease; and it sometimes becomes gradually less, though, according to my observation, it is never entirely removed.

When the curvature is first discovered, we sometimes find that only one of the vertebræ is displaced; at other times, two or more; and it often happens that where one bone only has been affected in the beginning, that several adjoining are seized in the after progress of the complaint; and, in some cases, there is reason to suppose that the deformity is a consequence of an affection of the vertebral ligaments alone. When one bone only is deranged, the patient is always rendered more completely paralytic than when several are affected, and the disease is more speedily fatal. For in the first case, the patient almost always dies within the course of a year or two, or less; while in the latter, he frequently lives as long as if no such disease had subsisted. The difference of pressure on the spinal marrow necessarily produced, will account for this difference in the appearances of the disease; and likewise for the symptoms becoming in some instances less remarkable in the course of the complaint than they were at first.

As this affection often proceeds from weakly persons indulging too much in particular postures, every habit of this kind should be carefully guarded against on the first appearance of the complaint; and if a particular habit is already contracted, its opposite should be advised. That the body may lie as much as possible upon an equal surface, a hair matras, laid upon boards, should be used instead of a feather bed.

By attention to these circumstances; by the use of an invigorating diet, the cold bath, bark, and other tonics, the disease has, in some cases, been prevented from advancing so far as it probably would have otherwise gone; but where any of the bones have been affected, I have never
seen

seen a complete cure obtained. Mr. Pott speaks highly of the effects of drains placed as near as possible to the tumor. He advises an issue to be made with caustic, on each side of it, large enough to admit of a kidney-bean, and the bottom of the fore to be sprinkled occasionally with powdered cantharides to keep it running.* I have employed this method with advantage when the ligaments were the seat of the complaint; but when it has appeared to prove serviceable where the bones were affected, I am of opinion that the change was rather induced by the pressure upon the spinal marrow being lessened as above explained.

All the advantage that can be derived from the use of machinery in this disease, must be from the support that it can give to the head and shoulders. This indeed is

* It may perhaps not be amiss to give a more particular description of Mr. Pott's method: To form the issue he prefers caustic. He tells us, that the caustic to be applied, should in adults, be large enough to form an oval eschar of about an inch in length, and nearly three quarters of an inch in breadth at the broadest part. One should be so applied on each side of the curvature, that the portion of skin covering the spinal processes of the protruded bones shall be left entire. In a few days, when the sloughs begin to loosen, the middle of them should be cut out, and a large kidney-bean, or some peas, put into each: Upon the entire separation of the eschars, the sores may be filled constantly with peas or beans; and powdered cantharides, or some other stimulant may be now and then applied to them; these will keep them running, and may perhaps produce some other good effects.

The issues should be kept open until the patient has recovered his general health. This period will vary exceedingly; in some, cures have been perfected in two months; in others, in not less than two years, two-thirds of which perhaps has passed without any signs of amendment.

Mr. Pott relates many cases in which there could be no doubt of the bones themselves being diseased, that were perfectly relieved by the method above described. See Pott's Works, VOL. III.

is an object of the first importance; and it can be very well attained by the use of the machine represented in plate XII. fig. 6. If this point is not attended to, the weight of the head will constantly tend to increase the distortion.

C H A P. XLVI.

Of Amputation.

BY the term amputation, we usually understand the removal of a limb.

This operation in itself is not difficult; but it is often very hazardous; and it requires the utmost attention to determine the particular circumstances in which it can with propriety be performed.

S E C T. I.

Of the Causes which may render Amputation necessary.

AMPUTATION may be rendered necessary by the causes enumerated under the following heads.

1. Bad compound fractures.
2. Extensive lacerated and contused wounds.
3. A portion of a limb being carried off by a cannon-ball, or in any other manner, if the bones be unequally broken and not well covered.

4. Ex-

4. Extensive mortifications.
5. White swellings of the joints.
6. Large exostoses, whether they be confined to joints, or spread over the whole bone, or bones of a limb.
7. Cases of extensive caries accompanied with bad ulcers of the contiguous soft parts.
8. Cancer, and some other ulcers of an inveterate nature.
9. Various kinds of tumors.
10. Particular distortions of a limb.

We shall consider each of these cases in the order mentioned.

(1.) In cases of compound fractures which occur in the army and navy, where the patients cannot be duly attended, where they must be much jolted and moved from place to place, if the bones are so much broken that when apposed they do not support each other firmly, and the soft parts are likewise much injured, I am perfectly of opinion, that, in general, immediate amputation should be advised.

In private practice, however, where the patient can from the first be placed in an easy comfortable situation, from which he need not be removed until the cure is completed, where he can have all the advantages of good air, a proper regimen, and good medical assistance, very few cases will occur in which amputation should be recommended. The only cause which, in such circumstances, can render an immediate performance of it proper, is the bones of a limb, together with the soft parts being so shattered and bruised, that there will be no chance of the member being rendered useful by any attempt that might be made to save it.

But it is particularly to be observed, that unless the operation can be had recourse to soon after the accident, it cannot again be admissible for a considerable time; for
whenever

whenever a limb has become swelled and inflamed, it can *in no case*, but with the utmost danger, be taken off until these symptoms subside.

And numerous observations have ascertained the fact, that amputation at this period, i. e. as soon as the inflammatory symptoms have gone off, and before the patient has been too much weakened by the discharge,* succeeds much better than when it is instituted immediately after the accident. In the latter case, death seems to be induced, by the violence of the symptomatic fever, which oftentimes induces fatal hemorrhagies; by the great and sudden change produced in the circulating system; and by the violent agitation of mind excited by the operation, and which seems to be more particularly induced at that time.

Although amputation is seldom necessary in private practice, yet in the subsequent treatment of compound fractures, it is sometimes rendered proper :

1st. By profuse hemorrhagies, which cannot otherwise be stopped; produced by some of the arteries being wounded by the ends of the fractured bones, as well as other causes.

2dly. By extensive mortification. This we shall consider hereafter. And,

3dly. By the ends of fractured bones remaining disunited, attended with the discharge of such large quantities of matter that the patient runs a risk of sinking under it.

In every case, when the last mentioned circumstances occur, and continue, notwithstanding every thing is done which would probably tend to remove them, such as the taking away all loose pieces of bone, the preserving the limb steadily in one posture, regular dressing of the sore

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* The operation seems to succeed better, whatever may induce a necessity for it, when the patient is somewhat weakened.

as often as seems necessary, allowing a nourishing diet, and a plentiful use of bark, nothing will so certainly save the patient as the removal of the limb.

(2.) Wounds not accompanied by fractures of the contiguous bones seldom require amputation: But whenever a limb is lacerated, or contused to such a degree as to have all the large blood-vessels destroyed, there will then be no prospect that the circulation can be preserved in it, immediate amputation should be advised: Mortification is particularly apt to occur in such cases. It also happens, that amputation, although it does not appear necessary at first, will become advisable afterwards, either from hemorrhagies which cannot be stopped, extensive gangrene, or large discharges of matter, as in cases of compound fracture.

(3.) When a portion of a limb has been removed by a cannon-ball, or some other means, and the bones are much broken and perhaps splintered, the muscles and tendons left of unequal lengths, and much lacerated and bruised, as the operation can be performed in the same time that the broken and splintered pieces of bones, and the injured parts of the muscles and tendons can be removed; as it will make a much less sore, which consequently will heal sooner and form a better stump than if the original wound is left, and no amputation employed, I have no doubt of the propriety of an immediate performance of the operation.*

(4.) In all cases of mortification by which the whole or a very great portion of the soft parts of the limb are destroyed, amputation is the only resource. But it should never be employed until the gangrene has fairly stopped its progress; and then I am of opinion we should perform it

* Here the surgeon's judgment and experience can alone determine the degree of injury which renders amputation necessary.

it as soon as possible, and without waiting, as advised by some, for the separation of the diseased parts.

(5.) White swellings of the joints are only to be removed, in some cases, by amputation. The particular circumstances in which this is advisable are described chap. III. The cause of the success of the operation in long continued instances of Hydarthrus, is probably similar to that above assigned in some cases of compound fractures.

(6.) Certain cases of exostosis, in which the tumor is productive of much inconvenience and injury to the patient, and which cannot be otherwise removed, require amputation. See chap. XLI. sect. iii.

(7.) When an extensive caries is accompanied by ulcerations which have destroyed so much of the soft parts that a cure cannot reasonably be expected, even if the diseased bone was removed, amputation is our only remedy. But we have instances upon record, in which the whole of some of the larger bones of the extremities have been removed, in young healthy subjects, where the soft parts have not been very much injured, and cures afterwards obtained: In such cases there has either been a reproduction of bone, or at least the formation of a substance which supplied its place.

(8.) When cancers on the extremities affect the ligaments or bones, and especially if they are extensive, nothing but the removal of the limb above the parts affected can be depended on; and even this sometimes fails. Every other species of local ulcer that injures the patient's health, and which, notwithstanding all the remedies employed, evidently becomes more extensive, and affords so large a discharge as might by a longer continuance endanger the patient's life, is likewise indicative of amputation.

(9.) Encysted tumors seldom render amputation necessary; but in some instances where they are deep seated, originating perhaps from the periosteum, they produce

caries

caries or even dissolution of the bones, and so injure the soft parts of the extremity, that the operation is the only remedy.

We sometimes find part of a limb considerably enlarged with an uniform hardness in some parts, and in others with a softness, as if a fluid was collected beneath. This swelling in the beginning usually affects the lower part of the member, and gradually extends over the whole of it. The skin at first has its usual colour, but at last it acquires a livid hue. There is no pain in the commencement of the complaint, but at last it becomes not only painful but extremely troublesome from its weight. It usually arises without any evident cause, and often in people who are otherwise healthy.

Swellings of this kind are at first often mistaken for anasarca; but the effusion into the cellular membrane which produces them, is tinged with blood, and is of an acrimonious nature. When they are opened, the discharge does not occasion much diminution in the size of them, and a painful sore is produced which always accelerates the disease. Nothing that I have ever seen used seems to retard its progress; and amputation should always be advised, as soon as the tumor becomes materially inconvenient; with me it has always prevented a return of the complaint, when performed on a sound part of the limb.

Swellings of the aneurismal kind, when very large, and seated in the ham or thigh, if they have continued so long as to hurt the texture of the soft parts, inducing an œdematous swelling in them, and so injure the bone, and have had these effects to such a degree as to preclude all hope of the parts being restored to health, even if the operation for aneurism should succeed, admit of no other treatment than of removal by amputation of the limb.

The aneurism here alluded to, is that which proceeds from a dilatation of the artery, and in which the coats of the vessel

vessel have burst, and a considerable effusion of blood has taken place into the cellular membrane. In the latter stages of this affection, the swelling becomes so large, that the beating of the artery is scarcely, *if at all** perceptible; from which it has sometimes been mistaken for a tumor of a different kind: The history of the case will, however, generally lead to a knowledge of its nature.

(10.) Where a limb is otherwise perfectly sound, it seldom happens that mere distortion of it can be a sufficient cause for amputation; but the distress produced by this affection, sometimes induces patients to request the performance of the operation, when more gentle means fail of removing the complaint.

The difficulty of determining the exact period of the various above enumerated complaints, at which amputation should be employed, and the blame which a surgeon is so apt to incur if he proceeds to the operation while the smallest doubt remains of its propriety, should induce every practitioner previous to a performance of it, to request the advice of some others of his profession, in all cases where he considers it necessary.

S E C T.

* In a case of aneurism of the arm from a wound in blood-letting, operated upon in the Pennsylvania Hospital in the year 1787, and in which part of the limb was excessively swelled, there was not *the least degree of pulsation* in the tumor: notwithstanding that it was evident to the operator, Dr. Foulke, as well as to most others present, it was the trunk of the brachial artery which was wounded, and that it was necessary to tie a considerable ramification also, which was cut during the operation, and which was perhaps two inches higher than the wound of the arterial trunk, the patient recovered perfectly in a short time.

S E C T. II.

General Remarks on the Method of Amputating Limbs.

THIS operation till lately was attended with a great deal of danger; in the present improved method of performing it, however, perhaps not more than one death will happen in twenty cases, even in hospital practice.

The circumstances which, in amputation, more particularly require our attention, are, the choice, when this is in our power, of the part to be operated upon; the prevention of hemorrhagy; the division of the skin, muscles and bones, in such a manner as to admit of the stump being entirely covered with skin; the including the arteries alone in the ligature; securing the teguments in a proper situation, so as to prevent them from retracting after the operation; and a proper subsequent treatment of the case.

Next to securing the patient from hemorrhagy, the most material of these is the saving such a proportion of the soft parts as will cover the stump, so as to heal the sore as nearly as possible by the first intention; for without this, the wound produced by the removal of a large limb is always extensive; the cure accordingly proves tedious; and in many cases, the discharge is so excessive, that the patient's health is irreparably hurt by it. In order to remedy these inconveniences, various attempts have been made at different times. At first, the soft parts were cut down to the bone by one stroke of the knife, and the bone afterwards sawed at the edge of the retracted muscles. It was afterwards proposed by Mr. Cheselden to divide the soft parts by a double incision; first to cut through the skin and cellular substance, and then to divide the muscles at the edge of the retracted skin; by this means the saw was applied higher in the bone, and the stump was better covered

covered both with muscles and skin. Still, however, an extensive fore was left, which in the thigh seldom healed in less than three months, and often required five or six; the stumps were often, from the retraction of the soft parts, pyramidal; and after they were healed, sometimes an exfoliation occurred at a distant period.

To prevent the retraction of the soft parts from the bone, a roller was applied from the upper part of the thigh to the end of the stump; and Mr. Sharp, as an additional help to the cure, proposed to keep the teguments near together by futures: But the last method was found injurious, and the former inadequate.

In consequence of the supposed impossibility of improving this method of operating so as to shorten the cure, and prevent a pyramidal form of the stump, about the year 1768, different surgeons attempted to revive the flap operation, which had been first practised near a century before by an English surgeon of the name of Loudham. See section v. The objections to this method of operating were, however, so forcible, that it has never been brought into general use. And practitioners by attention to the common mode of amputation have so improved it, that a sufficient quantity of teguments is saved to cover the whole end of the stump; and by this means, unless the patient is of a bad habit of body, or the inflammation induced runs very high, the whole wound usually heals in the course of two or three weeks, and the greater part of it, or perhaps the whole, by the first intention, without the formation of matter. This I consider as one of the most important improvements in the modern practice of surgery. I was induced to employ it from observation of the inconveniencies resulting from the want of attention to the saving of skin in various operations, but particularly in this; and ever since 1772, I have made it a constant rule to save as much integument as possible in all kinds of operations where I conceived it
might

might expedite the cure. It was not till 1779, that Mr. Allanson of Liverpool published an account of his improvement of the common method of amputation, and which he recommends from the experience of nine years. This is considered by many as the best mode of operating yet published; but although by it the wound is chiefly healed without the formation of matter, yet the reasons to be hereafter mentioned, induce me to give a preference to the method I make use of, and which I shall now describe.

S E C T. III.

Of Amputating the Thigh.

IN amputating either the thigh or leg, the patient should be placed upon a table of ordinary height, with the legs and arms secured and supported by assistants.

The flow of blood should then be stopped by the tourniquet, in the manner formerly directed in chapter v. and it is of consequence that in this operation the instrument should be applied so high, as that the cushion placed upon the femoral artery should reach the groin. The part of the thigh at which the amputation is made, must be in a great measure directed by the state of the disease, but in every case, as the utility of the limb will be proportioned to its length, no more of it should be taken off than is absolutely necessary. An assistant now grasping the upper part of the thigh with both hands, so as to draw up the skin and cellular substance as much as possible, the operator standing on the outside of the patient, should divide them with a circular incision down to the muscles; this may in general be done by one stroke of the amputating knife; (pl. ii. fig. 2.) but in large limbs, it is more easily done by two. The assistant continuing to draw the teguments upwards, the

the cellular substance connecting them to the muscles beneath, should be divided with the edge of the knife, until as much of the skin is separated, as the operator thinks will cover the stump completely.

The muscles should now be divided close to the edge of the retracted skin, and down to the bone, by one perpendicular stroke of the knife, beginning with the muscles on the inside of the thigh, and continuing it round the limb till it terminates where it commenced. By keeping his eye constantly upon the knife, the surgeon may easily avoid cutting the integuments in making this incision. Instead of proceeding now to the sawing of the bone, in the common way, we will more certainly form a good stump if the muscles be previously separated by the knife from the bone for about an inch. The whole of the soft parts being drawn up as far as they have been separated by a retractor,* the periosteum should then be divided, by carrying the knife round the bone directly beneath the retractor, carefully avoiding injuring the membrane above where the bone is to be divided, as it might produce subsequent exfoliations. The saw, (pl. iii. fig. 4.) should now be applied where the periosteum is cut, and the bone divided by long and steady strokes. During the sawing the leg should be held very firmly and steadily in the same direction; if it is too much raised, the motion of the saw will be impeded, and if depressed, the bone will be apt to be splintered. Should any sharp points or splinters remain, they ought to be immediately removed with the nippers, (pl. ix. fig. 3.)

The retractor must now be taken off, and the trunk of

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* A retractor is usually formed thus: Take a piece of leather, either soft or firm, eighteen inches in length, and about six wide, cut out a small round or oval piece in the middle, and from the hole thus made divide the strip to one end. The mode of applying it is too obvious to need description.

the femoral artery being drawn out with the tenaculum, a sufficient ligature should be made upon it before the tourniquet is loosened; all the arterial branches which can be discovered on loosening the tourniquet, and washing the wound with a sponge and water, should then be secured; taking care to leave the ends of the ligatures of a sufficient length to hang without the lips of the wound. The surface of the wound being well cleared of blood, the muscles and teguments should be drawn down till the skin completely covers the stump, and retained in this situation by an assistant, until a flannel or cotton roller, previously fixed round the body to prevent it from slipping down, be applied in such a manner as to support and fix them; for which purpose it should be passed two or three times nearly in a circular direction, round the upper part of the thigh, and should afterwards be continued in a spiral direction almost to the end of the stump, and moderately tight. It should then be pinned, as much of it being left loose as will pass two or three times around the stump.

The ends of the divided muscles being placed with as much equality as possible over the bone, the edges of the skin must be laid exactly together, so as to form a straight longitudinal line along the centre of the stump. When there are only one or two ligatures, they should be left hanging out of the inferior angle of the wound; but when there are several, they should be divided between the two angles, to prevent the parts from suffering by a large extraneous body fixed at any one place. An assistant retaining the edges of the skin in contact, two or three slips of adhesive plaster must be laid across the stump to preserve them nearly in this situation: and the whole end of the stump should now be covered with a large pledget of soft lint spread with Goulard's cerate, or the ceratum e lap. calam. Over this there should be placed a soft cushion of fine tow, and a
compress

compress of old linen; and for the purpose of retaining them, as well as to make a gentle pressure on the stump, a slip of linen, three inches in breadth, should be laid over them across the stump. The remaining part of the roller is to be employed to fix this, by passing it two or three times round the stump; and the pressure formed by the cross strap may afterwards be increased or diminished at pleasure, by drawing it with more or less tightness, and fixing it with pins to the circular roller.

While we are applying the roller, the tourniquet should be taken off; but it must be replaced immediately after the stump is dressed. If let loose it gives no uneasiness, and it enables the attendants to check any hemorrhagy which may succeed; a circumstance which merits attention for several days after the amputation of any of the extremities. The patient should now be carried to bed, and the stump, contrary to the usual practice, ought to be laid somewhat lower than the rest of the body; for this purpose the bed should be made with a moderate declivity from above downwards, and nothing should be put beneath the stump but a little fine tow.

To prevent the limb from being moved inadvertently, as well as to guard in some degree against the effect of those spasms which often prove troublesome after this operation, I commonly fix the stump down to the bed, by placing a strip of linen or flannel across near the end of the stump, and another at the upper part of the thigh, and connecting them by pins to the roller, and by pins or pieces of tape sewed on them to the matras,* to which tape is also to be fixed. A basket, or hooped frame, should now be put over the stump, to protect it from the bed-clothes; and an anodyne ought then always to be given, to prevent or remove pain and restlessness.

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* A matras is much preferable to a feather bed. B.

As hemorrhagies often happen many hours after the operation, the attendants should be directed to examine the stump frequently; and if any material discharge takes place, to tighten the tourniquet so as to restrain it till the surgeon can attend. This perplexing circumstance has never taken place in any considerable degree, when the method we have advised has been employed; but in the old mode of operating, the large surface exposed to irritation is very apt to induce spasms, which sometimes terminate in fatal hemorrhagies. When there is merely a trifling cozing of blood, it need not be regarded; but if the discharge is so great as to lead to a suspicion of its proceeding from a large artery, the dressings should be removed, and the vessel tied.

Troublesome spasms in the muscles of the stump succeed sometimes to this operation: If these are not taken off by laying the limb in an easy position, we must trust to opiates for their removal.

In order to remove the inflammation and tension of the wound, and the fever, which to a greater or less degree, always succeed to amputation, it will be proper to confine the patient to as low a diet as the state of his strength will permit. Where there is much vigour, bleeding should be used as soon as the symptoms of fever come on, and gentle saline laxatives should be given. This treatment is seldom necessary but for a few days; and afterwards would be injurious.

Where the stump is not covered with skin, as in the common mode of operation, and a free suppuration is expected, the dressings should not be removed till the fourth or fifth day; but in the method I recommend, the stump should always be examined at the end of the third day after the operation. For this purpose it should be supported by an assistant, while a few turns of the roller are taken off; and the dressings totally removed. In a few cases, the parts will be found to be united by the first intention; but for the most

part there will be a small quantity of matter all over the surface of the stump, and chiefly at the lower angle of the wound; and the parts will be red, tense, and painful to the touch, with a small separation between the edges of the divided skin. The surface of the stump should now be covered with a pledgit of emollient ointment, and a cushion of soft tow being laid over this, the cross strips of linen and roller should be again applied.

The wound ought to be thus dressed every other day;* and generally about the seventh or eighth day, the inflammation will be so far removed, that the ligatures may be drawn out; at least this should be gently attempted at every dressing, because they will now impede the healing of the wound. While the roller continues clean, it may remain, but as soon as it becomes sullied with matter, it should be changed. It should always be employed for three or four weeks, but if continued longer, it is apt to diminish the size of the limb.

As soon as the fore becomes clean and begins to granulate, the pain and tension being now gone off, the cure may with propriety be completed by drawing the edges of the wound together, by means of strips of a moderately adhesive plaster. By this management, even the largest stumps will generally heal in three or four weeks, often in less, in private practice, where every desirable advantage can be had; but in hospitals, where the patient often suffers more from the bad air, &c. than from the operation, the success is not so great. In some instances, large sinuses form in the stump between the teguments and muscles, and retard the cure considerably; and sometimes a cure cannot be obtained at all, without the assistance of good air and diet. But for one instance of this kind from the operation we have described, there will be twenty from the usual mode.

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* In most parts of the United States, during the summer season at least, it will be generally necessary to dress more frequently.

It should not be our object to heal the stump in the *first instance*, without the formation of matter; when this is done, by the use of strong adhesive plasters, &c. the teguments are apt to be very uneven, and the ligatures are removed with difficulty; but when the cure is accomplished gradually, as above directed, the ligatures may be easily taken out, and the stump is always left smooth and equal.

The circumstances of consequence, in which Mr. Allanson's method of amputation differs from the mode I have recommended, consist chiefly in the manner of dividing the muscles: and the after position of the skin. After separating as much skin as necessary, he directs a double edged knife to be applied to the inner edge of the vastus internus, and at one stroke to cut obliquely through the muscles, upwards as to the limb, and down to the bone, so as to lay the bone bare about two or three fingers breadth higher than is usually done by the common perpendicular incision; the point of the knife is then to rest upon and revolve round the bone, while the incision of the muscles is continued round the limb in the direction that was first given to it. The quantity of skin saved, and muscular substance taken out, must be in such a proportion to each other, that by a removal of both, the whole surface of the wound will be afterwards easily covered, and the length of the limb not more shortened than is necessary to obtain this end.

Mr. Allanson directs the skin and muscles to be placed over the bone in such a direction as that the wound shall appear only as a line, with the angles at each side; and, instead of securing the dressings with a part of the roller, he directs a manifold bandage to be employed.

I have used this method of operating; but I find it much more exceptionable than that I have above described. The removal of such a large portion of muscular substance as is done by Mr. Allanson's oblique incision, produces a
hollow

hollow, which not only retains the matter, but which prevents the stump from being so equal and smooth as when the skin is supported by a flat muscular surface, in the manner we have advised. Nor is the bone so well covered by muscle, and the danger of exfoliation so well avoided, by his method as by that I have described above. But if the ultimate advantages resulting from both were equal, the latter mode would claim a preference on account of its greater facility of performance. It is almost impossible to avoid mangling the skin in making the oblique incision of the muscles, and the assistants which Mr. Allanson directs to prevent this, must be apt, not only to embarrass each other, but the operator.

Mr. Allanson's reason for placing the lips of the wound transversely is, that after the cure, the cicatrix will be drawn near the lower edge of the extremity by the superior force of the posterior muscles, and consequently that the pressure on the stump in walking will be afterwards made upon the sound skin. But I have found no inconvenience from the cicatrix being opposite to the bone, and the lodgement of matter which is so pernicious, and would probably be so apt to occur from the method recommended by him, is to me a sufficient reason for preferring the perpendicular position of the integuments.

S E C T. IV.

Of Amputating the Leg.

WHENEVER the state of the disease will admit of the leg being amputated just above the ankle, it should be always done in preference to taking it off at the usual place about four inches below the patella; because the operation is there performed with more ease and safety to the patient,

on account of the smaller diameter of the leg and the greater proportional quantity of soft parts, which enable us to cover the fore more completely, and heal it sooner; and because machines may be fitted to it which are much more pleasing to the eye than the wooden ones commonly used; and with which the patients are rendered capable of walking very well, as they preserve the use of the knee joint.

But when this is not admissible, as the cure of a leg amputated immediately below the knee is always tedious, owing to the great extent of bone at this part, and the deficiency of soft parts, and as the bone is equally well defended from the pressure of an artificial leg when the operation is performed above the knee, I would always give a preference to the latter, when it was optional.

If, however, the usual place is chosen, the same general directions that were given for the amputation of the thigh, will apply to the operation here, except that the tourniquet need not be placed much above the knee, having the cushion on the artery in the ham: and as the teguments are closely attached to the bone on the fore-part of the leg, they must be rolled up, when a sufficiency of them is separated, to keep them out of the way of the knife. The muscles are to be cut just below the insertion of the flexor tendons of the leg; and the interosseous parts must be divided with the end of the amputating knife, or with a smaller knife termed a catline.

In sawing the bones, the instrument should be applied to both at the same time, to prevent a risk of splintering them; and in the application of the roller, two or three turns above the knee will be sufficient.

In operating above the ankle, the most convenient part is about nine inches below the knee, measuring from the condyles of the femur, both on account of accomplishing a speedy cure, and of adapting an artificial extremity to the stump.

stump. The cure is usually produced in less than three weeks, and the surface of the stump will be equal, and covered entirely with sound skin.

S E C T. V.

Of Amputating with a Flap.

THIS operation was invented a century ago, in order to obviate the disagreeable consequences of the usual method of amputation. In performing it, a flap of skin and muscles was preserved, sufficiently large to cover the whole stump.

The flap operation was never received into general use, because it was found difficult to restrain the hemorrhagy, when it happened to recur after the flap was applied and fixed in its situation; for, in order to discover the bleeding arteries, it was necessary to undo the whole; because the flap was found not to adhere uniformly over the surface of the stump; and, because the pain and inflammation produced, was more considerable than that which was consequent to the usual mode.

To remove these objections, Mr. O'Halloran, about the year 1768, proposed to dress the stump and flap as separate sores for the first twelve days; and the risk of hemorrhagy, and the inflammation, having then gone off, to secure the flap on the surface of the stump by plasters and bandages till they united.

By this improvement, the operation was rendered more safe and certain; and it is probable that it would gradually have come into general practice, if the improved method which we have already described, had not in the mean time been introduced: But, notwithstanding this is generally preferable, yet, wherever the divided parts cannot otherwise be properly covered with skin, the flap operation ought certainly to be employed. This will be the case in amputating the arm at the shoulder, the thigh at the hip-

joint, and the fingers or toes. But as some may perhaps prefer it when the operation is performed immediately below the knee or above the ankle, or in the arm and forearm, it will be proper to describe the method of doing it in all these places.

S E C T. VI.

Of Amputating the Thigh at the Hip-Joint.

THIS has always been considered as a very hazardous operation, and there are consequently very few instances of its having been performed; but, as in the method I shall recommend there is very little hazard from hemorrhagy, and so much skin is saved, that the sore can be entirely covered by it, and consequently will heal in a few weeks, whenever cases occur which would otherwise terminate in the death of the patient, we should certainly not hesitate to perform it.

The circumstances which most commonly render this operation necessary, are, gun-shot wounds, accompanied by fractures of the upper part of the os femoris, and spina venosa, or caries of the head of it: It may also be proper in all the cases formerly noticed, when treating of amputation in general.

In performing this operation, the patient should be placed upon a table, on the sound side, and secured by assistants. Let the tourniquet be applied as near as possible to the top of the limb, the femoral artery having the cushion fixed on it just below Poupart's ligament. Let the integuments and tendinous fascia of the thigh be divided by a circular incision, six inches from the top of the thigh; that is, at least three inches beneath the band of the tourniquet. Let the retracted skin be pulled an inch upwards; and then let the muscles be divided at its edge down to the bone. The arteries are then to be secured. This being
done

done, take a scalpel larger than the common size, and commencing at the upper edge of the circular cut on the posterior part of the thigh, make an incision down to the bone, and carry it up of the same depth to a little above the great trochanter, into the joint. Let a similar cut be made on the opposite side of the limb, at a sufficient distance from the femoral artery, and completely down to the bone. Let these two portions of flesh be now dissected from the bone, and the flaps formed by them be taken care of by assistants, while any artery divided, is tied as soon as it is observed. The joint being laid bare, the femur must be moved in different directions, and particularly inwards, where it yields most readily, from the brim of the acetabulum being lowest, until it is so far turned out of the socket as to admit of the round ligament being reached with the point of a scalpel, or a firm probe-pointed bistouri, and divided, when the limb may be removed.

If the acetabulum is found, our prospect of a cure will undoubtedly be more favourable than if it is carious: But in whatever state the bones may be, our treatment of the fore must be so directed as to heal it as much as possible by the first intention. After removing the coagulated blood, and placing the muscles as nearly as possible in their natural situations, the flaps should be drawn together so as to cover the fore as completely as may be; they should be secured in this situation by three or four futures, by adhesive plasters, and by compresses retained by a broad flannel roller passed several times round the body and over the stump; care being taken to leave the ligatures hanging out of the wound.

The patient must now be put to bed, and treated as in other cases, except that a more particular attention will be requisite to prevent and remove inflammation and fever: And it will be proper to advise a very moderate diet for a considerable time afterwards.

The ligatures may be removed in about ten or twelve days. Collections of matter will probably be very apt to form in the stump; and if pressure does not remove them, they must be discharged by puncture with a lancet.

S E C T. VII.

Of the Flap Operation immediately above the Knee.

THIS operation may be performed either with one or two flaps; but one is commonly to be preferred. The fore part of the thigh affords the best flap; and it should be chosen, not only on this account, but because any matter collected during the cure may be more readily discharged than when the flap is formed on any other part.

The patient being placed on a table, the tourniquet applied, and the skin drawn up, the extent of the flap should be marked with ink. This should be somewhat less in length than the diameter of the limb, and equal in breadth to the limb itself; and it ought to be of the same width all the way to within a little of its termination, where it should be rounded off so as to correspond with the figure of the fore on the back part of the limb. The extreme point of the flap should reach to the end of the limb, unless the teguments are diseased, in which case it must terminate where the disease commences; and its base should be where the bone is to be saved.

The flap being marked out, the surgeon standing on the outside of the limb, should enter a straight double edged knife, with a sharp point, (plate ii. fig. 5.) at the outside of the base of the intended flap, and carrying the point close to the bone, should push it through the teguments at the mark on the opposite side. The edge of the knife must then be carried downwards, in the direction marked out; and

and as it draws towards the end, the edge of it should be somewhat raised from the bone, so as to make the extremity of the flap thinner than the base, by which it will apply with more neatness to the surface of the fore. The flap being supported by an assistant, the teguments and muscles on the back part of the limb, should, by one stroke of the knife, be cut down to the bone, about an inch below where it is to be sawed; and the muscles being separated from the bone, to this height, by the point of the knife, the soft parts must all be separated with the leather retractor until the bone is sawed. The arteries are to be tied in the usual way; and the muscles and teguments should then be drawn down, and secured with a flannel or cotton roller, as advised in the common mode of amputation.

If the flap is to be immediately applied to the stump, the coagulated blood must be washed from both, and then they are to be connected by three or four futures, and dressed as directed in the last section. The dressings may be renewed in three or four days; and as soon as the ligatures are taken away, and the inflammation has subsided, any part which was not at first covered, may have the skin drawn over it and secured by adhesive plasters.

But, when Mr. O'Halloran's method is adopted, the whole surface of the stump is to be covered by a pledgit of lint, spread on both sides with some emollient ointment; the flap is then to be laid on this; and another pledgit of the same kind being placed over the whole, the dressing is to be finished in the usual manner. The applications may be removed in three or four days; and about the twelfth or fourteenth day, or whenever the inflammation has subsided, and the ligatures are taken away, any matter that may be on the fores is to be removed with a soft sponge, and the flap is then to be laid down upon the stump, to be there secured by futures, or by adhesive plasters, and the common dressings.

Of these two methods, Mr. O'Halloran's seems to me to be much the best. The cure is accomplished sooner, often in three weeks, and it is attended with much less pain and inflammation, by the secondary union he proposes, than by attempting to heal the wound by the first intention, without the formation of matter.

In order to form two flaps, a circular incision must be made through the teguments and muscles at the lower part of the limb, having the edge of the knife turned obliquely upwards; then let the sharp pointed knife above-mentioned, be pushed through the soft parts down to the bone on one side, and where the bone is to be sawed; the under edge of it being then turned obliquely outwards, let the muscles be divided down to the circular incision. A similar flap must be formed on the opposite side of the limb; and the intermediate parts being divided, the bone must be sawed, and the wounds dressed as formerly directed.

S E C T. VIII.

Of the Flap Operation below the Knee.

THE method of operating here, is nearly similar to that directed to be employed above the knee. We have hitherto been advised to form the flap on the back part of the leg; but I would prefer the outside, whether the operation is performed immediately below the knee, or at the distance formerly recommended above the ankle, on account of the matter that will be produced finding a more ready discharge, than when the usual part is chosen.

S E C T. IX.

On Amputating the Foot, Fingers, and Toes.

WHENEVER the whole foot is diseased, it becomes necessary to take off the extremity at the part we have mentioned above the ankle, even although the joint be sound; for if the operation was performed at the ankle, the wound could not well be covered by skin, and the length of stump would be inconvenient. But if only two of the metatarsal bones remain sound, and particularly if these are seated internally, the diseased parts alone should be removed. When the middle of the foot is alone affected, the bones should be taken off at the joint; because they are there amputated with more ease, and the saving of a small portion of them could be of little or no advantage; but if the bones situated internally or externally are the seat of the complaint, as it will be an object to save as much of the foot as possible, they should be sawed* immediately above the diseased parts.

On account of the friction in walking, it is particularly necessary to save as much skin as will cover the sore in this operation. A flap may generally be readily formed for this purpose; if possible, it should be on the under part of the foot.

The patient should be placed on a table; and the tourniquet applied above the knee. While we are sawing the bone, a piece of pasteboard, or of thin wood, must defend the contiguous sound bone from the teeth of the instrument. The subsequent parts of the operation are to be managed in the usual way. If futures are employed, they should

* A common springsaw (plate ii. fig. 3.) is to be used in this operation.

should be inserted in such a manner as to avoid the flexor and extensor tendons.

Fingers and toes are usually amputated in the same manner as the larger extremities, either by preserving a flap sufficient for covering the stump, and afterwards dividing the bone with a small spring saw, or by the double incision: But it is much better always to cut them off at the joints. A flap being marked with ink, and dissected from the bone with a scalpel, a circular incision should then be made through the rest of the soft parts, a little below the joint, and on a line with the base of the flap. The finger should then be moved, to ascertain the proper place in which the lateral ligament should be cut; and when this is divided, the whole may be readily taken off. The flap is then to be applied, and secured by adhesive plaster, a compress, and flannel roller. If it is necessary to tie an artery, the tenaculum should be used.

S E C T. X.

Of Amputating the Arm at the Joint of the Shoulder.

THIS operation may be rendered necessary by, abscesses in the joint; caries of the humerus reaching to the joint; compound fractures extending to the head of the bone; gun-shot wounds; and gangrene: and may be performed with safety, by any surgeon of steadiness, experience, and accurate anatomical knowledge.

It may be done in different ways, but the following appears to be the best. The patient should be placed on his back, upon a table covered with a matras and blanket. The tourniquet might be used, if the blood could not be otherwise stopped: But the best mode of guarding against hemorrhagy, is, for an assistant to place a compress on
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the subclavian artery, just above the clavicle, and make a sufficient degree of pressure on it to stop the pulsation at the wrist.

The shoulder should be made to project somewhat over the side of the table; and the arm being stretched out, and supported by an assistant at nearly a right angle with the body, a circular incision should be made through the skin and cellular substance, just at the insertion of the deltoid muscle into the humerus. The teguments may be allowed to retract about half an inch; and the muscles are then to be divided at their edge down to the bone. A perpendicular incision should now be made with a scalpel down to the bone, beginning at the acromion, about half way between the centre of the deltoid muscle, and the inner edge of it, and terminating in the circular incision, about an inch above the brachial artery. A similar cut must then be made on the back part of the arm, at such a distance from the first, that the two flaps formed by them may be of an equal breadth. The brachial artery should be tied as soon as it is cut by the circular incision, and any arterial branches that may be divided, should also be secured as soon as they are observed. The flaps should now be separated from the bone, cautiously avoiding the large artery; and being supported by an assistant, so as to bring the capsular ligament into view, an opening should be made into this, the bone dislocated, and the remaining part of the ligament divided. The flaps are then to be laid over the joint, and retained in their places by sutures and dressings, as in other cases.

The subsequent general treatment is to be similar to that advised in amputation of the lower extremities. With a view to prevent any risk of hemorrhagy after the operation, an experienced assistant should sit with the patient for the first two or three days, with directions to apply

pressure above the clavicle, should any considerable quantity of blood be discharged, until the vessel can be tied.

A cure may soon be expected in favourable circumstances; as the muscles appear to unite as speedily to cartilage as to bone.

S E C T. XI.

Of Amputating the Arm.

THE general observations we have made upon the method of amputating the thigh and leg, apply with the same propriety to the amputation of the arm and forearm. But it must be observed, that no more of the arm should be removed than is diseased, because the stump left is useful in proportion to its length: And there is no necessity for making a flap; as a sufficiency of teguments and muscles may be saved, in any part of the arm, to cover the stump, by the common operation.

C H A P. XLVII.

Of Removing the Ends of Bones in Diseases of the Joints.

THERE are several instances upon record of the ends of the larger bones being removed when diseased, and of the deficiency thus produced being supplied by

by nature. Mr. Park of Liverpool has lately proposed this operation as a general remedy in affections of the joints; such as injury to them from external violence, white swellings, and caries. He thinks it will be chiefly applicable to affections of the knee and elbow, particularly the latter, and more especially when they proceed from external violence. Mr. Park relates a case of white swelling of the knee in which it was practised with success. The sore was healed, but not without much perplexity and distress, in about ten weeks, and the patient has since been able to do duty on board of a ship, without the aid of a crutch. The operation was thus performed.

An incision was made, beginning about two inches above the patella, and continued about as far below it; another, crossing this at right angles, immediately above the patella, the leg being extended, was made through the tendons of the extensor muscles, down to the bone, and nearly half round the limb: the lower angles, formed by these incisions, were raised so as to lay bare the capsular ligament; the patella was then taken out, and the upper angles were raised, so as fairly to denude the head of the femur, and to admit of passing a small catline across the posterior flat part of the bone, immediately above the condyles, taking care to keep one of the flat sides of the point of the instrument quite close to the bone all the way. The catline being withdrawn, an elastic spatula was introduced in its place, to guard the soft parts while the os femoris was sawed; which done, the head of the bone thus separated was carefully dissected out; the head of the tibia was then with ease turned out and sawed off, and as much as possible of the capsular ligament dissected away, leaving only the posterior part covering the vessels. More than two inches of the femur was taken off, and above an inch of the tibia; which was just enough to admit of the leg being brought into a right line with the

the

the thigh, the previous contraction of the flexor muscles being such as to keep the two sawed ends of the bones in contact. To obviate the inconvenience of the redundancy of teguments, a few stitches were passed through the edges of the transverse wound, as well as that part of the longitudinal incision that extended up the thigh. The lightest superficial dressings were applied, and the limb placed in a case of tin, from the ankle to the insertion of the gluteous muscle.

Independent of the difficulty of preserving the limb in a fixed situation; of the inconvenience of a great depth of wound; and of the collections of matter which must inevitably take place, there are two other very forcible objections against this operation: The first is, that where the bones of large joints are so much diseased as to render their removal necessary, the surrounding soft parts are in general so much thickened, inflamed, or ulcerated, as to render any attempt to save them very uncertain, and much more hazardous than the amputation of the limb; and the second is, the high degree of inflammation which commonly succeeds to wounds of the larger joints.

To the first objection, Mr. Park replies, that he thinks this operation will be peculiarly useful only when the disease originates from external violence: and to the last, that the operation has been frequently done without any subsequent violent symptoms; and that when these have occurred, they have probably arisen principally from a partial division of the capsular ligaments, and may commonly be prevented by their total removal. But we must observe, that we can see no more propriety in taking off any part of the capsular ligament, than there would be in the removal of the tunica vaginalis in the operation for the hydrocele. Future experience, however, must determine the propriety of this part of the operation, as well as of the merit of the operation in general.

C H A P. XLVIII.

Of preventing or diminishing Pain in Chirurgical Operations.

THE pain induced by operations may be lessened, either by diminishing the sensibility of the system, or by compressing the nerves which supply those parts upon which the operation is to be performed. Narcotics of every kind might be employed for the purpose of lessening general sensibility; but nothing answers this purpose so well as opium. As this, however, when given in sufficient doses, is very apt to induce nausea and vomiting, I seldom venture to exhibit it before an operation. In general it proves most useful when exhibited immediately after, and then it very commonly alleviates that pungent soreness of which patients at this time usually complain; and by continuing to give it in proper doses from time to time, we are often enabled to keep the patient easy and comfortable, till relief is obtained by the formation of matter, or by the removal of the inflammatory tension which usually accompanies every capital operation: And as this tends very effectually to moderate the subsequent febrile symptoms, it should never be omitted.

The sensibility of limbs is always more or less diminished, by the compression on the nerves, produced by the tourniquet, in amputations and some other operations; but as this answers the purpose very incompletely, it has been lately

lately proposed by Mr. Moore, of London, to compress the principal nerves so completely as to render the parts beneath altogether insensible. This he endeavours to accomplish by means of a semicircular plate of iron covered with leather, having a compress at one end, which is to be applied immediately above the seat of the nerves, and by a screw passed in at one end.

In order to obviate the inconveniency which must necessarily arise from the pressure on the veins by this machine, Mr. Moore proposes to open one of them during the operation; but as this might be very injurious to weak patients, it would be much better to have the instrument formed so as to press chiefly upon the nerves; as this, however, cannot easily be done, on account of contiguity of the veins to the nerves, perhaps the same purpose may be answered by compressing the arteries of the limb for a minute or two before any pressure is applied to the veins, by which the latter may be previously emptied.

C H A P. XLIX.

Of Midwifery.

THE only operations in midwifery which a surgeon is called upon to perform, are, the cæsarian section, and the sigaultian operation or division of the symphysis pubis. The object of both these is the same, viz. to extract the fœtus when the delivery of it cannot be effected
either

either by means of the exertions of the mother, or by the aid of the common midwifery instruments, on account of a preternatural narrowness of the pelvis. By the first, an opening is made into the uterus for the removal of the child; and by the latter, the diameter of the pelvis is intended to be increased, so as to allow the foetus to pass in the usual way by the vagina.

SECT. I.

Of the Cæsarean Operation.

THIS operation has not only been performed when the pelvis has been so narrow as not to allow the child to pass out, but also when the child has been forced into the cavity of the abdomen, after a rupture of the uterus, from this organ contracting too forcibly before the os tinæ has been sufficiently dilated.

The cæsarean section is directed to be performed, either with a view to save both the mother and child; to save the mother only, when we know that the child is dead; or to save the child immediately after the death of the mother.

As there are but few instances of the mother being saved by this operation, some have advised it never to be performed, except in the latter case; but if it is proper at all, it certainly should be employed, not only then, but in both the other circumstances mentioned, to give some chance of preventing death, at least to the mother. The following is the method of performing it.

The patient should be placed on a table, and laid upon her back, and her hands and legs properly secured by assistants; her head should be moderately elevated with pillows, and her thighs somewhat raised. The operator standing one side of the table, is to make an incision with

a scalpel through the teguments of the abdomen, beginning two inches above the umbilicus, on the outer edge of the rectus muscle, and from thence about six inches perpendicularly downwards. The uterus is now to be laid bare, by continuing the cut through the tendinous parts of the abdominal muscles and peritonæum; and an opening being then made in the uterus large enough to receive the finger, a probe-pointed bistouri is to be conducted upon this, in order to make the cut of the womb as long as the external opening. The bistouri is also the best instrument to divide the peritonæum and tendons.

If any large blood-vessel is cut in making the incision, either of the external parts or of the uterus, it should be immediately secured by the tenaculum; and the ligature should be left long enough to hang out at the external wound. The child must then be taken out, and the placenta, and any blood that may have escaped, removed as speedily as possible; the intestines, if they have protruded being then replaced, the external wound should be secured with three or four sutures, as directed chap. xxxix. sect. xi. § 3. The wound being covered with a pledgit of emollient ointment, the abdomen should be supported by a flannel roller; and the patient should then be put to bed, and strictly enjoined to avoid speaking and every kind of exertion. She should be kept cool, and opiates should be given to obviate pain.*

S E C T.

* A new mode of performing the Cæsarean operation is recommended by *M. Lauerjat*, in a volume on that subject, published at Paris, in 1788. His method is, to make a *transverse* incision, of about five inches in length, through the parietes of the abdomen, between the recti muscles and *spina dorſi*. The incision must be made on the right or left side, higher up or lower down, according as the *fundus uteri* happens to be situated, after the membranes have been ruptured and the uterus has had time to contract. The incision of the uterus ought to be as near as possible to its fundus, and similar in every respect

S E C T. II.

Of the Division of the Symphysis Pubis.

THIS operation was suggested by there being in some instances, a certain degree of separation of the ossa pubis during labour; and by the great danger of the operation described in the last section. It was proposed in the sixteenth century by *Monf. Pineau*, but *Mr. Sigault* of Paris, was the first who put it in practice, in 1777.

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spect to that made in the abdomen, with which it will, at first, correspond.

Having given directions for the extraction of the child, and the proper management of the mother, *M. Lauerjat* enumerates the advantages which this mode of operating has over that of the longitudinal incision, hitherto in use. 1. In this way, there is at least two-thirds of the uterus, towards its inferior part, left untouched. This cavity retains the lochia till discharged in the natural way. The longitudinal section leaves no such cavity; hence extravasations in the abdomen, and the death of at least nine in ten of all who have been operated on in this manner. 2. The transverse incision is more favourable to the speedy healing of the wound. The uterus, in pregnancy, is extended longitudinally more than transversely; and as the contraction, after delivery, must be in proportion to this previous extension, the lips of the transverse incision are brought together, and soon united; whereas the lips of the longitudinal incision have a natural tendency to separate in every part, except at the angles. 3. The lips of the external wound are brought together by the most natural and easy situation of the patient, (the head inclined forward, and the thighs bent), and their union is facilitated; but let her lie in what position we may, the lips of the wound, if made by a longitudinal incision, will separate, and it will be impossible to bring them together without having recourse to the uniting bandage, which he thinks a dangerous expedient.

M. Lauerjat performed the operation, in this way, on three patients, with success. The names of two other surgeons are given, who also performed it successfully four times. No unsuccessful case is mentioned.

The operation is easily performed. The patient must be laid upon her back on a table; the pelvis should be raised by two or three pillows, and the legs and arms secured by assistants. The bladder should then be emptied by the catheter, which should be retained in the urethra, by an assistant, till the bones are divided, in order to point out the urethra, and thus prevent it from being wounded.

After shaving the pubes, the operator, standing one side of the patient, should, with a scalpel, make a longitudinal incision through the teguments of the symphysis of the pubes, from the upper edge of these bones nearly their whole breadth: the cartilage by which they are joined should then be slowly and cautiously divided; which is easily done on account of its softness.

The bones now recede considerably from each other; and to prevent this from taking place suddenly and forcibly, the assistants should be directed to support the thighs carefully towards the close of the operation; and if a sufficient opening is not immediately produced, they may afterwards be cautiously separated.

The child and placenta are now to be delivered in the usual way; and the bones should then be put together, and retained in their situation by a flannel or cotton roller applied round the pelvis and thighs. The patient should be kept as much as possible in one posture until the bones have united, which will probably happen in five or six weeks: But she should not be allowed to walk, or use any posture which might change the situation of the bones, in less than nine or ten weeks. The fore in general heals with light easy dressings.

The only important objection to this operation is, that it gains so small a space in that part of the pelvis where an increase of size is most required; between the sacrum and pubes: For here the difficulty is almost always met with. After the division, the diameter of the pelvis in this direction remains nearly the same, although a separation of at least

two inches* is produced, from side to side. However, as even this may in many instances be of essential advantage, and as the operation is attended with no kind of danger, for it has in several instances, been repeatedly performed on the same woman, it should always be advised in preference to the cæsarian section. And if future experience should determine that the child may always be delivered in this manner, it should even be preferred to the mode of delivery by the crotchet.

C H A P. L.

Of Opening Dead Bodies.

THIS operation is employed with a view to ascertain the causes and seats of diseases. In order to do this with accuracy, every preternatural appearance should be committed to paper. After noting the internal marks of disease, we proceed to examine the external parts. When the disease has been seated in one cavity, we do not open the others; but when they are all to be examined, it is proper to begin with the head.

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* Dr. Orne, of Salem, New-England, performed this operation on a woman who died in child-bed, and found that $2\frac{3}{4}$ inches were gained without difficulty: a quarter of an inch more might have been gained. See an interesting publication by the Massachusetts Medical Association, entitled *Medical Papers*.

The body being placed upon a table, and the head firmly supported, an incision should be made from ear to ear, across the parietal bones. The scalp is now to be dissected from the parts beneath; and half of it being turned backward, and the other half over the face, with a common amputating saw, we must divide the cranium, beginning on the os frontis just above the frontal sinuses, and continuing it all around. The separated part may then be raised with a levator. If we wish merely to know whether any water be contained in the ventricles, the brain need not be removed; but if our object is to ascertain the state of the brain, it must be taken out and examined at leisure. The extravasated blood being afterwards removed by a sponge, the parts are to be replaced and the scalp sewed by the glover's stitch, or in any other way agreeable to the operator: For this purpose, narrow tape and a large curved needle, with a triangular point, are usually employed.

The cavities of the thorax and abdomen are most effectually exposed in the following manner: Let an incision be made through the integuments from the top of the sternum to the umbilicus, and from thence on each side and through the muscles, to the top of the os ilium; the teguments and muscles must now be dissected from the sternum and ribs, and the cartilages divided with a strong knife as near as possible to the ribs. The diaphragm being then separated beneath, the lower part of the sternum and cartilages connected with it, being raised and turned upward, the sternum must either be separated from the clavicles, or cut across near its upper end.

This will bring the viscera fully into view, and most of them may then be examined without being removed; if, however, much accuracy is requisite, all or any part of them may be taken out, as may be judged necessary.

To prevent the effusion of blood or excrement, two
strong

strong ligatures should be passed, at the distance of an inch from each other, round the lower part of the intestines and large contiguous blood-vessels, and round the trachea, œsophagus, and large blood-vessels of the neck. The parts between the upper and lower ligatures being divided, all the viscera may then be easily removed by dissecting them from the contiguous parts, and raising them up as we go along. When the necessary examination has been made, the effused blood all washed off with a sponge, and the viscera replaced, the teguments must be drawn over them, and stitched neatly together.*

In opening diseased bodies, the operator should be very cautious to avoid wounding his fingers and hands : Death has been the consequence of neglecting this.

C H A P. LI.

Of Embalming.

EMBALMING, formerly so much in fashion, is now seldom employed, except for preserving bodies from putrefaction, during the interval between the death and burial of the person, when this is to be unusually long. The following is the present method of performing it. The brain, and all the viscera of the thorax and abdomen being

* The glover's stitch is generally employed for this purpose; and in performing this, either a straight or curved needle may be made use of.

ing removed in the manner mentioned in the last chapter, they are all, excepting the heart, put into a leaden box with a considerable quantity of an aromatic antiseptic powder, prepared with, myrrh, frankincense, cloves, the leaves of lavender, rosemary, mint, and other similar articles; and to these are added some of the odoriferous oils. The blood being taken out of the different cavities, and the heart replaced, they are all filled with a due proportion of odoriferous oils or spirits, and the parts afterwards sewed up. By some, the mouth and nostrils are stuffed with these powders and oils; and incisions are made into all the fleshy parts of the body, which are also stuffed with them, and sewed up: but there is no necessity for this, unless the body is to be kept for a considerable length of time, or to be carried a considerable distance; in which case, the trunk and extremities are firmly rolled up with bandages, and the whole varnished.

The body is afterwards to be covered with cerecloth,* secured by tapes or ligatures; and it is then dressed, and either laid in a coffin, or exposed to view, according to circumstances.

C H A P.

* The cerecloth is made of linen dipped in a composition of wax, oil, and rosin, and coloured with verdegris, or red lead.

C H A P. LII.

Of Bandages.

BANDAGES are employed, for the retention of dressings; for stopping hemorrhagies; for removing deformities; and for effecting the union of divided parts.

A proper application of bandages is an object of considerable importance; but as it can only be acquired by manual practice, we shall merely offer a few general observations on the subject.

1. Bandages should be formed of such materials as are sufficiently firm for effecting the purpose for which they are employed, at the same time that they will fit with ease upon the parts to which they are applied. Hence they must necessarily be of different materials in different cases. Thus bandages for herniæ must be very firm and elastic; while in general, those bandages made of cotton, linen, or flannel, will serve every purpose. Till of late, linen was usually employed for bandages; but experience has now shewn that cotton and flannel are preferable. They absorb moisture more readily, whether produced by sweat, or the discharges from sores, at the same time that they are better calculated, from their elasticity, for yielding to the swelling which often takes place in fractures and other injuries.

2. Bandages should be applied just tight enough to effect the purpose for which they are intended, without incurring any

any risk of impeding the circulation, or doing harm in any other manner.

3. Bandages should be applied in such a manner that they may be easily loosened, and the parts examined with accuracy. Hence, in fractures of the thigh, and leg, where the limb cannot with propriety be frequently raised, we now prefer the manifold bandage to the roller.

4. Bandages should always be laid aside as soon as they have accomplished the purpose for which they were made use of; as they may often do harm afterwards by impeding the growth of the parts.

5. The bandages used for effecting different ends in the same parts must necessarily be different; and those with the same view in different parts of the body must also vary.

As all the variety of bandages in use are mentioned in the course of the work, and generally their particular application, we shall, in this place, do little more than give a general enumeration and description of them.

1. The night-cap, with a band to tie it before, and another behind.

2. The radiated bandage; a roller applied in a crucial form over the forehead, top, and back of the head, and under the chin.

3. The uniting bandage; formed of a long roller with two heads, with a slit or opening in the middle, through which one of the heads is to be passed.

4. The common roller.* When this is employed for one of the eyes, it is termed monocolus; when for both, binocolus.

5. The four-headed roller. This is formed of a long piece of linen, or other material, divided lengthways, except for a little space in the middle of it, in the centre of which

* In general, the width of rollers may be from one and an half to two and an half inches, according to circumstances.

which is an oval hole; and is employed in fractures of the lower jaw. The undivided part is applied to the chin, the end of which projects through the hole. The two superior heads are then carried backwards over the occiput, and returned forward over the os frontis, where they may be pinned. The lower heads of the roller being reflected over the chin, are then carried to the top of the head, and there fastened.

6. The napkin and scapulary. The napkin is about six or seven inches broad, and when used for the retention of dressings, should pass but once around the body, and be tied before by pieces of tape; but when it is employed for a fractured rib, it should go several times around. It is to be placed immediately below the arm pits. The scapulary consists of a slip about three inches broad, and of a length sufficient to reach from the upper part of the napkin behind, and pass over the shoulders to be connected to it before; and has the anterior end of it longitudinally divided, the slips being carried on each side of the head.

7. The bandage for compressing the abdomen after the paracentesis. See pl. xi. fig. 5. and explanation.

8. The truss for herniæ. See pl. vi. fig. 4. and explanation.

9. The suspensory bandage for the penis and scrotum. This is formed by a small pouch of linen or flannel, or what is perhaps better than either, of cotton, connected to a circular bandage passed round the body, either before only, or both behind and before.

10. The T bandage. Formed of a strap passing around the body, to which a broader piece is connected, and slit longitudinally for better than half of its length; these slips pass from behind, on each side of the penis and scrotum, and are pinned to the anterior part of the circular strap.

11. The manifold bandage. This is formed generally

of six or nine slips of cotton, linen, or flannel, connected in the middle by another slip, in the manner represented in pl. xi. fig. 2.*

* This form of bandage is thought by some to be improved, by having the opposite tails or slips connected so as to form a very obtuse angle: This makes them apply more neatly to the limb.

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EXPLANATION OF THE PLATES.*

PLATE I.

FIG. 1. Represents the instrument termed a trepan. Every part of it is here represented about one-third less than the proper size. The upper part of the handle A A, is made of wood; all the rest of polished steel. B is the saw. C, the nut of a screw which fastens the upper part of the saw, which is in the form of that of the perforator, fig. 7. to the handle of the instrument. D, the nut of a screw passing through a slit in the handle, and fixed in the upper part of a moveable pin, E. By pushing up this nut, the pin is raised so as to be no impediment to the sawing, after the perforation is deep enough to render it unnecessary. This pin is usually screwed into the bottom of the head, and is then to be removed by the key, fig. 6.

The trephine, which is commonly made use of in this operation, only differs from the trepan, in the form of the handle; the part of this connected with the saw being straight, and on a line with it, and the wooden part crossing this at right angles.

Fig. 2. The stand of the levator fig. 5. In using this instrument, the pin on the moveable ball in the frame, is to be fixed in one of the holes of the levator: The ball should be easily moveable in every direction; and the frame is to be held steadily during the operation.

Fig. 3. A lenticular. This instrument is sharp on one side,

* In the arrangement of the figures in the plates, the principal object has been, to introduce as many as possible; but in describing them, the instruments particularly connected as to their uses are generally explained in succession, without regard to their numerical distribution.

side, and the button at the end is hollow for receiving the pieces of bone scraped off.

Fig. 4. A raspatory, for removing the pericranium.

Fig. 7. A perforator, for forming a hole for the reception of the pin of the trepan. The head of it is to be exactly of the size of that of the saw, as it is connected to the handle of the trepan in the same manner.

Fig. 8. A common gum lancet.

PLATE II.

FIG. 1. Forceps for removing the bone, in the operation of trepanning. They are not here represented of the full size.

Fig. 2. An amputating knife. This instrument is different in form from the common knife, delineated by Mr. Bell: It serves for every mode of amputation, and renders the catlin totally unnecessary. It may be about a foot in length, including the handle, and an inch and a quarter in breadth at the broadest part.

Fig. 3. A small spring saw, used in amputating the fingers or toes.

Fig. 4. Forceps for extracting polypi from the nostrils. This instrument should be somewhat curved when used for polypi in the throat. See chap. xxxi. sect. 4.

Fig. 5. An instrument invented by Dr. Hunter, of London, for applying ligatures around polypous excrescencies in the uterus.

PLATE III.

FIG. 1. Mr. Freke's machine for reducing luxations. In order to render this instrument readily portable, it is divided in the middle, and the two halves are connected by brass hinges at C, and by two hooks and eyes on the other side of it. It thus forms, when shut, a box only one foot

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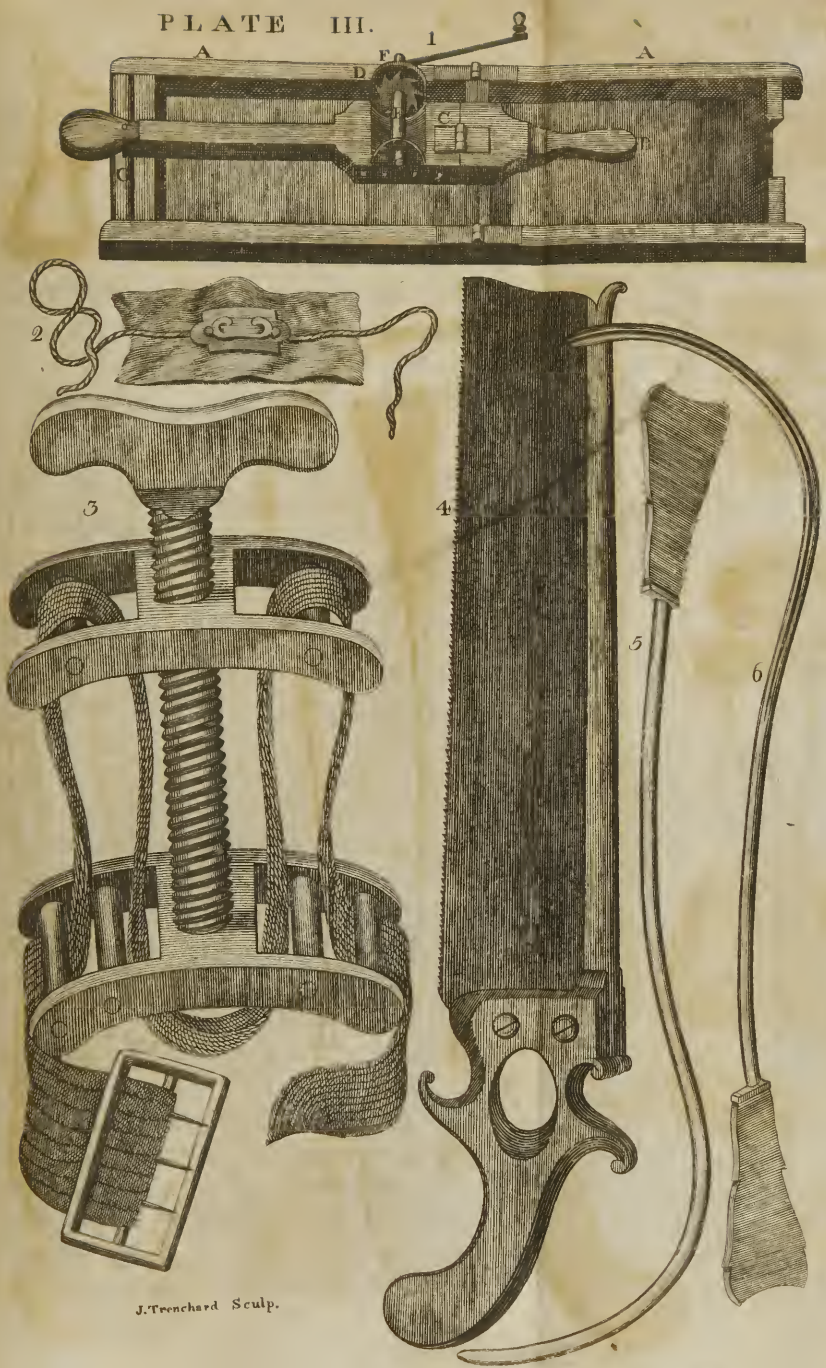
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PLATE II.



J. Trenchard Sculp.

PLATE III.



J. Trenchard Sculp.

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foot eight inches long, nine inches broad, and three inches and a quarter deep. When one end of it is fixed on the ground, the other stands high enough to become a fulcrum or support to the lever B, which is fixed on the roller E by a large wooden screw, which turning side-ways, as well as with the roller, forms a circumrotatory motion, so that it may serve to reduce a luxation either forward, backward, or downward.

The roller on which the lever is fixed, is just the diameter of the depth of one of the boxes, and into it are driven two iron pins, the ends of which are received by the sides of the box, which are an inch thick.

The lever is two feet four inches long, and is cut, and connected again by hinges at C, to fold up so as to be contained in the box: On the back part of it is a hook to keep it straight; one end of it is to hang over the roller G, an inch and an half, which is to be excavated and covered with buff leather, for the more easy reception of the head of the os humeri.

The iron roller E has two holes through it, for receiving two cords from a brace, fig. 2. fixed on the lower part of the os humeri. This roller has a square end on which is fixed a wheel D, notched round, which works as a ratchet on a spring ketch under the lever, by which it is stopped as it is wound up with a winch; so that at pleasure it may be let loose by discharging the ketch.

The brace, fig. 2. consists of a piece of buff leather, large enough to embrace the arm, sewed on two pieces of strong iron, curved plates rivetted together, one of them having an eye at each end to fasten two cords in; the other is bent at the ends into two hooks, which are to receive the cords after they have crossed the arm above.

In order to keep the patient steady in his chair, and to prevent the scapula from raising or depressing the lever, after the limb is drawn forward by the winch, there must

be

be fixed over the shoulder, a girth, with two hooks at the end of it: This should be long enough to reach the floor on the other side, where it must be hooked into a ring screwed into the floor.

Mr. Bell observes, that the strap or girth presses down the scapula, and thus impedes the reduction; he therefore proposes, that it should either be altogether wanting, or made with a slit to pass over the arm, so as to draw back the scapula, and instead of passing obliquely downwards, that it should go straight across, and be fixed in a post on a line with the shoulder. The lever of this instrument should, he thinks, be *fixed*, so as to serve only for a support to the arm; or if it is ever used as a lever, it should be managed with the utmost caution; but this appears to him both dangerous and unnecessary.

The great advantage of this machine is, that we by it are able to apply any necessary force in the most gradual manner, and in any direction.

Fig. 3. A screw tourniquet. Every part of this instrument is here represented of the full size; it may be made either of brass or steel; and the strap connected with it ought to be of very firm materials, at least an inch broad, and of a length rather more than sufficient to pass round the largest part of the extremities.

As an improvement on this instrument, as here represented by Mr. Bell, a small screw has been made to pass through the upper part of the large female screw, so as to enable the operator himself to keep the strap fixed to any degree of tightness.

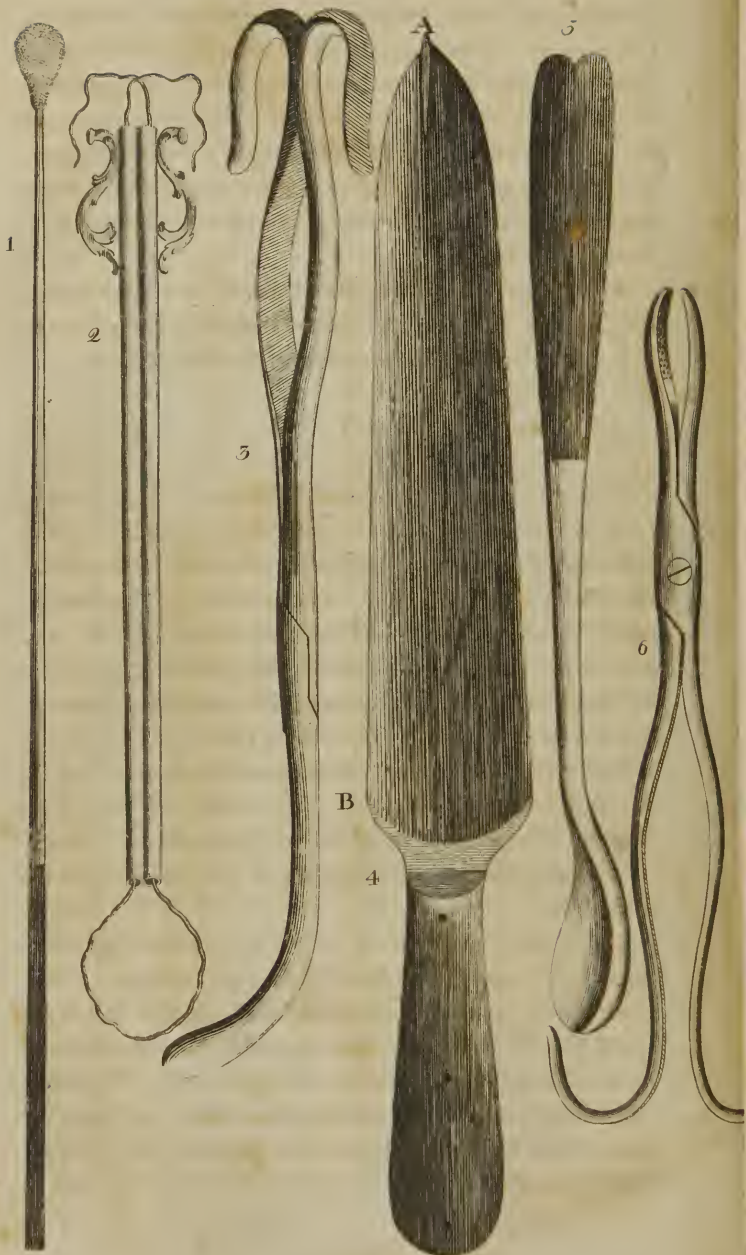
Fig. 4. An amputating saw. This should be about seventeen inches in length, including the handle, and two inches and a quarter in breadth, at its broadest part.

Fig. 5. A common sound or staff, used in searching or sounding for the stone.

Fig. 6. A grooved staff for the operation for lithotomy.

The

PLATE IV.



The groove is here represented on the side, which is preferred by some, to having it on the back, in the usual way. The termination of the groove should always be perfectly free and open, otherwise it will be difficult to disengage the gorget from it; and its edges ought to be very smooth. If the instrument has a greater degree of convexity than here represented, it is not easily introduced, and always injures the urethra.

A staff for a full grown subject should be twelve inches long, besides the handle; and for children of seven years and under, should be from seven to nine inches long.

PLATE IV.

FIG. 4. A gorget somewhat different from the usual form which is represented by Mr. Bell. This instrument only differs from the common gorget in the construction and direction of its handle. The handle is made of wood, and is in the same general direction with the blade, but bent downwards, so as to form a very obtuse angle with it. In the common gorget, the handle is made in the manner of that of the cutting director in plate v.

For adults, the gorget should measure from A to B, five inches and an half; and at its widest part one inch. The beak should be turned a little forward, and should be carefully adapted to the groove of the staff with which it is used.

Fig. 3, 6. Different forms of forceps for extracting the stone. For adults, they should be ten inches long. Their blades should not meet when shut, and the teeth should be small, forming merely a roughness, and be confined to within an inch of the extremity of the instrument. These circumstances will save the bladder from injury, and prevent small stones from being fixed near the joint, and thus dilating the instrument.

Fig. 5. A scoop for removing small pieces of stone that cannot be taken up by the forceps.

Fig. 1. A probang, for pushing substances fixed in the œsophagus into the stomach. It consists of a piece of soft sponge, firmly tied to a piece of flexible polished whalebone, from fifteen to sixteen inches long.

Fig. 2. A double canula for removing polypi from the nostrils. When the polypus is seated in the throat, a canula somewhat curved at the end, answers better than the straight one here represented.

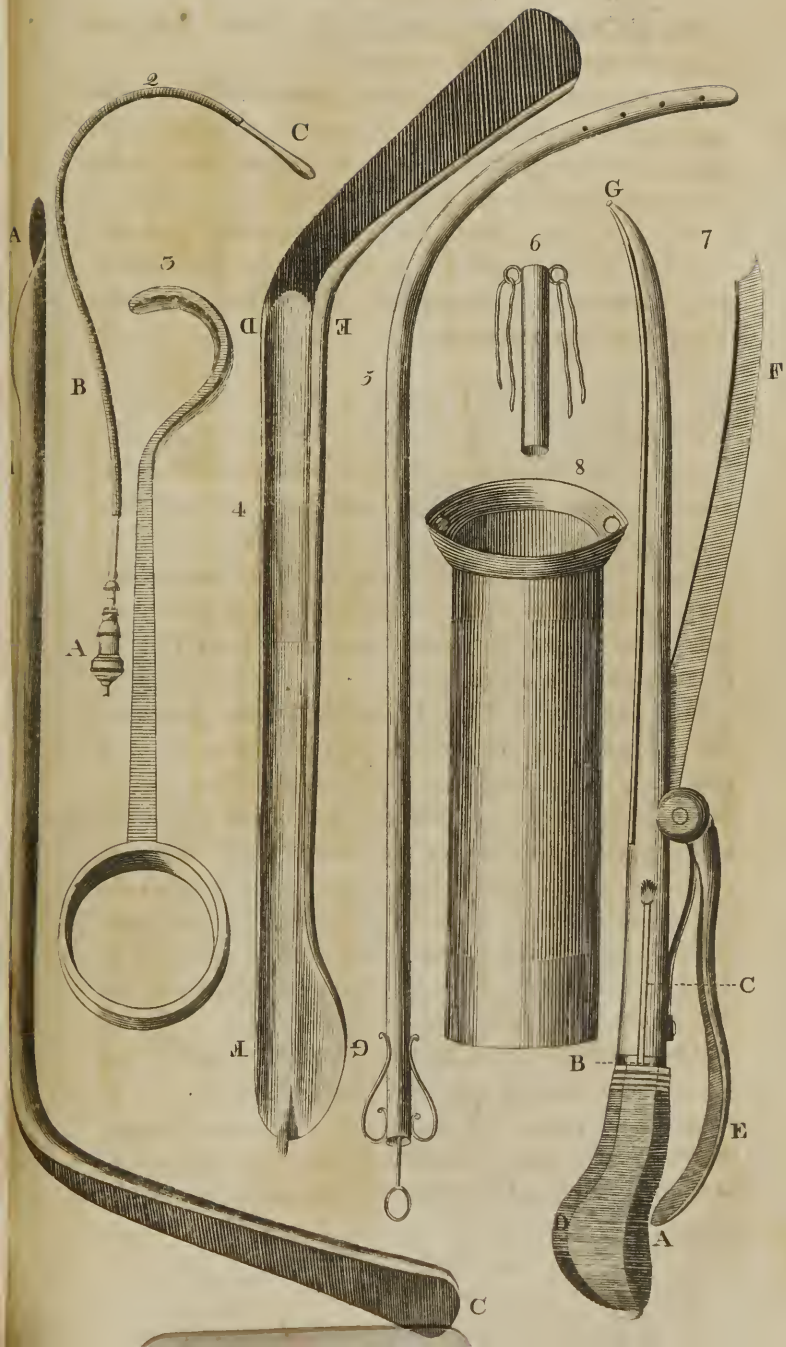
PLATE V.

FIG. 1. A side view of Mr. Bell's cutting-director. It should be, for an adult, five inches from A to B, and three inches from B to C.

Fig. 4. A front view. This instrument, in the grooved part, should be exactly three-eighths of an inch broad, viz. from D to E; and the cutting part of it from F to G, should measure nearly an inch.

Fig. 7. A view of Frere Cosme's instrument for lithotomy, opened. If the spring C is pressed upon, so as to raise it out of the nitch B, (of which nitches there are several) as the handle A is made to move upon a pivot, it may be turned, and the projecting part of it D, being turned entirely round, and pressure applied to E, it will raise the knife F to the elevation here represented. The point G should be made blunt and round, so as to run freely in the groove of a staff. The length of this instrument, including the handle, should be ten inches.

After making the incision with this instrument, the forceps may either be introduced upon the forefinger, or upon a blunt gorget. It is asserted that a wound of any determined size may be formed by this lithotome cachée, as it is termed: And it is preferred by some to the gorget, because



cause it makes but one cut, while with the gorget, if the greatest care is not employed we will be very apt to make two: This, however can only arise from inattention. See page 175 to 183.

Fig. 8. A silver canula of a flat form, for compressing the arteries cut in lithotomy which lie too deep to be tied.

This tube should be four inches in length, and an inch broad: The holes in the brim of it are for the purpose of connecting it, by pieces of tape, to a circular bandage passed around the body.

Fig. 5. A male catheter of silver. The holes near its extremity answer better than a slit, which is sometimes made, as with these it is not so apt to be entangled with the urethra. Female catheters are usually made straight, or with a very small degree of curvature; and rather more than half the length of the male. The female sound should always be curved. Catheters have been also made of leather, of flexible wire rolled into the form of a tube, and covered with bougie plaster, and of the caoutchouc or elastic gum or resin.

Fig. 2. A machine for injecting tobacco smoke by the anus. A is a brass box for containing burning tobacco, screwed on a small brass tube, which is connected to an elastic leather pipe, wound round with brass wire B, and which is again fitted to a common glyster-pipe C. In both ends of the box there is a division of thin brass, perforated with small holes; one, for the admission of air, and the other, for the transmission of smoke. To the box, a pair of double bellows is to be connected.

The bellows should be of the common size. The box should be an inch and an half in diameter, and three inches in length: the brass tube should be six inches in length, and a quarter of an inch in diameter. The leather pipe ought to be nearly of the same diameter with the tube, and

about two feet and an half in length. The glyster pipe should be somewhat larger than those in common use.

Fig. 3. A hook for enlarging the foramen ovale, in herniæ of that part.

Fig. 6. A silver canula, for introducing into the urethra after amputating the penis.

PLATE VI.

FIG. 1. A new form of speculum oculi. The handle of it may be made either of steel or of wood, but the rest of it should be either of silver or of finely polished steel. In order to enable those who think it the best practice to withdraw the speculum, in operating for the cataract, while the knife or needle is in the eye, a vacancy may be left in the circular part.

Fig. 2. A bandage for the eyes. It consists of two pieces of polished wood excavated into the form of cups, and covered with a black or green ribband.*

Fig. 5. A couching needle to be used with the right hand in operating on the right eye.

Fig. 7. A flat oval couching needle.

Both of these instruments are represented of the full size. The handles should be made of light wood, and the steel part should be exquisitely polished. Neither of them should exceed forty grains in weight.

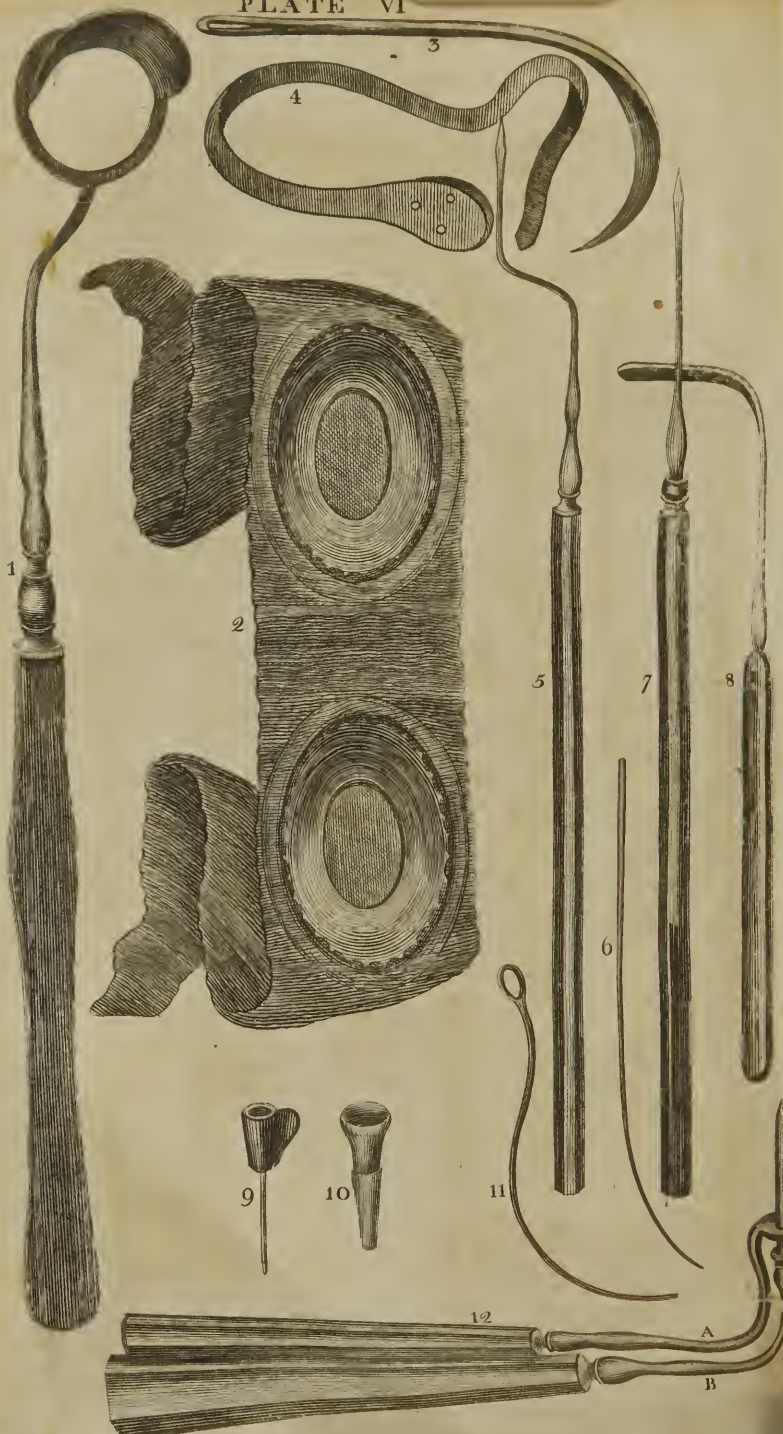
Fig. 8. A flat probe, made of gold or silver, for inserting through the pupil, in order to tear an opening in the capsule of the crystalline lens.

Fig. 3. A flat round-pointed needle, somewhat sharp at the end, for passing a ligature around the artery, in
cases

* This bandage, with the difference of having a small perforation made opposite to the pupil of each eye, might be used in cases of strabismus in children.



PLATE VI



cases of aneurism, and around the spermatic cord, in extirpating the testis.

Fig. 4. A spring or steel truss, for an inguinal hernia of the right side. There is a bolster or pad, for pressing upon the opening through which the parts protrude, at one end, and the leather with which the steel is covered, is formed into a strap having several perforations near the end, for connection with the knobs on the back of the pad. They sometimes have a strap to go between the legs, but this is in general unnecessary; and are necessarily double when there is a hernia on both sides.

Fig. 6. A curved probe to be inserted into the lachrymal puncta.

Fig. 11. A curved probe to be inserted, by the nostril, into the nasal duct of the lachrymal sac.

Fig. 9. A small tube, of the size of the lachrymal puncta; injections are thrown through this into the sac. The injections are thrown into this tube by a syringe, with a long and small pipe.

Fig. 10. and 12. Instruments employed by Mr. Pellier in the operation for fistula lachrymalis. Fig. 10. is the tube for leaving in the passage. Fig. 12. B is the perforator introduced through A the compressor.

PLATE VII.

FIG. 1. A sharp curved probe for removing the crystalline lens in the operation proposed in page 294.

Fig. 2. One of the best forms of the knife used in the operation of extracting the cataract. It should be tolerably strong, and highly polished. Near the point, both sides of it should be sharp, by which the cornea is more easily penetrated; but the other part of the back should be round, which gives strength to the instrument, and lessens the risk of hurting the iris.

Fig.

Fig. 4. A knife of a similar form with the former in the cutting part, but curved, for performing the operation on the right eye with the right hand.

Fig. 8. A scoop for removing either the whole or any part of the lens, when it lodges in the pupil, or in the anterior chamber of the eye between the iris and cornea, in attempting its extraction.

Fig. 3. A blunt curved bistouri.

Fig. 5. One of the best and most useful forms of curved needles. It should have no edge on its concave part, and be made somewhat round like a lancet, on both sides.

Fig. 6. A tenaculum.

Fig. 7. The canula of the trocar, fig. 10. The trocar here represented is of the form of a flat oval; and penetrates with much more ease than the common round trocar with a triangular pointed fillette.

Fig. 9. A hook for separating the eye-lids. It should be made either of polished silver or steel.

PLATE VIII.

FIG. 1. A scarificator for opening abscesses in the throat, and for scarifying the amygdalæ. The wings to the canula, are for compressing the tongue.

Fig. 2—5. An instrument for stuffing hollow teeth with gold or lead, or for burning the nerve of a tooth.

Fig. 3. Mr. Mudge's inhaler, for conveying steams of warm water, and other liquids, to the throat and breast. When used, the grating A ought to cover the hole near it which shews the passage to the valve. Fig. 6. A section of the cover, in which is shewn the construction of the cork valve B, and also the conical part C, into which the flexible tube D is fixed.

When the inhaler, which holds about a pint, after being three parts filled with hot water, is fixed in the arm-pit, under the bed-clothes, the end of the tube E is to be applied

1



PLATE VIII



J. Trenchard Sculp.

plied to the mouth; the air, in the act of inspiration, then rushes into the apertures F, and passing through the hollow handle, and afterwards into a hole in the lower part, where it is foldered to the body, and therefore cannot be represented, it rises through the hot water, and is received into the lungs, impregnated with vapour. In expiration, the contents of the lungs are discharged upon the surface of the water; and instead of forcing the water back through the hollow handle, the air escapes by lifting the round light cork valve B, so as to settle upon the surface of the body under the bed-clothes. Thus respiration is completely performed without removing the instrument from the mouth.

The flexible part of the tube D, is about six inches long, and fitted with a wooden mouth-piece E, at one end, and a part G of the same materials at the other, to be received into the cone C on the cover. This flexible tube is made by winding a long slip of silk oil-skin over a spiral brass wire. This should be then covered with a slip of the same size of thin silk, and both secured by strong sewing silk, wound spirally round them.

Care should be taken that the different parts of this machine be closely fitted to each other: And it is necessary that the area of the holes on the upper part of the handle, taken together, the size of the hole in the lower part of the handle and which opens into the inhaler, the opening of the conical valve itself, and that in the mouth-piece, as well as the cavity or inside of the flexible tube, should be all equally large, and of such dimensions, as to equal the size of both the nostrils: And thus respiration may be performed with ease.

Fig. 4. A small scoop; the most convenient instrument for removing peas, and other substances, which may get into the nostrils or ears.

Fig. 7. Is a representation of a species of forceps, of which

which Mr. Bell gives no figure. They are very convenient for the purpose of supporting the parts during a dissection, and answer tolerably well for drawing out blood-vessels, when the use of forceps is thought advisable. The pin rather higher than the middle of the instrument, is rivetted to one blade, and passes through a small perforation in the other; its use is to keep the blades directly apposed.

PLATE IX.

FIG. 1. A broad flat needle, for introducing cords or setons.

Fig. 2. An acoustic, or instrument for concentrating sound in cases of deafness: Of this there are various forms.

Fig. 3. A pair of nippers, or cutting pliers, for removing splinters of bone.

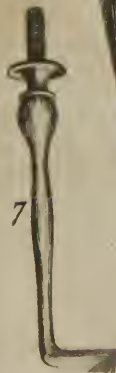
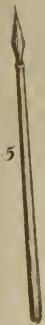
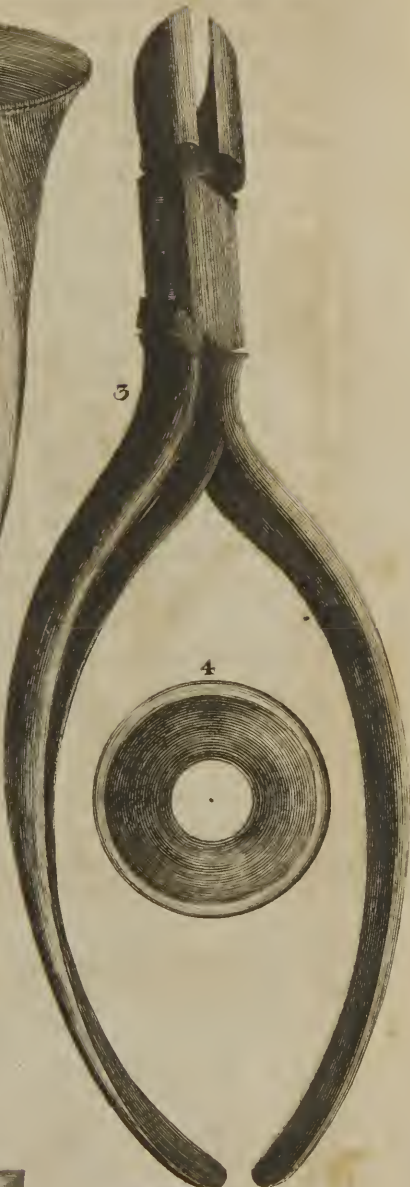
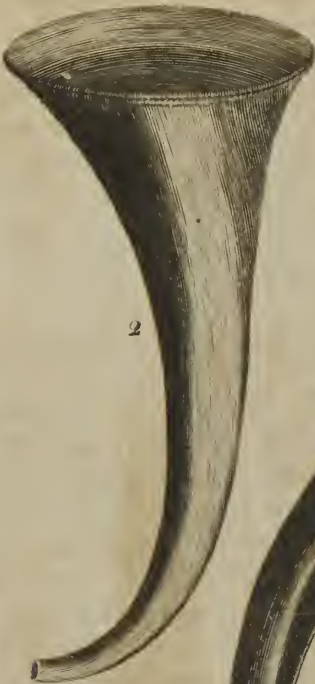
Fig. 4. A pessary. Pessaries may be made of any firm wood, and should be very highly polished. Before introducing them, they should be oiled, and have a string connected to them, in order to admit of their easy removal.

The pessaries made of sponge immersed in glue, or melted wax, compressed till cold, and then cut into proper forms, answer very well, and particularly if covered with soft waxed linen, to hinder them from fretting the parts. Those of the elastic resin loose their elasticity too soon.

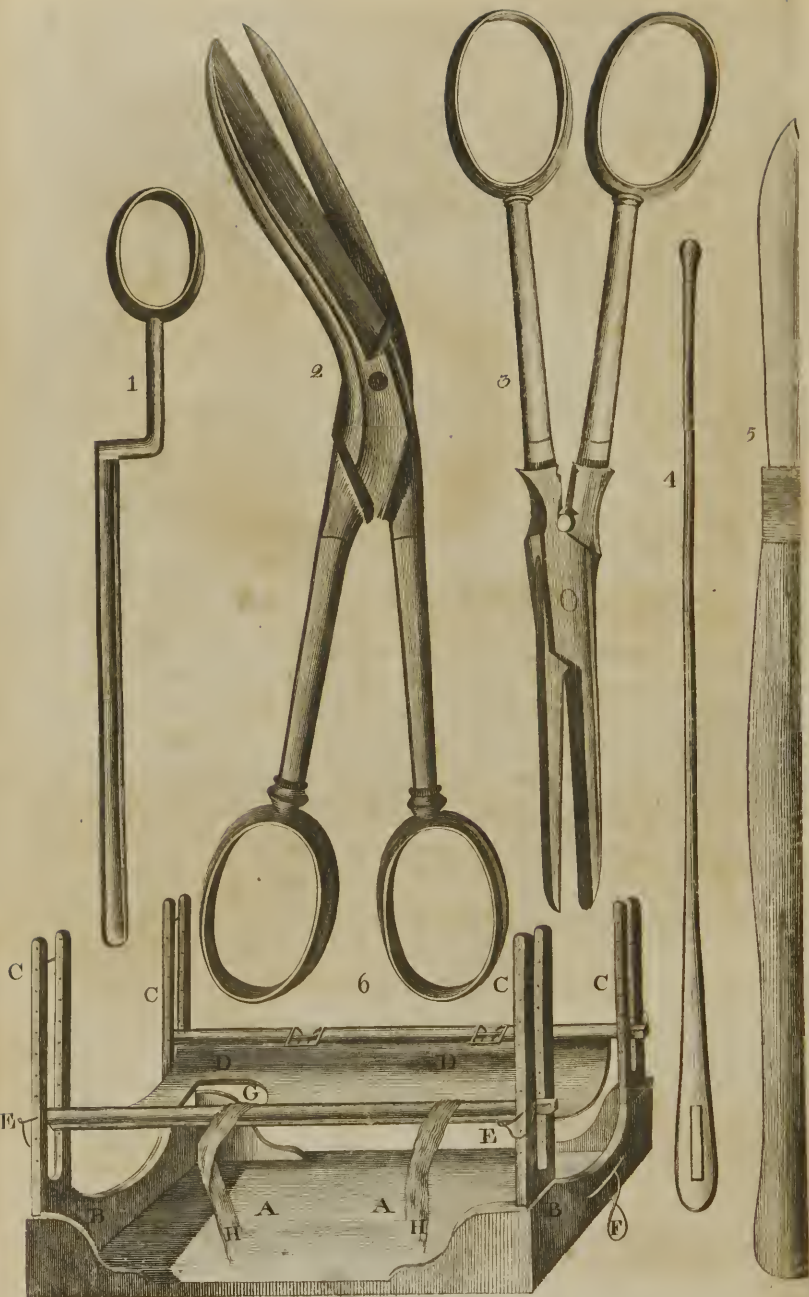
Fig. 5. A flat pin for the operation of the hare-lip. The end of the pin should be of gold, and the point of steel.

Fig. 6. and 7. Two different forms of scaling instruments, for removing tartar, and other matter from the teeth. There is much variety in the form of instruments of this kind.

PLATE IX



J. Trenchard Sculp.



P L A T E X.

FIG. 1. A director. Fig. 2. A pair of crooked scissars. Fig. 3. A pair of Forceps. Fig. 4. A seton probe: Probes are sometimes made small and pointed at one end, instead of having an eye. Fig. 5. A scalpel: When this is intended for a pocket case, the handle must be made in the manner of that of the bistouri. (pl. vii. fig. 3.)

These instruments, with the bistouri, a tenaculum, (pl. vii. fig. 6.) a scarificator, or gum lancet, (pl. i. fig. 8.) a pair of straight scissars, a case for caustic and red precipitate, a spatula, and a few crooked needles, form a complete set for a pocket case.

Fig. 6. A fracture box.* A A. The base or bottom, formed of deal an inch and an half thick. BB, the two ends rising from the base, and terminating in the pillars CCCC. These may either be fixed to the pillars, or, in order to render the machine portable, be made moveable, and fixed for use by a double pin at each end F. DD, an excavated moveable piece of wood for supporting the fractured limb. This part of the machine may be raised to any height by the pins EE passing through the holes in the pillars CCCC; and it may at pleasure be raised at one end, and depressed at the other. HH, two straps connected with buckles on the opposite side for fixing the limb after it is properly placed. Before laying down the leg, the dressings should be all applied, and the excavated part of the box lined with soft wool.

* This machine is seldom made use of in this place. Compound fractures are dressed as lightly as possible, with the bandage and splints used in simple fractures. A third splint, applied to the back of the leg, in fractures of this part, will enable the patient to lie on his back occasionally, and thus answer in some degree the intention of the fracture box.

wool. G, a hole for receiving the heel, to prevent it from being hurt when the leg is stretched out.

PLATE XI.

FIG. 1. A jugum, for compressing the urethra. It consists of a piece of elastic steel, lined with velvet or soft flannel. By means of the screw, A, its width can be regulated; and the cushion B being placed upon the urethra, any necessary degree of pressure can be applied to it, without interrupting the circulation in the penis to any considerable degree.

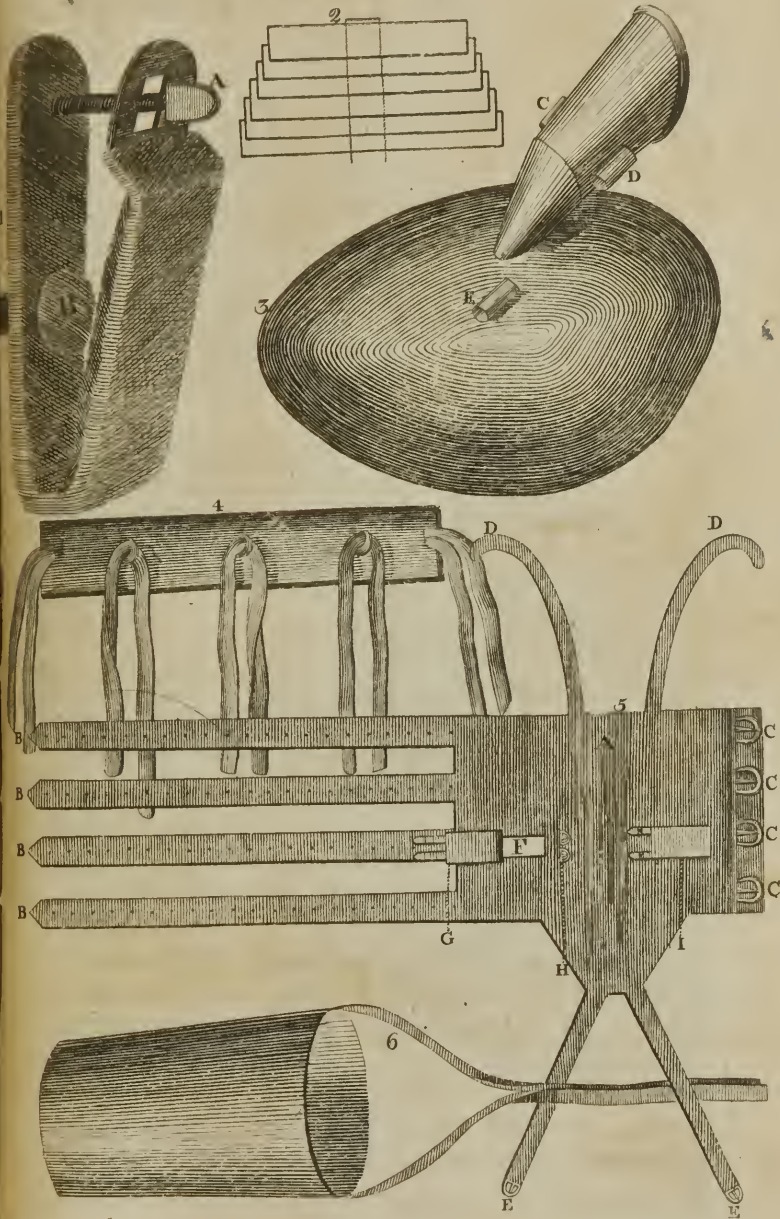
Fig. 3. A receptacle for the urine. It may be made of tin, silver, or any other metal: It is convex on one side, and concave on the other which is applied to the thigh. CD, two tubes for connecting the part into which the penis is put, by tapes, to a bandage passed round the body. F, a small tube for fixing the instrument to the thigh. It may contain three or four gills.

Fig. 2. A manifold bandage, of 12 tails.

Fig. 4. This very useful part of the apparatus for extending dislocated limbs, is formed of thick shamoy or buff leather. It is to be tied firmly around the limb with the straps at each end; and the extension is made by assistants pulling the straps passed over the hooks: It answers much better than towels, which are usually employed.

Fig. 5. A bandage for compressing the abdomen during and after the operation of the paracentesis: It is made of soft leather lined with flannel. A the body of the bandage, which should reach from ilium to ilium, to be there fixed by the straps BBBB to the buckles CCCC. The straps DD, by passing over the shoulders, serve to fix the buckles EE, which pass through between the thighs. The perforation is to be made through the window F, which afterwards

PLATE XI



afterwards is shut by the straps G, and the buckles H, as represented by the letter I.

Fig. 6. A pessary for the prevention of herniæ in the vagina. As steel is apt to rust, this tube should be made of gold, silver, or ivory, with a cord at one extremity, for the purpose of withdrawing it when necessary.

PLATE XII.

FIG. 1. A form of the best species of splints, for fractures of the extremities, perhaps yet invented.* This is not the most common form, which is oblong, of the same breadth all the way, but rounded at the ends; but it answers exceedingly well for the leg or arm. They are made by gluing a piece of wood† about the tenth of an inch in thickness, upon leather. The wood is afterwards cut through to the leather by a knife or a saw, in the manner represented in the figure.

These splints are preferable to pasteboard, because they have more firmness, with a sufficient degree of flexibility.

Fig. 2. and 7. Mr. Sharpe's splints.* They are formed of strong pieces of pasteboard made with glue; and are a little convex externally and concave internally. The first is the splint to be fixed on the outside of the leg: In general it should be eighteen inches long, and in width, two inches and three quarters at the strap next the knee, and two and a quarter inches at the other straps.

DFDFDF, represent three leather straps, being perforated near the ends to connect them to the knobs AAA on the splint fixed upon the internal part of the leg. These

4 E

straps

* To both these kinds of splints some prefer those made in the shape of Mr. Sharpe's, but formed of flexible pieces of whale-bone, connected by linen, nearly in the manner of women's stays, and fastened by thin leather or girthing straps in the mode of Mr. Sharpe's.

† Cedar is usually employed in this city.

straps should be from fifteen to twenty inches in length, and one in width, and must be sewed to the outside of the splint.

G, a part to support the foot; from E to H, it should be five inches.

C, The foot-strap, twelve inches long, sewed to the end of the splint, and passing under the heel and through the leather loop B on the upper splint, to the lowest pin A.

I, a hole, two inches long and nearly one wide, to receive the malleolus externus.

Fig. 3. A sling, or machine for supporting the fore-arm. AA, a case of firm leather properly lined with flannel and wool, of a sufficient length to cover the arm, from the elbow to the ends of the fingers, for the left side. B, a collar of soft buff leather for passing over the right arm, in order to support the fore part of the case; this it does by means of the strap F passing over the left shoulder and fixed to a buckle at C, to prevent it from slipping down. GH, two straps and buckles for fixing the arm to the case.

Fig. 6. A machine for supporting the head and shoulders; and commonly employed in distortions of the spine. A, an iron collar, properly covered, for passing round the neck. By means of the long iron plate connected with this, it may be raised or depressed at pleasure. BBB, a broad iron plate, fitted to the back and shoulders. CC, two straps, to be carried over the shoulders, brought beneath the arm pits, and fixed to two knobs on the shoulder plates. D, a strap for fixing the plate going down the back, by being tied round the body.

Fig. 4. An artificial leg, made of firm hardened leather. A, an oval piece of the same kind of leather lined with shamoy, fixed upon a plate of iron C, and moving upon an axis at the knee. The strap I, with the buckle connected with it, serves to fix it to the thigh. There must also be an oval piece connected with a similar piece of iron

on the opposite side of the thigh: These plates and pads should reach about nine inches up the thigh. B, a strap that comes from the sole of the foot, and goes up the inside of the leg to the middle of the thigh, where it is fixed by a buckle, to a strap coming from the opposite shoulder; this serves to support the leg very effectually.

Fig. 5. A piece of soft shamoy leather, which fixes by a buckle and strap round the condyles at the knee, and prevents the consequences of the leg rubbing against the knee: The stump hanging loose within the leg, the friction is entirely sustained by the condyles and patella.

Fig. 8. An artificial fore-arm and hand, made of the same materials, to be fixed to the shoulder by the straps DE.

The legs abovementioned are equally useful with the common wooden legs, and preferable from being neater, and not liable to break: and they answer better than those of copper from being considerably lighter, and not apt to be misshapen by bruises.

Mr. Wilson, of Edinburgh, who is the inventor of this species of artificial legs and arms, makes three different kinds, corresponding to the part at which the limb is amputated. When the leg is taken off lower than the usual place below the knee, as recommended in chap. xlvi. sect. 4, the leg above represented answers. The second kind is intended for those cases where the amputation has been performed at the usual place below the knee; the knee then rests upon a soft cushion, but has no flexion; and the hollow for receiving the thigh goes nearly up to the hip: It is fixed with straps and hooks, and opens behind to receive the thigh. When the limb is taken off above the knee, a joint is formed in the artificial leg. In walking, the limb is made steady by a steel bolt, running in staples, on the outside of the thigh, being pushed down; the knee is rendered flexible by this bolt being pulled up.

The

The rest is obtained from the leg embracing the upper part of the thigh, and from the hip resting upon the stuffed thigh-box.

The artificial arms are covered with white lambskin, coloured so as to resemble the human skin. The nails are of white horn coloured. The joints are made in the shape, and so as to have the motions, of the natural joints. The fingers and metacarpus are made up to the proper form, with soft shamoy leather and baked hair. In the palm of the hand there is an iron screw, in which a screw nail is occasionally fixed. The head of this nail is a spring plate, so made as to hold a knife and fork: And by means of a brass ring on the first and second fingers, a pen may be used for writing.

The quantity of parts to be supplied, must determine whether the straps are to be connected to the arm alone, or to the arm and shoulder.

I N D E X.

A.

A BSCESSES in general, - - -	9
the antrum maxillare,	328
breasts of women,	425
globe of the eye,	272
gums,	327
liver,	423
lumbar,	431
Affections of the brain from external violence,	235
Air extravasated into the thorax, - - -	226
Albugo, - - - -	279
Amputation in general, - - - -	527
of the arm, - - - -	554
at the shoulder, - - - -	552
cancerous mammæ, - - - -	233
the foot, - - - -	551
fingers, - - - -	551
leg, - - - -	543
penis, - - - -	164
thigh, - - - -	536
at the hip, - - - -	546
toes, - - - -	551
with a flap, - - - -	545
above the knee, - - - -	548
below the knee, - - - -	550
Anasarca, - - - -	451
	Aneurisms,

Aneurifms,	-	-	-	-	100
false or diffused,	-	-	-	-	103
true or encysted,	-	-	-	-	100
varicose,	-	-	-	-	102
Angina	-	-	-	-	423
Anus imperforated,	-	-	-	-	207
Arteriotomy,	-	-	-	-	96

B.

Bandages,	-	-	-	-	567
Blood effused into the eye-ball,	-	-	-	-	276
Blood-letting in general,	-	-	-	-	84
the arm,	-	-	-	-	93
ankles and feet,	-	-	-	-	95
hemorrhoidal veins,	-	-	-	-	96
jugular vein,	-	-	-	-	94
tongue,	-	-	-	-	96
topical,	-	-	-	-	97
Bones, removal of the ends of	-	-	-	-	554
Bougies,	-	-	-	-	195
Bronchocele,	-	-	-	-	453
Bronchotomy,	-	-	-	-	228
Buboes, venereal,	-	-	-	-	427
Burns,	-	-	-	-	417

C.

Cæfarean section,	-	-	-	-	559
Calculi urinary,	-	-	-	-	166
Cancer of the eye-ball,	-	-	-	-	282
breast,	-	-	-	-	233
lip,	-	-	-	-	323
Carbuncle,	-	-	-	-	13
Castration,	-	-	-	-	159

Cataracts

Cataracts,	-	-	-	-	284
depression of	-	-	-	-	287
extraction of	-	-	-	-	291
Cerate, common,	-	-	-	-	25
faturnine,	-	-	-	-	26
Chilblains	-	-	-	-	435
Cirfocele	-	-	-	-	154
Compression of the brain from external violence,					237
Concretions of the eye-lids,	-	-	-	-	268
within the capsular ligaments,					448
Concussion of the brain,	-	-	-	-	247
Contusions	-	-	-	-	437
of the head,	-	-	-	-	251
Corns,	-	-	-	-	458
Couching,	-	-	-	-	287
Cupping,	-	-	-	-	97

D.

Deafness,	-	-	-	-	354
from imperforated meatus auditorius,					355
excrescences in the meat. audit.					356
extraneous bodies in the meat. audit.					<i>ib.</i>
wax in the meatus auditorius,					357
Dentition,	-	-	-	-	324
Dislocations,	-	-	-	-	494
Distortions of the limbs,	-	-	-	-	521
spine,	-	-	-	-	524
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