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A
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BY
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ILLUSTRATED WITH COPPERPLATES.

VOLUME I.

SECOND AMERICAN, FROM THE SEVENTH EDINBURGH EDITION,

CORRECTED AND ENLARGED.

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PREFACE

TO THE

SEVENTH EDINBURGH EDITION.

I HAVE reason to hope, that this, the seventh edition of my System of Surgery, will be found considerably improved : I have been at pains to insert in it all such real improvements as have been made in Surgery since the first editions of it were published ; and to give representations of such useful instruments as have been invented during that period.

It is also my intention, still to keep these objects in view, and to incorporate in such future editions as may be called for, every improvement in Surgery with which I may become acquainted.

I must, however, observe, that I do not engage to notice all that may be mentioned to me as improvements, or that authors may judge proper to publish : for not having done so, I have already indeed been pointedly blamed : but authors should recollect, that with whatever partiality they may view their own productions, and those improvements which they themselves or their friends may bring forth, that others may not value them so highly.

Anxious to avoid controversial writing, in which, a full occupation of my time, in what I judge to be more useful pursuits, does not permit me to engage,

and to which my inclination is altogether adverse, nothing shall tempt me to give way to it. This remark I am induced to suggest, from being informed, that some have written in such a petulant manner on different parts of my publications, as if they wished and expected I should reply to them: books of this kind, however I shall never read: no advantage could accrue to this or any other publication, nor credit to myself, from replying to authors who seem chiefly to write for the purpose of declaiming against others, and for asserting their own superiority over all who have gone before them: leaving others to act in this matter as they may judge proper, I shall continue, as I have hitherto done, without regard to the opinions of individuals, to detail, what from experience and observation I know to be the best practice, and to state my opinions clearly and decidedly; but without attempting to force those opinions upon others, I shall allow the Public to determine, whether these, or those of other men, submitted to their consideration ought to be followed.

In speaking of the late improvements in Surgery, I have elsewhere observed, what may here with propriety be repeated, that were I to endeavour to trace all that have been proposed within these last fifty or sixty years, I should often find it difficult, and in some instances impossible, to determine, by whom the practice, as it is now established, was introduced; and in order to give a fair account of the progress of the different operations of surgery, from their rude to their

PREFACE.

improved state, I should be obliged to enter on a full chronological history of each : while this kind of inquiry could serve no useful purpose, it would tend to render more prolix, a work which, from the variety of its objects, must necessarily extend to a great length : I shall, therefore, in general, decline it : when the author, however, of any remarkable improvement is with certainty known, I shall never fail to give him all the credit which his discovery seems to merit : but to notice every inconsiderable alteration that may be proposed upon instruments and operations, and to enumerate the opinions contained in many publications, often the productions of men of no practice or observation, as it could tend to no utility, it will not therefore be attempted.

I have also formerly remarked, that I wish every where to avoid theoretical disquisitions : when the subject under consideration can be rendered more clear and intelligible, I have occasionally employed such reasoning as experience and common sense seem evidently to support ; but I have studiously guarded against the discussion of doubtful speculative opinions : in addition to this, I may observe, in the words of a celebrated German practitioner, that I have carefully avoided general maxims : in no science, he very properly observes, does self-sufficiency, or bold and general assertions, and decided axioms, more certainly mark ignorance and want of experience than in the science of medicine.* Infomuch, that in whatever

* Aug. Gottlieb Richter, M. D.

publication they abound, there is much cause to suspect that the author has not enjoyed those full opportunities of observing the progress of diseases, and the numberless varieties that they assume, which every man ought to have done before he attempts to give information to others.

To this publication it has been objected by some, that it is too minute, and of course too extensive. But it must be recollected, that it is chiefly written for those who are learning, or who are yet young in the profession of surgery, and not so much for men of experience, who alone have stated this objection, and who in this instance seem to have forgot the steps by which they themselves gained the knowledge which they possess, or that they ever required assistance in the more early part of their surgical pursuits. It was the want of this kind of assistance, when I entered on the study and practice of surgery, and which at that time was generally felt and complained of, that first suggested to me the propriety of publishing this work; and if it shall continue to afford to the younger part of the profession, what I have reason to hope it has hitherto done, an easier method than they formerly possessed, of acquiring knowledge in the practical part of surgery, and of the principles on which it is founded, I shall not be disposed, from the remarks of a few, to alter the manner in which it is written. At some future period, I, or my son, now engaged in the same profession, may give an abridgement of the whole, which may serve as a manual or directory, for those

who are occupied in the line of chirurgical operations ; but the concise description of an abridged work, would be ill calculated for those who have seen nothing, and who have therefore all to learn.

In this and the sixth edition, a considerable change will be perceived in the arrangement of the subjects ; and the volume on Inflammation and Ulcers, formerly published separately, makes part of the present work. A general index is also subjoined to the last volume.

With a view to illustrate this work, and to give me an opportunity of adverting more particularly than can be done in a general system, to many of the more important parts of surgery, I have, for many years past, been occasionally employed in arranging for the press, narrations of such accidents and diseases, in the management of which I have been personally concerned, as I conceive will answer this purpose ; and they will be judged to be the more valuable, as a great proportion of all that I shall select will relate to circumstances, in which I have had occasion to act on consultation with other practitioners. Two volumes of this kind are nearly ready, and will be published as soon as they are finished, under the title of, “CONSULTATIONS and OBSERVATIONS on many of the more important parts of surgery.”

EDINBURGH, }
Sept. 1, 1801. }

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ERRATA.

VOL. II.

Page 39, 3d line from top, for fig. 2. read fig. 5.

VOL. III.

Page 202, 15th line from top, for fig. 1. read fig. 3.

Page 235, 4th line from bottom, for fig. 5. read fig. 4.

VOL. IV.

In Explanation of Plates, (error in copy.) Plate II. fig. 2.
for Chap. XIII. Sect. I. read Chap. VIII. Sect. I.

A
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CHAPTER I.

ON INFLAMMATION.

SECTION I.

Of the Symptoms and Causes of Inflammation.

§ 1. *General Remarks on Inflammation.*

INFLAMMATION is the most frequent, as it is, perhaps, the most important, object of the surgeon's attention. We daily meet with it as the consequence of operations, and in the treatment of wounds, contusions, and ulcers. It is therefore considered as a fit subject for the first article of a System of Surgery.

Every organized part of the body is liable to inflame, but as the inflammation of internal parts is generally productive of symptoms which more properly fall within the province of Medicine, it would here be foreign to our purpose to give any account of them. I shall therefore treat of this symptom, and its various consequences, as they commonly occur in the external parts of the body; and as all the phenomena of inflammation will be understood

from the consideration of phlegmon, or local inflammation, any observations that I shall offer will be more particularly confined to that variety of the disease.

§ 2. *Of the Symptoms and Terminations of Phlegmon.*

PHLEGMÓN is a term which we apply to a circumscribed tumor, attended with heat, redness, tension, and a throbbing pain. These are the first appearances of phlegmon; and when they are slight, and the part affected of no great extent, they have frequently no apparent influence either on the pulse or health of the patient; but, whenever they are considerable, and the inflammation extensive, the pulse becomes quick, full, and generally hard; and at the same time, the patient complains of universal heat, thirst, and other symptoms of fever.

If, either by an effort of nature, or by the application of remedies, the pain, heat, and tension are removed, the other symptoms that I have mentioned likewise abate, and the patient soon gets well. This is justly reckoned the most desirable manner in which inflammation can in general terminate, and is termed Resolution.

When, instead of diminishing, however, the symptoms of heat, pain, and redness rather increase; when the febrile symptoms likewise augment, and the tumor acquires a larger size, turns soft, somewhat prominent in the middle, and acquires a clear shining appearance, the different symptoms of fever then abate, and on the tumor being compressed on each side, a fluid is found to fluctuate underneath. In this manner inflammation is said to terminate in Suppuration.

But when the pain and redness of the part increase, together with the fulness of pulse and other symptoms of fever, at the same time that the tu-

mor does not become more prominent, we have then reason to fear, that Gangrene or Mortification will ensue.

Mortification first appears by a change of colour in the part affected, which, from being of a bright red, becomes livid, while small vesicles, containing a thin acrid serum, are frequently dispersed over its surface; the pain abates; the pulse sinks, but continues frequent; the tumor at last loses its tenseness, turns black and flaccid, and thus terminates in a real mortified or dead spot.

These are the several ordinary consequences of inflammation. We shall now proceed to treat of the various causes by which it is induced, and lastly of the method of cure.

§ 3. *Of the exciting and predisposing Causes of Inflammation.*

THE exciting causes of inflammation, are, in general, whatever tend to stimulate, or produce pain: such as, all variety of wounds, whether simple, lacerated, or punctured, and with whatever instrument they may be produced; also bruises and burns, whether by the actual or potential cautery; likewise all corrosive and irritating applications, as, the different strong acids, cantharides, and all the class of rubefacientia. Ligatures may likewise be mentioned, and in some instances tumors that act as ligatures, by producing an undue compression on any of the blood vessels and nerves; as also, violent exercise of any particular member, and cold applied to a particular part.

These are the most common external causes of phlegmon: but there are others which tend to produce the same effect, which we are to consider entirely as internal; such are the different vitiated states of the fluids, excited by the presence of mor-

bid matters of different kinds, as the matter of lues venerea, small pox, and measles. Fevers, too, that end in critical inflammation, and consequent abscesses, seem likewise to act in the same manner.

Under one or other of these heads may be comprehended almost all the exciting causes of inflammation. I may here, however, observe, that there are other causes, which, with sufficient propriety, may be said to be of the predisposing kind, in so far as they tend to produce such a state of the system, as renders it more susceptible of inflammatory complaints than it otherwise would be. The most remarkable of these, is a plethoric habit of body, most frequently induced by full living; in some cases by want of due bodily exercise, and not uncommonly by a combination of both. We also observe, that inflammatory diseases are more frequent in young than in old people, and in men more than in women.

§ 4. *Of the proximate Cause of Inflammation.*

VARIOUS opinions have prevailed on the proximate cause of inflammation: some of which have never been generally admitted, and others, after having prevailed for a time, have at last, too, been rejected.

The doctrine on this subject, which for some years has prevailed in this University, as it readily accounts for the action of the several exciting causes of inflammation, for the effects of the disease, and for the operation of the medicines usually employed in the cure, appears most clearly to explain the proximate cause also.

From observing the various phenomena of inflammation, an increased action of the vessels of the part affected will, in every instance, be found to take place; and as, from an increased action in the arteries of a part, all the circumstances of inflam-

mation may be explained, we are hence induced to consider this state of the vessels as the cause by which it is immediately produced.

This opinion, as I have already observed, is particularly supported by a review of the several exciting causes of inflammation; all of which being of a stimulating nature, their application to living or sensible parts must of course tend to excite a preternatural exertion of the vessels in such parts. Thus, to reason from analogy, we observe, that sternutatories applied to the internal membrane of the nose, the aliments to the stomach and intestines, and the blood to the internal surface of the vessels in which it is contained, all serve, as so many stimulants, to an action of a different kind; and in the same manner, corrosive or irritating substances, when applied to the coats of the arteries, naturally in them produce the same effects as in other muscular organs.

We thus, in a very probable manner, account for the action of all direct stimulants, in the production of inflammation. It frequently happens, however, that inflammation takes place when the application of stimulants, or irritating substances, cannot in any degree be suspected. In such cases, the increased action of the arteries and of the heart, when it occurs, seems to be supported by a spasm or constriction of the extreme vessels, either of a particular part, or of the whole body: and hence, from the known tonic or astringent power of cold, we account for the frequent occurrence of inflammatory diseases in the cold seasons of winter and spring; and hence, too, the throat and lungs are more especially apt to inflame, from these parts being more particularly liable to the immediate action of cold.

Dr. Cullen, who considered spasm as the sole proximate cause of inflammation, when treating of this subject, says, "That a spasm of the extreme

vessels takes place in inflammation, is presumed from what is at the same time the state of the whole arterial system. In all considerable inflammations, though arising in one part only, an affection is communicated to the whole system; in consequence of which, an inflammation is readily produced in other parts besides that first affected. This general affection is well known to physicians, under the name of *Diatheſis Phlogiſtica*. It most commonly appears in persons of the most rigid fibres; is often manifestly induced by the tonic or astringent power of cold; is increased by all tonic and stimulant powers applied to the body; is always attended by a hardness of the pulse; and is most effectually taken off by the relaxing power of blood-letting. From these circumstances, it is probable, that the diathesis phlogistica consists in an increased tone, or contractility, and perhaps contraction, of the muscular fibres of the whole arterial system.”*

An increased action in the vessels of a part, being admitted as the proximate cause of inflammation, we can pretty clearly account for the operation of the several predisposing causes, as well as for the symptoms which occur in the course of it.

Thus the increased action of an artery, by forcing or propelling into the smaller sets of vessels, red globules, and other dense parts of the blood which they cannot easily transmit, very readily accounts for the redness, tumor, tension, and throbbing pain, which occur in every case of phlegmon: as likewise, in some measure, for the augmentation of heat, which increased attrition must in such cases always produce. It is probable, however, that the accumulation of animal heat alone, which must necessarily arise from a larger proportion of blood being sent to a part than it naturally receives, will have a considerable influence in the production of an increased degree of heat.

* See First Lines of the Practice of Physic, p. 88.

The method of cure, as I have already observed, tends also to confirm the opinion that I have ventured to suggest as the cause of inflammation. Thus the most effectual remedies, in almost every case of inflammation, are exactly such as would be advised for the removal of an increased tone in any particular part, were we convinced that this alone was the disease, viz. a low diet, bloodletting, and other weakening evacuations, together with emollient sedative applications: but this, when we come to speak more particularly of the different remedies, will more fully appear.

In almost every case of phlegmon that does not run to an unusual depth, and not attended with symptoms uncommonly violent, we may venture upon a favourable prognosis. For, if resolution, which is the easiest and most desirable termination, is not effected, suppuration will most probably ensue: and the danger arising from this, when the constitution is otherwise healthy, is not commonly very material.

When, however, an inflamed part is of large extent, with the tumor passing to a considerable depth, and the general symptoms of fever violent, a good deal of danger is to be dreaded. For besides the risk arising from the fever itself, if the symptoms continue severe, without showing a tendency either to resolution or suppuration, gangrene will, in such circumstances, probably follow: and in what manner this may terminate, is always uncertain.

SECTION II.

Of the Treatment of Inflammation by Resolution.

§ 1. *Resolution of Inflamed Tumors, in some instances, not to be attempted.*

FROM what has been said, it will appear, that in the treatment of phlegmon we ought in general to have it in view to accomplish a cure by resolution. Some exceptions, however, occur to this, in which the removal of inflammatory tumors by resolution ought not to be attempted.

Thus tumors succeeding to fevers, and other internal diseases, ought very commonly to be brought to suppuration; for nature in that way pointing out an exit for some superabundance of fluids existing in the system, it might be productive of hazard to give her any interruption. It is indeed, in all such cases our safest and best practice to assist her as much as possible, by the use of such applications as will most readily tend to promote suppuration.

Some tumors, however, even arising from internal causes, are of a nature that practitioners should not meddle with, either in view of curing them by resolution, or in bringing them to suppuration: thus, in swellings proceeding from scrofula, it might be dangerous to make use of repellent applications, at the same time that it is not often advisable to promote their suppuration, from the cure of the sores which succeed to this proving always tedious and uncertain; and such swellings, it is well known, may remain for a great length of time, without any sort of risk to the patient; so that, in general, we think it most prudent never to meddle with them.

In lues venerea, too, as we are possessed of almost a certain antidote for the virus; and as buboes, and other inflammatory swellings which occur in that disease, are commonly, when opened, exceedingly troublesome, and very difficult of cure, it is our safest practice to remove them by discussion; and this more especially, as their being brought to suppuration can by no means free the patient from the disease; but leaves him, on the contrary, under the same necessity of undergoing a mercurial course, as if no evacuation from the tumor had taken place.

In cases of erysipelas, likewise, which is a variety of inflammation, but which is easily distinguished from real phlegmon, by the colour of the inflamed part not being of such a bright red, but having a more dark copper-like appearance; and by the swelling that occurs in it, not rising evidently into a tumor, but being more diffused, and ending as it were imperceptibly upon the surrounding parts, we should always endeavour to remove the disease by discussion; for when swellings of an erysipelatous nature terminate in the production of matter, they seldom either afford good pus, or heal kindly when opened.

It is, however, with these few exceptions, our best practice to endeavour to remove every inflammatory tumor by resolution.

§ 2. *Of the Remedies to be employed for the Resolution of an inflamed Part.*

IN the incipient state of phlegmon, when the symptoms are not so violent as to produce fever, topical remedies alone, with a due attention to regimen, often answer the purpose. But when the inflammation runs high, and excites heat, and a febrile affection of the pulse, other remedies must be employed.

In almost every case of phlegmon, it has been the prevailing practice to employ warm fomentations and cataplasms; but, as warm emollient applications have the most powerful influence in promoting suppuration, as will be shewn more particularly hereafter, the use of such remedies, while the cure is to be attempted by resolution, must necessarily be improper.

In the treatment of inflammation by resolution, the first object of our attention should be the removal of the exciting causes of the disease; such as, extraneous bodies in wounds; pieces of fractured bones; luxations; and, in short, whatever may appear to have influence in exciting irritation.

Of the various applications usually employed for the discussion of inflammation, we trust chiefly to those of a sedative nature; and, next to these, emollients prove most useful.

Of the former kind, may be considered all the preparations of lead dissolved in vinegar; and the vegetable acid by itself appears likewise to act as a sedative.

Our best emollient applications, are all the variety of bland expressed oils, such as those of almonds, olives, and linseed; also ointments of a soft consistence, made with any of these and pure wax.

§ 3. *Remarks on the Preparations of Lead, and other sedative Applications.*

IN speaking of sedatives for the cure of external inflammation, it will not be understood that I mean to recommend indiscriminately the whole class of medicines which in different circumstances are found to be of this nature. Thus, opium, though one of the most powerful of all sedatives, yet, as its external application to the human body is frequently found to excite irritation, however useful it may at times have been found in some varieties

of inflammation, it will never probably, as an external application, be generally admitted.

Warm emollient fomentations, too, although they undoubtedly act as sedatives, by tending more effectually to remove tension and pain, than perhaps any other remedy, yet, from much experience of their effects in local inflammation, I have long been convinced, when the resolution of inflamed tumors is wished for, that such applications very commonly do harm: for, in general, they either tend to promote suppuration, or, when long continued, are apt to induce such a relaxed state of the parts, as renders the entire removal of the tumor always tedious.

No such reasons, however, have occurred against the preparations of lead. On the contrary, it may be affirmed, that while they may be used with perfect safety, they prove also much more powerful as discutients than any other remedy that hitherto has been employed.

We are induced to suppose, that the preparations of lead act chiefly as sedatives, not only from their effects upon the stomach, which appear all to be of a sedative tendency; but from their immediate and obvious operation when applied externally to an inflamed part: which, when the preparation is of a proper strength, is almost constantly an abatement of the different symptoms of pain and tension, at the same time that an agreeable soothing sensation is communicated to all the parts to which they are applied.

Mr. Goulard, in his Dissertation upon the external use of the preparations of lead, recommends them as almost equally proper in every stage of inflammation. Even when tumors have come to full suppuration, a proper use, he says, of his *Extractum Saturni*, not by its repelling quality, for he will not allow it to be possessed of such, but by its occasioning an exudation of the contained matter, renders

it almost always unnecessary, he says, to open them.

He likewise mentions the same remedy as a proper application in gangrene. From my own experience, however, of the preparations of lead, I cannot take upon me to recommend them in either of these cases. I have, indeed, made trial of them all in gangrene, but with no obvious benefit: and, however strongly they may be recommended by Mr. Goulard, in the cure of abscesses, or collections of completely formed pus, I must own, that in this state of the disease I never thought of employing them. So that it is in the real inflammatory state of phlegmon only, and while a cure by discussion may still be expected, that such applications are here meant to be advised.

From the deleterious effects commonly supposed to arise from lead, when taken into the system, an objection has, by some authors, been raised against the external application of all the preparations of lead.

That lead, in different forms, has, on being taken into the stomach, frequently proved poisonous, there is no reason to doubt; and that, in some particular instances, disagreeable symptoms have occurred, where some of the preparations of lead have been externally used, is also perhaps certain. That such bad symptoms, however, if they were not merely accidental, or produced by other causes, are, at least in general, very rare effects of the remedy in question, I can venture certainly to affirm. For in all the experience which I have had of the external application of the preparations of lead; and in many cases, particularly of burns, I have known the greatest part of the whole surface of the body covered with them for days, nay, even for weeks together; I do not recollect an instance of any disagreeable symptom being produced by them.

Of all the preparations of lead for external use, *saccharum saturni*, or *cerussa acetata*, as it is now termed, is perhaps the best, as it has all the advantages of the others ; while, in it the exact strength of the preparation is more certainly ascertained. For although in the *extrait de saturn* of Goulard, as likewise in the *acetum lithargyrites* of our Dispensatories, which are both, it may be observed, very nearly the same, we may be certain of the quantity of lead employed to the vinegar ; yet we can never, but by crystallization, know exactly, or even nearly, how much of the lead the menstruum may have dissolved, as this must depend upon different circumstances and particularly on the strength of the acid, and exact degree of heat that may be employed ; which are points, we may observe, not always in our power exactly to regulate. For these reasons, therefore, the salt, or fugar of lead, as it is called, should be always preferred, when it can be procured in an unadulterated state ; but, as of late it has often been found mixed with chalk, and other substances not soluble in water, I have elsewhere had occasion to remark, that till this abuse is obviated, the *acetum lithargyri* will necessarily be preferred.

The best mode of applying the remedy, seems to be in the form of a watery solution ; for the preparation of which, the following proportions are, for general use, found to answer :

℞. Sacchar. saturn. unc. fs.

Solve in acet. pur. unc. iv.

Et adde aq. fontan. destillat. lb. ii.

The addition of vinegar renders the solution much more complete than it otherwise would be ; and without it, indeed, when such a large proportion of the lead is used, a considerable part of it commonly separates and falls to the bottom.

This is the form which I commonly employ for the use of this remedy ; but as Goulard's extract

and water are preferred by many, I think it right to mention his method of preparing them. The extract is prepared as follows :

To each quart, containing thirty-two ounces of French wine vinegar, add one pound of litharge of gold. Put them into a glazed earthen vessel, and let them simmer for an hour, or an hour and a quarter, upon a gentle fire, taking care to stir them during the ebullition with a wooden spatula : the vessel is now to be removed from the fire, and the fæces being allowed to subside, the liquor upon the top must be poured into bottles for use.

The water used by Mr. Goulard, which he terms the *vegeto-mineral water*, is prepared by adding two tea-spoonfuls, which he specifies to be one hundred drops, of this extract, to a quart of water, and four tea-spoonfuls of brandy. The quantity of the extract and brandy to be diminished or increased according to the nature of the case, or degree of sensibility in the inflamed part.

In making use of these solutions, as it is a matter of importance to have the parts kept constantly moist, cataplasms prepared with crumb of bread completely soaked in them, in general answer the intention best. But, when the inflamed part is so tender and painful as not easily to bear the weight of a poultice, a circumstance by no means uncommon, pieces of soft linen, moistened with the solution, answer the purpose tolerably well : although when this objection to the use of cataplasms does not occur, as they retain the moisture longer, they should always be preferred. These remedies should be always used cold, or with no greater warmth than is pleasant to the feelings of the patient ; they should be kept unremittingly applied to the part affected, and renewed always before turning hard.

When, in cases of phlegmon, the tension and irritation of the skin are considerable, emollients prove often useful : the pained parts being, in this

state of the disease, gently rubbed over with any mild expressed oil two or three times a day, the tension, irritation, and pain, are thereby much relieved, and the discussion of the tumor greatly promoted.

In every case of inflammation, indeed, emollient applications afford relief. But as the preparations of lead prove still more effectual, and as unguents of every kind tend considerably to blunt the action of lead, these two sets of remedies should never be combined: nor should emollients be ever prescribed, while we hope to accomplish a cure by resolution; but only when irritation, tension, or pain, are so considerable as to render their application indispensable.

When parts affected with inflammation are not very tender, and especially when they lie deep, the application of the vegetable acid is often employed with advantage; and the best form of using it is in cataplasms, made with the strongest vinegar and crumb of bread. In such cases, too, I have sometimes found, that an alternate use of this remedy, with the saturnine solution already pointed out, has produced more beneficial effects, than we commonly derive from the continued use of any one of them.

At the same time that these applications are continued, bleeding with leeches, or cupping and scarifying, as near as possible to the part affected, proves generally useful, and in no case of local inflammation of any importance should ever be omitted. In all such cases, the diseased part should be kept as much as possible at rest: the patient should be kept upon a cooling regimen, and should abstain entirely from the use of wine and spirits.

In all the slighter degrees of inflammation, a due perseverance in the remedies I have mentioned, will, in general, prove sufficient. But, when the pulse is quick, full, or hard, and accompanied with

other symptoms of fever, general bloodletting ought never to be omitted; the quantity to be determined by the violence of the disease, the age and strength of the patient. Gentle laxatives, too, together with cooling diaphoretics, prove in such circumstances very commonly useful.

These evacuations being premised, we endeavour to procure ease and rest to the patient; an object I may remark, which in the treatment of every inflammatory tumor, should be considered as of the first importance. Where the patient is deprived of natural rest, and in all cases accompanied with pain and irritation, opium is the remedy upon which alone we can place dependence. In large wounds, especially after amputations and other capital operations; and in punctures of all kinds; large doses of opium very commonly prove useful. In all such cases, however, opium, in order to have full effect, must be given in large doses: otherwise it is very apt to do harm; a circumstance to be considered as the chief reason of opiates having by many been unjustly condemned in every case of inflammation.

With proper attention to the circumstances I have mentioned, the resolution of phlegmon, in general begins to take place in the course of three or four days; at least before the end of this period, it may for the most part be known how the tumor will terminate. If the heat, pain, and other attending symptoms, abate; and especially if the tumor begins to decrease, without the appearance of gangrene; we may then, with some certainty, conclude, that perseverance in the same mode of treatment, will at last accomplish a cure by resolution.

But, on the contrary, if all the symptoms rather increase; and especially, if the tumor runs larger, and somewhat soft, with an increase of throbbing pain; we may then conclude with certainty that suppuration will take place: in such circumstances, those applications should be laid aside that were

advised while a cure by resolution was judged to be practicable, at the same time that nature should be as much as possible assisted in the formation of pus, or what is called the *maturation* of the tumor.

For this reason, bloodletting, and other evacuations which may have been advisable, in attempting to remove the swelling by discussion, should never be carried a greater length than may be merely necessary for rendering the febrile symptoms moderate; for where the system is much reduced, and suppuration afterwards takes place, the maturation of the tumor not only proceeds slowly, but the patient becomes unable to bear the discharge that ensues from it:

But although I have already remarked, that if some appearances of resolution do not take place in the course of a few days, suppuration will most probably ensue, and that consequently a change of treatment will become necessary, yet this, it must be observed, is to be taken in a limited sense. For the best time of desisting from one mode of treatment, and commencing the other, can only be ascertained by close attention to the various circumstances of every particular cure. In a considerable degree we find that it depends on the seat of the inflammation; phlegmon being in some parts much more apt to terminate in speedy suppuration than in others.

Thus, in the cellular membrane, as well as in every soft part of the body, inflammatory tumors suppurate much more quickly than when tough membranous parts are affected. Hence, in the coats of the eye and of the testicles, very severe degrees of inflammation often continue for many days, nay, even for weeks, without either abating in the symptoms, or ending in suppuration. In such cases, therefore, that go on even to considerable length, we need not be afraid of continuing our discutient

remedies for a much longer time than otherwise would be proper ; nor should we ever be deterred from using them, unless either an evident suppuration has taken place, or there appears from the violence of the symptoms a considerable risk, either of gangrene, or of some incurable obstruction : in which event, we should no doubt endeavour to promote the suppuration of the tumor.

Among other applications for the removal of inflammation by resolution, blisters ought not to be omitted, and I have in some instances known them prove useful, even where suppuration had commenced. In the early stages of inflammation, blisters should be applied directly upon the pained part ; but when the skin is much inflamed, they excite so much pain, that we rather apply them to the contiguous sound parts : in this manner they have appeared to promote the discussion of venereal buboes, even where matter has been evidently formed.

SECTION III.

Of Suppuration.

§ 1. *General Remarks on Suppuration.*

BY the term *Suppuration*, is understood, that process, by which the contents of tumors and ulcers are converted into a whitish, thick, opaque, somewhat fetid matter, termed *Pus*. This, for the most part, is the effect of a natural exertion of the system ; but we know from observation, that the formation of pus can be promoted by artificial means. Before proceeding, however, to consider the treatment necessary for this purpose, it will not

be improper to premise an examination of the different opinions that have prevailed on the nature of pus, and this especially, as it will tend to elucidate the action of those remedies on which we chiefly depend in this stage of the disease.

§ 2. *Of the Formation of Pus.*

By many practitioners pus has been supposed to consist in a dissolution of the blood vessels, nerves, muscles, and other solids, of the parts in which inflammation occurs:

This was the opinion of Boerhaave,* Platner,† and many others.

Others, again, have supposed purulent matter to be formed in the blood; and that it is secreted, in its complete state into abscesses, wounds, and ulcers.

That the first of these opinions is ill founded, is obvious from this, that very extensive wounds and ulcers continue often for a great length of time, without being attended with any loss of substance; which would not be the case, if the discharge which they afford was produced by a dissolution of the solids of the parts in which they are seated. Issues, likewise, afford instances of this; by their yielding, for a number of years, even a daily discharge of pus, without producing any evident alteration or diminution in the state of the solids.

The other opinion has probably arisen from abscesses being sometimes observed to form suddenly, and without being preceded by any obvious inflammation; so that the matter contained in them has been supposed to be at once deposited from the blood, in a state completely purulent.

Previous, however, to the formation of pus in any part, where due attention is given, some degree of inflammation is always observed. But as

* Aphorism 387.

† *Institutiones Chirurgicæ*, § 54. &c.

inflammation often occurs in a slight degree, and without being attended with much pain, it sometimes proceeds to suppuration, without being particularly noticed by the patient; especially in cases of internal collections of matter. We are told, indeed, of very quick translations of matter from one part of the body to another: but if such instances ever occur without the intervention of inflammation; a circumstance, however, much to be doubted; yet, still, it is no material objection to our argument, as such cases can only be considered as *particular* and very *unusual* exertions of the system.

It may be remarked also, that if purulent matter frequently existed in the blood, as it undoubtedly would do if this opinion was well founded; in some cases, at least, it would surely be liable to detection: but no matter of this kind has ever yet been discovered in blood. Such pus, too, as is found in wounds and ulcers, would not at first appear thin and serous, as it always does, if deposited in a completely formed state.

The most probable opinion hitherto advanced concerning the formation of pus, is, that it is a change produced by a certain degree of fermentation, upon the serous part of the blood, after being secreted into the cavities of ulcers and abscesses; and that this fermentation is produced either by the natural heat of the part, or by heat artificially applied.

That it is the serum only of blood, which is proper for the formation of pus, and that it is produced by the application of a certain degree of heat, was first made probable by an experiment related by Sir John Pringle, in the appendix to his Treatise on the Diseases of the Army;* and the opinion was afterwards confirmed by other experiments of the same nature made by Mr. Gaber, and related

* Experiment xlv

by him at full length in the second volume of the *Acta Taurinensia*.

Sir John Pringle found, that pure serum, kept for some days in a furnace regulated to the human heat, after becoming turbid, dropped a white purulent sediment. The crassamentum of blood, in the same space of time, and degree of heat, changed from a deep crimson to a dark livid colour; so that, when any part of it was mixed with water, it appeared of a tawny hue. Serum, digested with a few red globules, and in the same circumstances, was of the same colour.

Mr. Gaber's experiments tend all to corroborate the same opinion, namely, that pure unmixed pus is formed only of serum. The addition of red globules to serum, and crassamentum digested by itself, exhibited nearly the same appearances as those quoted above from Sir John Pringle.* Fat, which is thought by many to be a principal ingredient in the formation of pus, was found by Mr. Gaber, when exposed to the trial that I have mentioned, to exhibit no appearances of that matter; nor were any portions of flesh, when digested either with serum or water, convertible into it.

From all which, it may be concluded, that the addition of any of these articles to serum, instead of rendering it capable of producing good pus, has always the contrary effect: and that it is pure serum alone from which pus can be obtained.

It may here be remarked, once for all, that what is meant by *pure serum*, is not that finer halitus, which, in a healthy state of the body, is constantly secreting into the different cavities, merely for the purpose of lubricating and keeping them moist, and which is again generally absorbed; but it is that serous fluid which separates spontaneously from blood, upon that fluid being allowed to remain at rest when discharged either from an artery or a

* *Act. Taurin.* vol. ii. page 87.

vein ; and in which, though there is never supposed to be any mixture of red globules, yet there is certainly always more or less of the coagulable lymph ; some proportion of which seems absolutely necessary for serum to possess, to render it capable of producing pus.

The several effects that I have mentioned as arising from digestion upon serum out of the body, there is reason to think, will occur from it, when collected in the cavities of ulcers ; and, from the result of the experiments that I have quoted, it is probable, that, according as serum is there deposited more or less free from mixtures of fat, red globules, and other substances, it will yield pus of a more pure or vitiated nature.

This account of the formation of pus, is the most satisfactory, I conceive, of any that has as yet been given ; and this especially, as it renders evident, as I have already observed, the operation of the remedies which usually prove most effectual in the cure.

§ 3. *Of the necessary Remedies for promoting Suppuration.*

WHEN, for the reasons that I have given, it is judged proper to advise means for promoting the suppuration of an inflamed part, then such remedies as were previously used for curing the disease by resolution, ought immediately to be laid aside.

No further evacuations can then in general be admitted ; and if the patient has been much weakened, a full allowance of diet, and even a proportion of wine, become necessary.

For although a high degree of inflammation proves always unfavourable to suppuration, by promoting the progress of gangrene, as will be afterwards mentioned ; or by tending to propel into the cellular membrane, which in general is the seat

of abscesses, a quantity of red globules, together with the serum of the blood, which alone ought to be extravasated for the formation of good pus; yet, in order to have a due quantity of serum secreted for the purpose of suppuration, and, at the same time, to have its fermentation properly carried on, the different inflammatory symptoms must never be allowed to subside suddenly; otherwise an abscess, containing ill digested matter, as it is termed, will most probably ensue.

Thus we find in smallpox, which may be considered as small phlegmasiæ, that although blood-letting and other evacuations to a certain extent prove frequently useful, yet a proper suppuration never takes place if the patient has been much debilitated by any considerable discharge; and the same thing very certainly happens, in similar circumstances, in abscesses of a larger size. The patient, therefore, should neither be allowed to live so fully as might raise the inflammation too high, nor reduced in such a manner, by evacuations and low diet, as to induce the contrary extreme.

Having in this manner endeavoured to procure a deposition in the cellular membrane, of serum proper for the formation of pus, the next circumstance requiring attention is, that a due degree of fermentation be excited, and preserved in it, so that its progress towards suppuration may not be retarded.

This we accomplish with most certainty by the use of such applications as tend to preserve a proper and constant degree of heat in the swelled part; and were this kept sufficiently in view, there is reason to believe that almost all the soft tumors that we meet with in practice, might be made to suppurate; and that according to the degree of heat in which they are kept, they form into tumors of melicerous, stcatomatous, or other consistences. For unless a due degree of heat be applied and continu-

ed, serum being merely extravasated, will never produce pus: hence in ascites, and other dropfical tumors, large quantities of serum remain in this state for a great length of time, without any suppuration taking place; merely from their being produced without any inflammation at first, so that no assistance is obtained from any degree of *preternatural* heat; and the *natural* heat of those parts in which serous collections usually occur, is seldom sufficient of itself.

The degree of heat best suited for promoting suppuration, is not, perhaps, easily ascertained; but the more considerable it is, at least to a certain extent, the more quickly, it is probable, pus will be formed.

This we find, indeed, from Mr. Gaber's experiments, is so far the case:* and the observation is likewise confirmed by daily experience, in every case of phlegmon; in which the tumor, *ceteris paribus*, always proceeds more quickly or slowly to suppuration, as it is seated nearer to, or at a greater distance from, the heart. Hence, in the extremities, particularly in the legs, inflammatory tumors proceed slowly to suppuration; while they commonly suppurate quickly on the trunk and head. Thus, inflammation of the ears and throat frequently arrives at complete maturation, and even bursts of itself, in the course of forty-eight hours from the first attack.

We ought, therefore, never to fail in preserving a due degree of heat in every inflamed part that we wish to bring to suppuration; more especially in situations very distant from the heart, where artificial heat is most wanted, and where, if duly applied, almost every tumor, though seated on the extremities, might probably be made to suppurate

* When speaking of pus being formed in, and subsiding from serum digested in a degree of heat equal to that of the human body, Mr. Gaber says, "Eò autem citius subsidebat quò calor erat major." *Loco citato.*

in the same space of time with those in the ears and other parts that I have mentioned.

I am not only convinced by observation, of what is here asserted of the advantages to be obtained from this; but also from a course of experiments in which I was engaged some years ago upon the same subject. But as the results of these were exactly similar to those of Mr. Gaber, I did not preserve an account of them. I recollect, however, that in a heat equal to 100° of Fahrenheit's thermometer, the deposition of matter from serum took place in little more than half the time that was requisite for the same effect at even eighty degrees.

It was the prosecution of these experiments that first suggested to me the probability of the advantage to be derived from the preservation of a due degree of heat in inflamed parts; and I have accordingly, on many occasions since that period, found the treatment of such cases go on more easily than otherwise I should either have expected or have been able to explain.

Warm fomentations and cataplasms are the means commonly employed for the application of heat to an inflamed part; and when regularly and frequently renewed, nothing can more effectually answer the purpose. But, in the ordinary manner in which they are applied, being renewed only once, or at most twice, in the day, they must frequently do more harm than good. For as soon as the degree of heat which they at first possess, is dissipated, the moisture which they keep up, with the consequent evaporation that ensues, must always render the part colder than if it had been merely wrapped in flannel, without the use of any such application.

In order to receive all the advantages of such remedies, the part affected should be well fomented with flannels pressed out of a warm emollient decoction, applied as warm as the patient can easily

bear them, continued at least half an hour at once, and renewed four or five times a day.

Immediately after the fomentation is over, a large emollient poultice should likewise be applied warm, and renewed every second or third hour at furthest. Of all the forms recommended for emollient cataplasms, a common milk and bread poultice, with a proportion of butter or oil, is perhaps the most eligible; as it not only possesses all the advantages of the others, but for the most part can be more easily obtained.

Roasted onions, garlic, and other acrid vegetables, are frequently made use of as additions to maturing cataplasms: when there is not a due degree of inflammation in the tumor, and when there is reason to think that the suppuration would be quickened by the inflammatory symptoms being somewhat increased, the addition of these substances may prove useful; but when stimulants are necessary in such cases, a small proportion of strained galbanum, or of any of the warm gums, dissolved in the yolk of an egg, and added to the poultice, is not only a more elegant, but a more certain form of applying them. In some cases, too, the same intention may, with more certainty, be obtained, by combining a small quantity of cantharides with any application that we mean to employ.

Whenever inflammation, however, takes place in any considerable degree, stimulating substances can never be necessary, and ought not to be employed.

Tumors attended with little inflammation, are commonly said to be of a cold nature; and as they are generally indolent, and proceed very slowly to suppuration, plasters composed of warm gums are often applied to them with advantage; in such cases, they prove useful, not only by the stimulus and irritation which they excite, but by the heat which

they tend to preserve in the part. They become particularly necessary, when the patient, by being obliged to go abroad, cannot have cataplasms frequently renewed, or conveniently applied: but, if it be not when some such objection as this occurs, the latter, for very obvious reasons, should always be preferred.

Dry cupping, as it is termed, that is, cupping without the use of the scarificator, is frequently employed with advantage for promoting the suppuration of tumors: it is only, however, in tumors of slow progress, where there seems to be a deficiency of inflammation, that it can ever be necessary; but in all tumors of an indolent nature, and where there is still some probability of suppuration taking place, I have seldom observed such good effects from any other remedy.

Matter being fully formed in a tumor, is known by some degree of remission of all the symptoms taking place; the dolor pulsatilis, that before was frequent, now goes off; and the patient complains of a more dull, constant, heavy pain: the tumor points at some particular part, generally near to its middle; where, if the matter is not encysted, or deep seated, a whitish yellow appearance is observed, instead of a deep red that formerly took place; and the fluctuation of a fluid underneath, is, upon pressure, very evidently discovered. Sometimes, indeed, when an abscess is thickly covered with muscular and other parts; and when, from concurring circumstances, there can be little doubt of the collection of matter being considerable, yet the fluctuation cannot be readily distinguished: but it does not often happen, that matter is so very deeply lodged as not to be perceived on proper examination.

This, however, is a circumstance of much importance in practice, and deserves, it may be remarked, more attention than it commonly meets

with. In no part of the furgeon's employment, is experience in fimilar cafes of more use to him than in this ; and however fimple it may appear, yet nothing more readily diftinguifhes a man of obfervation, than his being able eafily to detect collections of deep feated matter : whilft nothing fo materially affects the character of a furgeon, as his having, in fuch cafes, given an inaccurate or unjuft prognosis ; for the event comes generally at laft to be clearly demonstrated to all concerned.

Together with the feveral local fymptoms of the exiftence of pus which I have enumerated, the frequent fhiverings that patients are liable to on its firft formation, may likewise be mentioned : thefe, however, feldom occur, fo as to be diftinctly obferved, unlefs the collection is confiderable, or feated internally in fome of the viscera. But, in every large abfcelfs, they are almoft constantly met with ; and, when they appear along with other fymptoms of fuppuration, they tend, in a very material degree, to afcertain the real nature of the difeafe.

§ 4. *Of Abfcelfes, and of the proper Period for opening them.*

IN the treatment of abfcelfes, it is a general rule, not to difcharge their contents till complete fuppuration has taken place : for, when laid open more early, and while any confiderable hardnefs remains, they commonly prove troublefome, and feldom heal kindly.

In fome cafes, however, it is neceffary to deviate from this general rule, and to open them much fooner ; particularly in all fuch critical abfcelfes as occur in malignant fevers. In the plague, too, we are commonly advifed to open the tumors that appear in it, as foon as they are tolerably advanced, and not to wait till they are fully matured ; for, in fuch instances, it is found that the patient re-

ceives more benefit from an early discharge of matter, than he can suffer harm from the tumors being somewhat prematurely laid open.

Abscesses situated upon any of the joints, or upon either of the large cavities of the breast and abdomen, more especially when they seem to run deep, should be opened as soon as matter is perceived in them. For, when the resistance is on every side equal, they will just as readily point internally as outwardly; and the consequence of a large abscess bursting into either of these cavities, is well known to prove most frequently fatal: an instance of which, in the following case, I had some time ago an opportunity of observing, which, with very little attention, might have been prevented.

A surgeon of eminence, and of extensive practice, was applied to by a young healthy looking man, with a large abscess upon the left side of his chest. A fluid, upon pressure, was evidently found to fluctuate; and an opening was determined upon, to give vent to the matter. But the operator being much engaged in business, two or three days were allowed to pass, when unluckily the patient died suddenly in his bed, the night before the abscess was to have been opened.

On examining the body, the tumor was found to have disappeared entirely, without any external opening being perceived; and, on laying the thorax open, the matter was observed to have burst inwardly upon the lungs, and hence had produced immediate suffocation.

In all other cases, however, the rule in opening abscesses should be, to allow a free suppuration to take place, before giving vent to the matter: we have next to determine on the mode in which this should be done.

§ 5. *Of the different Methods of opening Abscesses.*

Two methods of opening abscesses have been recommended by authors, namely, by caustic and incision. To the former; however, there are many objections. It does not answer the purpose better than a simple incision; upon a tender inflamed part, it gives much more pain; it is more slow in its effects; and the surgeon never has the command of it so entirely as to destroy those parts he would incline, and no more; for all the different kinds of caustic, notwithstanding the greatest attention, will sometimes spread farther, and penetrate deeper, than the operator intends. Of this, I some years ago, met with a remarkable instance in a case of hydrocele, in which serum is contained in the tunica vaginalis testis, in circumstances quite similar to matter collected in an abscess.

Caustic was applied to the anterior part of the scrotum, with a view to produce a radical cure: but whether there had been little water collected, or whether a preternatural adhesion of the testis to the tunica vaginalis had, at this part, been produced, is uncertain; but the caustic penetrated to the body of the testicle, and gave the patient, as may readily be imagined, a great deal of distress. It did, to be sure, accomplish a cure: but the danger attending such an accident, although it probably might not frequently occur, is, I should imagine, a very strong objection to the use of caustic in all such cases; and it is now indeed very generally, I believe, laid aside, the preference being justly given to the scalpel.

When tumors are not large, they are commonly opened by a longitudinal incision, with a lancet or scalpel. This should be so directed as to terminate at the most depending part of the swelling, and of such a size as may give a free discharge to the matter: about two thirds of the length of the tumor is for this purpose perfectly sufficient.

When abscesses, however, are of great extent, they are commonly laid open through their whole length; and when the teguments have been much stretched, we are advised by many to take part of them away altogether. But this is a practice which seldom, or perhaps never, should be followed; for scarcely any abscesses are so large as to destroy entirely the contractile power of the integuments; and while this remains in any degree, there is still cause to hope that the parts may again recover their former tone and dimensions. It is surprising indeed to observe the extent to which this observation applies. In many instances, the skin has been known to recover its tone entirely, after having been for a time completely deprived of it.

These are the several modes of opening abscesses with the scalpel. Some inconveniences, however, are found to proceed from all of them: as soon as an opening is made in a tumor, the whole contained matter is discharged suddenly and at once: whereby, when the collection is large, faintings and other disagreeable symptoms are apt to ensue; and a free admission of air is given to a great extent of ulcerated surface.

The bad effects of air on all varieties of sores, is well known to every practitioner; but its pernicious influence, on a newly opened abscess, is often really astonishing. It first occasions a total change in the nature of the matter, and turns it from perhaps a very laudable pus to an ill digested sanies; and afterwards brings on a quickness of pulse, debilitating sweats, and other such symptoms, which, for the most part, when the collection has been considerable, either carries the patient off in a short time, or terminates in a confirmed phthisis, which sooner or later proves fatal.

This I have, in many instances, had occasion to observe; and that in such cases it is the admission of air alone which produces the bad symptoms, there

is little reason to doubt, from patients in this situation being often found to remain for a great length of time without any hectic symptom. In all large collections of matter, I have seldom known an instance of their being opened by a large incision, without almost every hectic symptom taking place; commonly in less than forty-eight hours from the time of their being laid open.

In what manner the admission of air to an abscess operates in producing such a powerful and sudden effect, is perhaps difficult to determine. The irritation which it excites on a large extent of ulcerated surface, is perhaps the chief reason: by acting as a stimulus on the extremities of the absorbents opening into the fore, it may occasion a larger absorption of matter than would otherwise take place; and it may likewise, by rendering the matter more putrid than before, give even to the same quantity when absorbed, greater activity in producing fever.

That this conjecture is well founded, with respect to an increase of putrescency being one of the causes of the bad effects arising from the admission of air to fores, there is much reason to believe. For, in the first place, although the discharge from abscesses is commonly mild, and free from any disagreeable fetor on their being newly laid open; it almost constantly becomes thin, acrid, and more fetid in the course of a few dressings, which is a certain proof of a greater degree of putrescency having then taken place. On this principle, too, we may account for the operation of many of the remedies commonly employed in the treatment of fores; and more especially of those powerful antiseptics, fixed air, and Peruvian bark.

We know from experiment likewise that other substances, as well as that part of the blood from which pus is formed, is rendered putrid, and more quickly so, by the admission of air, than otherwise,

while in the same degree of heat, they probably ever would be.*

From these considerations, therefore, the greatest caution should be observed in preventing the admission of air to the internal surface of every large collection of matter; and this, we may remark, is most effectually done, by opening collections of this kind by means of a seton or cord, and not with caustic or the scalpel.

This method of discharging the contents of tumors, by the introduction of a cord, is attended with every advantage of that by incision: it, moreover, empties the swellings, of whatever size they may be, not suddenly, but very gradually; it effectually prevents a free admission of air; it is not commonly attended with so much pain and inflammation; nor is the cicatrix occasioned by it ever so inconvenient, or unseemly, as it often is after a large incision.

At one time it was the practice in the royal infirmary of this place, to open large abscesses, as well as those of a smaller size, by extensive incisions: the consequences were such as I have related; many of the patients were thrown into such obstinate hectic fevers as they never recovered from; and others, though they did get better at the time, were commonly so much reduced, that they were apt to be seized with other disorders, from which they seldom recovered.

This was the most frequent result of our treatment of large abscesses by incisions; and similar consequences will still be found to prevail where this practice is continued: but since the seton came to be generally used, few or no such disagreeable circumstances have occurred. Many of the largest

* Vide Sir John Pringle's and Mr. Gaber's experiments on this subject. *Loc. cit.*

tumors have been opened in this manner; and when the patients are otherwise healthy, they very commonly do well; with this further advantage, that a cure is frequently obtained in less than half the time that is necessary on their being opened with large incisions.

Many instruments have been proposed for opening tumors, by means of cords being passed through them; but none of them answer better than the curved director in Plate III.

An opening sufficiently large for the cord, being made with a lancet in the upper part of the abscess, the director, threaded with a cord of candle-wick cotton, or soft silk, proportioned in thickness to the size of the tumor, is then to be introduced, and its point pushed downwards till it is felt externally at the most depending part of it. The director being kept firm by an assistant, an incision is to be made with a scalpel upon its under extremity, of a length somewhat more considerable than the opening first made by the lancet: for when this is not done, and when the under orifice is not larger than the upper, the matter is very apt to transude above; which always proves inconvenient, and ought therefore to be avoided. The director is now to be pushed downwards, with so much of the cord as to leave two or three inches out at the lower orifice. That the cotton may run easily on its first introduction, as likewise at the subsequent dressings, as much of it as is to be used at the time should be well rubbed over with any emollient ointment.

In twenty-four hours or thereby from the insertion of the cord, it ought to be drawn downwards, so as to admit of all that part of it being cut off which had been lodged in the abscess; and in this manner the same quantity should be moved daily, as long as it is meant to be continued.

A regular and flow discharge of the matter is thus produced; the sides of the abscess are thereby

allowed to contract gradually; and a slight inflammation being produced over the whole internal surface of the diseased parts, they are thus made to unite sooner than they otherwise would do. As the discharge becomes less, so the size of the cord should be also lessened; and it is easily done, by withdrawing a thread of the cotton once in two or three days. At last, when there is little more matter afforded than might be looked for from the diameter of the cord, it may be altogether taken out; and gentle pressure being continued upon the parts affected by a roller for a few days longer, a certain and lasting cure will very generally take place.

In the passing the cord, it was expressly said, that it should be done from above downwards; that is, by an opening made in the upper part of the abscess. For when the first opening is made in the depending part of the swelling, a considerable quantity of matter immediately runs out, which, as it causes the sides of the upper part of it to collapse, renders it more difficult to introduce the director through the whole course of the abscess, than when done in the manner I have advised: when rightly performed, the bottom, as well as every other part of the tumor, is kept distended to the last, very little of the matter escaping by the upper orifice; and, being introduced in this way, the quantity of cord that still remains to be used is kept clean and dry; which never can be the case when a cord is inserted from beneath.

To some these circumstances may appear too trifling to deserve particular notice; but too much can never be said in rendering the account of a beneficial practice clear and evident.

All that I have hitherto said of the use of setons in cases of abscess from recent inflammation, applies with equal propriety to tumors of long duration, when the matter contained in them is either of a

purulent nature, or of a consistence not much thicker than pus. All encysted tumors of the thinner melicerous kind, are as successfully treated in this manner, as recent abscesses: so that the practice is by no means confined to one kind of tumor only; and it may even probably be employed in others, for which it has not as yet been advised.

It answers particularly well in all glandular collections of matter, where the admission of air proves highly pernicious. Even scrofulous tumors, and venereal buboes, when fully matured, and the teguments not too thin, may with much advantage be opened in this manner.

SECTION IV.

OF MORTIFICATION.

§ 1. *General Remarks on Gangrene.*

THE termination of inflammation, by resolution and suppuration, having been fully considered, we come next in order to speak of gangrene or mortification.

The several appearances of gangrene having been already enumerated, it is not now necessary to mention them: only, it may be remarked, that mortification, or the last stage of gangrene, is known only by the diseased part becoming totally black, by its losing all pain and sensation, at the same time that it usually emits a considerable fetor: at last, too, a softness or flaccidity takes place, together with an entire dissolution of the different parts of which the organ is composed.

This does not, indeed, happen in every instance of gangrene; for there are some instances of what

is called dry gangrene, in which the parts continue totally mortified for a great length of time, without either turning flaccid, or running into dissolution.

Such cases, however, do not occur from inflammation. They commonly happen from the flow of blood to such parts being stopped by compression, whether by tumors, ligatures, or other similar causes, obstructing the principal arteries that used to supply them; which, when the stoppage of the circulation is complete, always occasions a very slow mortification; and as the parts, in such instances, are no longer supplied with fresh quantities of fluids, while a considerable exhalation must still be going on, such a degree of humidity cannot therefore occur, as in other cases of gangrene. Hence this species of the disease has, perhaps with propriety enough, been termed the dry gangrene.

Another variety of the disease is mentioned by authors, viz. the white gangrene;* in which the parts supposed to be mortified do not turn black, but retain nearly their natural colour. Whether this, however, can with propriety be denominated gangrene, there is some reason to doubt; but as it is chiefly that variety of gangrene that succeeds to inflammation, that we are now to consider, and in which no such varieties are ever observed, I shall not at present carry our inquiry further; and it is the less necessary, as nearly the whole course of the treatment to be hereafter pointed out, applies, with almost equal propriety, to every variety of the disease.

Of all the inflammatory diseases to which the human body is liable, that variety of inflammation termed erysipelas, is observed most frequently to terminate in gangrene; and whenever phlegmon is in any degree conjoined with erysipelas, as some-

* *Quesnay, Traité de la Gangrene, p. 337.*

times happens, it seems thereby to acquire a similar tendency, not only in being more difficult to bring to suppuration than the true phlegmon, but by going on more frequently to the state of mortification.

The best and surest means of preventing mortification, is to endeavour to obtain either the resolution or suppuration of the tumor, by a due application of the remedies that have been already pointed out. But, in some cases, the disease is far advanced, and gangrene already begun, before the surgeon's assistance is called in; and, in others, the inflammation runs so high, and proceeds so quickly, that gangrene takes place notwithstanding all the remedies we can employ: in some instances, this occurs so speedily, that the inflammation is scarcely discerned till mortification appears to commence.

§ 2. *Observations on Carbuncles as a Species of Gangrene.*

THIS rapid progress of inflammation occurs most frequently in cases of carbuncle, what by the French is termed *charbon*; in which the inflammation proceeds so quickly to mortification, that in some cases no evident tumor takes place, and the parts become black, and completely mortified, often in the course of twenty-four hours from the first attack.

The quick progress usually made by carbuncle, renders it the worst and perhaps the most dangerous species of inflammation. Patients indeed often recover from external carbuncles, when not very extensive, and not seated on any of the large blood vessels and nerves: but when they fix upon any of the viscera, they must, probably in every instance, prove fatal, as no remedies with which we are acquainted can prevent their progress towards the last stage of mortification.

As carbuncles commonly appear without any evident cause, they are in general most probably owing to a scorbutic or putrid state of the fluids; for, when putrescency prevails in the system, every inflammatory tumor that occurs, is very apt to terminate in mortification.

This opinion, of carbuncles depending upon a putrescent state of the system, is further confirmed, by their being most frequently met with as a symptom of plague; for, although they are sometimes met with even in this country, where the plague is now never known, yet the real carbuncle is not a common occurrence.

In such instances we easily account for gangrene, from the predisposition in the system to putrid diseases: but in what manner is it produced by inflammation in other cases, and where no such disposition can be supposed to take place? This we shall proceed to investigate.

§ 3. *Of the Causes of Gangrene.*

AN increased action in blood vessels I have already endeavoured to establish, as the immediate or proximate cause of inflammation; and the same cause will, in many instances, account for the rise of mortification.

One evident effect of an increased action in the vessels, is a propulsion into the smaller capillaries, of a greater quantity of the more dense parts of the blood than naturally they were meant to transmit. When this is not considerable, a due circulation is commonly in a short time restored, and no bad consequences ensue; nay, even when actual extravasation of the serous part of the blood into the cellular membrane has in some degree taken place, the fluid is often reabsorbed, and a cure is thus obtained by resolution. But when extravasation has tak-

en place to a still greater degree, suppuration is the most frequent consequence.

When, again, a strong exciting cause is applied to a constitution already predisposed to inflammation; as a lacerated wound, for instance, in a robust healthy man; the violent irritation, and consequent increased action of the vessels that ensues, occasions the red particles of blood to be likewise poured forth together with the serum. In this manner a collection of extravasated fluid is produced, and the preternatural heat produced by the inflammation, soon excites in it some degree of fermentation; which, from the nature of the fluid on which it has to act, not being able to produce purulent matter,* and the crassamentum of blood being particularly liable to run into the putrid fermentation,† mortification, which may be considered as the ultimate stage of putrefaction, comes in course to be produced.

Mortification being, in this manner, excited, the progress which it afterwards makes, does not appear difficult to explain. The putrescent particles of the extravasated serum, by insinuating into the cellular membrane of the contiguous parts, very quickly extend the contagion; and in this way the mortification continues to advance, till meeting with a part, perhaps naturally more irritable than the others, or which by this time has become so by the effect of the disease, a certain degree of new inflammation is in this manner induced: this again, as it renders the parts more firm and compact, makes them less easily penetrable by the putrescent contagion; and suppuration taking place, as the effect

* Mr. Gaber, when speaking of his experiments on the crassamentum of blood, says, that he could never obtain genuine pus from it; and further adds, "Verò similiùs ergo sanguinem cæteris puris principiis admixtum, ipsum magis fatidum et deterius reddere," &c. *Loco citato*, p. 87.

† "For some animal substances, such as urine, the bile, and the crassamentum of blood, soon putrefy." Sir John Pringle's Experiments, Appendix, p. 6.

of the preceding inflammation, a complete separation of the diseased from the sound parts, is in this manner accomplished.

At least, that this inflammation, with a consequent formation of matter, does, in cases of gangrene, always happen before the diseased parts separate from the sound, is a fact well known to practitioners; and, that the cause that I have assigned for these appearances is the true one, few I think will doubt, who advert to the various phenomena which this stage of inflammation very uniformly exhibits.

Thus the local symptoms of gangrene appear to be pretty clearly explained; and the sinking of the pulse, which, in extensive mortification, always occurs, and which is by much the most remarkable change that takes place in the system, is a very natural consequence of that debility, which seems to be a constant and necessary attendant on a putrescent state of the fluids, from whatever cause it may arise; a circumstance that is particularly demonstrated in putrid fever, and in scurvy, where a languid pulse and general debility are considered as the most characteristic symptoms.

§ 4. *Of the Prognosis in Gangrene.*

In every case of gangrene, the prognosis should at first be doubtful; for even in the slightest cases, the system, from the contagion of putrid matter, is, in some instances, injured so much, that the patients are suddenly carried off, without appearing previously to have been in much danger.

In such cases, however, as succeed to inflammation from an external cause, where the gangrene is neither very deep nor extensive, and where it does not seem to spread, the prognostic ought to be much more favourable than in those arising suddenly from an internal cause, where the mortifica-

tion runs deep, and more especially when it is still continuing to advance; in which circumstance the greatest danger is always to be dreaded.

Indeed, no person whatever, labouring under mortification, even from an external cause, can be said to be free from risk, till the diseased parts are separated, and entirely cast off from the sound; the poison of putrid miasmata being of such a destructive nature, that many instances have occurred of patients being quickly carried off, seemingly from this circumstance alone, long after the progress of the mortification had ceased. In such cases we presume, that the putrescent miasmata prove destructive, chiefly by their deleterious influence on the nervous system. In long continued cases of mortification, the general mass of fluids may sometimes suffer from the absorption of putrid effluvia; but as patients, labouring under mortification, frequently die suddenly, and before any putrescency has appeared in the system, we conclude that this most probably happens from some effect produced either upon the nerves themselves, or on the sensorium from whence they originate. But in whatever manner the putrid fomes of a mortified spot may operate, their influence is frequently so pernicious as to warrant the conclusion I wish to establish, namely, that no person labouring under mortification, can be said to be free from danger till all the diseased parts are removed.

§ 5. *Of the Remedies employed in Gangrene.*

IN the cure of gangrene, when no bloodletting or other evacuation has been prescribed during the preceding state of inflammation; if the pulse continues quick, full, or hard; and especially if the patient is young and plethoric; it then becomes necessary, even although mortification may have commenced, to empty the vessels by one general

bloodletting; which, by moderating the fever, proves often the surest means of preventing the progress of the disease. In this view, bloodletting may, in such cases, be considered as an antiseptic; and it often, indeed, in this particular state of mortification, proves more useful than any other remedy we employ.

In the same view that we recommend bloodletting, gentle laxatives, and a free use of acidulated cooling drink, become necessary. But as, in the farther progress of mortification, the patient is apt to sink, and the pulse to turn languid, every evacuation, especially of blood, should be directed with caution, and never carried farther than may seem to be necessary for rendering the symptoms moderate.

When, again, as is most frequently the case when gangrene has made much progress, the patient is much reduced, either by severe evacuations, or merely by the effects of the disease; when the pulse is low, and the other symptoms of fever not considerable; in these circumstances a very different treatment becomes necessary: the principal indication now being, to prevent the system from sinking too much, by a proper use of cordials, and especially by those of the tonic kind; while, by the same means, we enable it to free itself from, or to cast off, the mortified parts. For, as I have already observed, the separation of gangrenous from healthy sound parts, being always the effect of inflammation, it should be our chief care to assist nature as much as possible, in exciting in the system, by every proper means, that disposition which, from experience, we know to be most favourable for the production of inflammation; which, when speaking of the general predisposing causes of inflammation, I have endeavoured to shew, is a full plethoric state of the vessels, which at the same time we

generally find to be combined with a more invigorated tone of the vessels themselves.

It may, perhaps, be imagined, that this indication proves, in some measure, contradictory to what I have said of the propriety of bloodletting in some cases of gangrene; but when duly considered, it will not appear to be so. For we well know, that, in every disease to which the system is liable, an over dose of the most effectual remedy will often prove just as detrimental as a medicine of the most opposite tendency: and, in the same manner, though a certain degree of inflammation is, perhaps, necessary for the cure of gangrene; yet, in a very high degree, it always becomes hurtful.

With a view to fulfil the intention of this indication, a good nourishing diet becomes necessary, with such a proportion of generous wine as the strength of the patient, and symptoms that exist for the time may require.

By due attention to regimen, particularly by a proper allowance of wine, more real advantage is commonly obtained, than we ever experience from the whole tribe of stimulating warm cordials. When, however, the patient is languid and much reduced, some of these, such as the volatile alkali, and *confectio cardiaca*, ought, at the same time, and in such quantities, to be prescribed, as the immediate situation of the patient renders necessary.

But of all the medicines hitherto used in mortification, none proves so efficacious as Peruvian bark, which has often a very powerful influence in arresting its progress: being a powerful tonic, it may probably act by invigorating the system; and thus, by rendering it more susceptible of that inflammatory tendency, which I have shewn to be so necessary for effecting a separation of mortified parts, it may in this manner enable it to throw them off. It may likewise, in some instances, act as an antiseptic, merely by correcting putrefaction; but in or-

der to have much influence in this manner, it ought to be locally applied to the diseased parts, either in the form of poultices or fomentations.

But in whatever manner the bark may operate, it can in no case of mortification be, with propriety, omitted, excepting in the first stage of the disease, while symptoms of inflammation still continue: as soon as these abate, it may always, both with safety, and advantage, be employed.

The best rule for the quantity of bark to be given in gangrene, is that the doses should be large, and as frequently repeated as the state of the stomach will permit. It often indeed happens that the stomach cannot contain a sufficient quantity of the bark in substance, which is always the best mode of using it; but particularly in gangrene, where none of the finer preparations of bark are ever to be trusted.

Of all the forms employed for exhibiting bark in substance, I have generally found it fit easiest on the stomach when conjoined with an aromatic or spirituous water, and to the use of which in cases of gangrene that require bark, there can never be any objection. The following formula seldom is disagreeable, and I have known it answer with patients whose stomachs rejected every other.

℞. Aq. alexiter. simp.

cinnamon. fort. *aa* unc. iv.

tinctur. aromat. unc. i.

Pulv. cort. Peruv. subtil. unc. fs; misce.

Coch. ii. omni. semihorâ fumendis, agitâtâ phialâ.

In this manner a drachm of the bark is taken every hour, which frequently, in less than twenty-four hours, has some influence on the appearance of the disease. Much depends upon the medicine being in fine powder, as patients often bear considerable quantities in that state, when they reject even very small doses of a coarse powder.

Two varieties of bark have of late years been employed in this country, which we never had an opportunity of using before : I mean the yellow and red barks, but I have not found that either of them are equal to the best ordinary bark of a brown or cinnamon colour. One remarkable instance of this, I shall mention with regard to red bark, and I could also mention others of a similar nature of the yellow bark : a gentleman, for several years, had laboured under a sinuous ulcer, the discharge of which, once in two or three months, always became thin, putrid, and very acrid. The influence of common bark, in correcting this, was so remarkable, that a few doses commonly had a considerable effect in rendering the matter thick, and less offensive. From the taste, and other sensible qualities of the red bark, being stronger than those of the ordinary kind, I was at first inclined to think favourably of it ; and among others I prescribed it to this patient. But although he continued for several days to take it in the same doses he had always used of the other, it did not prove in any degree useful, while on the common bark being again employed, the matter, from being thin and fetid, was quickly converted into pus of a proper consistence.

One trial, however, is by no means sufficient for enabling us to form a just opinion of any medicine : and accordingly I was resolved to put it to the same test in future occurrences of a similar nature. It has now been three times tried in the same manner, and the result has been always the same. The red bark has never produced any change on the nature of the discharge, while the influence of the other has been uniformly the same. Our patient indeed is now so much convinced of the inefficacy of red bark, that it is with reluctance he is induced to take it ; although, at first, his expectations from it were raised very high, not only from the opinion

that I ventured to give of it, but from the high panegyrics bestowed on it by others.

This is the most remarkable case I have met with, for comparing the effects of the different kinds of bark: but I have likewise seen the red bark fail in other cases, where the common kind of it proved evidently useful; so that, although I cannot with certainty say that the red bark will never prove useful in cases of mortification, and in such ulcers as I have described, yet from the result of all the experience I have yet had of it, I am inclined to consider it as of an inferior nature to the other. Further observation, however, is necessary to determine a matter of such importance.

Together with bark, the vitriolic acid is frequently employed in gangrene with advantage; and the best form of using it is, by acidulating the patient's drink with elixir of vitriol.

These are almost the only internal remedies to be depended on in case of gangrene. Many others, indeed, have been recommended; but all the advantages to be obtained from any of them, may be procured with more certainty from a proper application of the few that I have enumerated.

A variety of external applications are pointed out by authors, particularly those of the antiseptic kind; such as, the warm gums and balsams, ardent spirits, and even alcohol: and to admit of their nearer application to the sound parts, with a view to the preservation of these from putrefaction, deep scarifications through the diseased, and into the sound parts, have been generally advised.

But although articles of this kind may prove useful in preserving *dead* animal substances from corruption; that they will prove equally serviceable when applied to living bodies, is much to be doubted: there is even cause to imagine, by the strong irritation which they excite when applied to a living fibre, that, in almost every case of gangrene,

they may rather do harm; it being only, as I have observed already, a very slight degree of inflammation that ought to be excited. The incisions, too, when carried into the sound parts, with a view to facilitate the operation of remedies, may likewise do harm, not only from the risk of wounding the blood vessels, nerves, and tendons, that lie in the way; but also, by allowing a free and farther entrance of the putrescent matter into the parts not yet affected: and unless they are carried so deep as freely to reach the sound parts, applications of the antiseptic kind can never have any effect in answering the purpose for which they are meant. For these reasons, and from never having observed any advantages to accrue from scarifications, I have long advised them to be laid aside.*

Theriac was, in former times, and still is with some practitioners, a very common application in gangrene; but from any opportunities I have had of seeing it used, I cannot say that it ever seemed to produce any obvious benefit.

All the advantages we derive from the great variety of applications usually pointed out for gangrene, are obtained with more ease, and generally with more certainty, from the use of stimulating embrocations; which, by exciting a slight irritation upon the surface, and especially when assisted by a free use of bark, at last commonly excites the wished for degree of inflammation. With this view I have frequently employed a weak solution

* Although I was convinced, from experience, of what I have advanced against the use of scarifications, as well as of the impropriety and inefficacy of very warm stimulating applications in mortification; it was not without diffidence that I first ventured to assert it, the opinion at that time being in a great measure new. I am now happy to find, however, in a late publication, the same practice recommended from the best authority. Vide *Chirurgical Observations*, by Percival Pot, F. R. S. &c.

In the same publication is given a particular description of a species of mortification incident to the toes and feet, in which Peruvian bark has little or no influence, and in which opium, given in large doses, frequently repeated, proves an effectual remedy.

of sal ammoniac in vinegar and water, and often with advantage: a drachm of the salt to two ounces of vinegar, and six of water, form a solution of a proper strength for every purpose of this kind; but the degree of stimulus can be easily either increased or diminished, by using a larger or smaller proportion of the salt.

Although, for the reasons I have given, incisions may not, in general, be proper, yet, whenever the mortification runs deep, scarifications should be made in the diseased parts, with a view of removing them, which, by taking off a considerable load of putrid dead matter, not only lessens the fetor, which, in such cases, is always considerable, but often renders it more easy for the sound parts to throw off the remainder: when incisions, however, are employed for this purpose, care should be taken that they be not carried so deep as to injure the sound parts.

When, by the means of cure that I have thus ventured to propose, or by the effects of a natural exertion of the system, a slight degree of inflammation begins to appear between the diseased and sound parts, we may, in general, with some certainty, expect, that in due time, an entire separation will take place: and when a full suppuration has fairly commenced, there is still less cause to doubt of a cure being to be obtained.

On the mortified parts being removed, the remaining sore being in the state of a simple purulent ulcer, must be treated as sores of this description ought always to be, with mild easy dressings; at the same time, that the strength of the patient should be supported by the continuance of nourishing diet, the bark, and such quantities of wine as he can easily bear.

In this manner, all ulcers produced by gangrene, may be healed, where the disease has not been very

extensive; but where mortification, seated on any of the extremities, has penetrated deep, so as to reach the bones, and where the surrounding soft parts are in any considerable degree destroyed, amputation of the member becomes our only resource: this measure, however, should never be advised, till a full and complete separation of the mortified parts has taken place; and it ought, in every case of gangrene, to be held as an established maxim, never to amputate a limb till a full stop has been put to the disease, or till the mortified parts have been completely separated from the sound: for, although the parts immediately contiguous to those *evidently* diseased, may outwardly appear to be sound, yet there can never be any certainty of the parts, even directly beneath, remaining so till a separation occurs; so that, till this takes place, the disease will still be apt to return upon the remaining stump.

It must be observed, however, that as soon as an entire separation of the gangrene is perceived, no time should be lost in putting the operation in practice; for, as long as any of the corrupted parts remain in contact with the sound, the system must still continue to suffer, by the constant absorption of putrescent particles, that so long will be going on.

CHAPTER II.

OF TUMORS.

SECTION I.

Of Tumors in general.

EVERY preternatural enlargement, in whatever part of the body it is seated, may be termed a tumor.

Tumors daily occur in one form or another: they are often followed with important consequences, and frequently give much embarrassment both to patients and surgeons: for these reasons they merit particular attention.

We meet with much variety in the general appearances of tumors, as well as in the method of treatment best suited for their removal: but those varieties only should be mentioned in a work of this kind, which require some peculiarity in the method of cure.

Tumors may with propriety be divided into two general classes: into those that are acute or inflammatory, and such as are chronic or indolent. Authors have for the most part distinguished them into such as are said to be of a warm nature, and those which they suppose to be cold, from their being destitute of pain and redness, symptoms which we commonly observe to accompany heat. But I prefer the terms of acute or inflammatory, and chronic or indolent, as being more scientific; at the same time that they are more expressive of the real nature of the different affections: for it will be

found to hold perhaps univerſally, that tumors are acute or indolent, that is, that they are rapid or flow in their progreſs, nearly in proportion to the degree of inflammation with which they are attended. I mean, therefore, to rank in the firſt claſs of tumors, all thoſe which, from their commencement, are accompanied with inflammation; and, in the ſecond, all thoſe which are not evidently accompanied with this ſymptom.

It will unavoidably however happen, that ſome tumors will be mentioned under one claſs, which, during ſome part of their progreſs, may appear to belong to the other: thus, a tumor beginning from inflammation, may terminate in a ſtate of perfect indolence; while others, which at firſt were evidently chronic or indolent, may at laſt become inflamed. My views on this point are to characterize them by thoſe ſymptoms which appear moſt obviouſly at their commencement; a mode of diſtinction which appears to be the moſt accurate; for it is not what a tumor may eventually become, but what it actually is on its being completely formed, that can admit of any deſcription: and although all the variety of tumors which fall within our obſervation, or of which I mean to treat, are enumerated in the following claſſification, ſome of them will fall, with more propriety, to be conſidered in other parts of the work. Thus, the conſideration of aneurifm and thrombus ſucceeds to bloodletting, as being moſt frequently induced by that operation. Collections of matter in the antrum maxillare, gum boils, and other affections of the mouth, fall to be noticed immediately after toothache; while we have already finiſhed the conſideration of abſceſs and mortification, as the conſequence of phlegmon.

CLASS I.

Acute or Inflammatory Tumors.

Phlegmon, with its consequences, abscess and mortification.

Erysipelas.

Ophthalmia.

Inflammation of the ear.

Angina, or inflammation of the throat.

Inflammation and abscess of the liver.

of the breasts of women.

of the testes.

of the anus and perinæum.

Venereal buboes.

Lumbar abscesses.

Paronychia or whitlow.

Chilblains.

Sprains and contusions.

CLASS II.

Chronic or Indolent Tumors.

Encysted tumors, usually so termed.

Ganglions.

Swellings of the bursa mucosa.

Concretions and preternatural excrescences within the capsular ligaments of joints.

Aneurisms.

The true, the false, and varicose aneurisms.

Varicose veins.

Hemorrhoidal swellings.

Hydropic swellings.

anasarca or œdema.

hydrocephalus.

hydrops pectoris, and hydrops pericardii.

ascites.

dropfy of the ovaria.

hydrocele.

spina bifida.

Swellings in the fublingual glands.

Tumors containing air.

General emphyfema produced by air efcaping from the lungs into the cellular fubftance, as fometimes happens from the fpiculæ of fractured ribs penetrating the fubftance of the lungs.

Local emphyfematous tumors produced by putrefaction in a particular part. This is a rare occurrence; but cafes of it are recorded by different authors.

Tympanites.

Tumors formed by the difplacement of particular parts.

Herniæ :

of the brain.

inguinal and fcrotal.

congenital.

crural.

umbilical.

ventral.

at the foramen ovale.

in the perinæum.

of the alimentary canal and mefentery.

of the omentum.

of the liver, fpleen, and other abdominal vifcera.

of the bladder.

of the intefines into the vagina.

Protrufion of the eyeball.

Prolapfus uteri.

Prolapfus ani.

Tumors formed by the difplacement of bones in cafes of diflocation.

Scrofulous tumors.

White fwellings of the joints.

Bronchocele.

Sarcomatous tumors.

Sarcocele.

Schirrus.

Cancer.

Polypous excrescences in the nose and throat,

Polypi in the ear.

in the uterus.

Condylomatous tumors in the anus.

Excrescences in the urethra.

Nævi materni.

Warts.

Corns.

Tumors of the bones.

Simple exostoses.

Venereal nodes.

Spina ventosa.

SECTION II.

Of Acute or Inflammatory Tumors.

THE general theory and management of inflammation having been fully considered in the last chapter, in proceeding to speak particularly of inflammatory tumors, those circumstances only will be noticed which require some peculiar mode of treatment.

§ I. *Of Erysipelas.*

ERYSIPELAS, as being a variety of inflammation, has in some instances been mistaken for phlegmon: it may, for the most part, however, be easily distinguished from phlegmon. In phlegmon, the inflammation is circumscribed and elevated. In a great proportion of cases, it is seated in the cellular

substance ; and any effusion which takes place is for the most part converted into purulent matter : but in erysipelas, the tumor is diffused, and not much elevated ; it seldom proceeds deeper than the skin ; any effusion with which it is attended is commonly thin and acrid, and not convertible into pus, and the skin acquires a kind of copper colour, instead of that of crimson red, which occurs in the first stage of phlegmon.

By experience we know, that sores proceeding from erysipelas are difficult to cure : it should therefore be our first object to endeavour to prevent that effusion by which these sores are produced. Some indeed allege, that this practice must be attended with risk, as erysipelas, for the most part, appears to proceed from some disease of the constitution ; and hence we are advised rather to encourage the discharge of that matter which nature in such cases seems inclined to deposit. This observation, however, is not confirmed by experience, for we find that the discussion of erysipelas may be attempted with the same freedom and safety as inflammation of any other kind.

A common prejudice prevails against the use of unctuous and other moist applications in erysipelas ; and fine flour, starch, or hair powder, are almost the only remedies that are applied to it. These are used with a view to absorb the acrid matter, which erysipelatous inflammation often throws out in the form of pustules, and which unctuous and moist applications are rather supposed to encourage. But to me it appears that they prove more useful in preventing the effusion or formation of that matter, than in absorbing it afterwards. By soothing or allaying that uneasy sensation which usually accompanies erysipelas, and which they often do very effectually, they necessarily tend to lessen that preternatural action of the diseased vessels, which in every case of inflammation we consider as the cause of

the subsequent effusion; and as they usually prove more pleasant in every respect than moist applications, they should therefore in the first stages of the disease be preferred. It happens, indeed, in some cases, that they have little or perhaps no effect in procuring relief. In such instances, I have sometimes found, that by keeping the inflamed part exposed to the air, and wetting it every now and then with a feather, soaked in a weak solution of saccharum saturni, immediate ease has been procured, and no disadvantage has afterwards occurred from it. In general, however, the dry farinaceous powders answer better.

Almost an universal prejudice has prevailed against bloodletting and other evacuations in erysipelas: and as erysipelas is commonly supposed to be attended with some degree of putrescency, instead of evacuations, bark, wine, and stimulating cordials, are commonly advised. It appears, however, that the ideas of practitioners upon this point have not been founded on observation: for it is now known, that blood may be discharged with the same safety in erysipelas as in other cases of inflammation; and by doing so, and adhering in every respect to an antiphlogistic regimen, we have it often in our power to prevent the disease from terminating in those effusions that I have mentioned, and which, at all times, we should endeavour to do.

It is proper, however, to remark, that local bloodletting, which in other varieties of inflammation proves often useful, is not admissible here: for the orifices by which the blood is drawn off are apt to degenerate into those troublesome ulcers, which erysipelas when it terminates in effusion, is very apt to produce.

By one or more general bloodlettings, according to the strength of the patient; by the use of gentle laxatives, mild sudorifics, and a cooling diet; and by frequently dusting the part affected with one or

other of the powders I have mentioned, almost every erysipelatous tumor may be discussed. But when effusion is found to have occurred in any considerable quantity, it should be discharged immediately by a small opening in the most depending part of it. In this state of the disease, emollient cataplasms are commonly applied, with a view to bring the contents of the swelling to suppuration. This, however, proves always pernicious: for the effusion being of a nature which cannot be converted into pus, poultices can never be of the same use as in cases of phlegmon; and as it is commonly sharp and acrid, if it be not speedily discharged, it is apt to do harm, by corroding the skin and contiguous parts. The best applications in this state of the disease, are those of the saturnine kind, such as Goulard's cerate, or wax ointment with a small proportion of saccharum saturni.

§ 2. *Of Inflammation of the Ear.*

THE passage, as well as the bottom of the ear, is entirely membranous; consequently the inflammation which attacks it proves always in a high degree painful: for we know that inflammation of membranous parts gives more pain than that of parts of a looser texture, from the blood vessels not yielding so readily as those of the latter, to the distention which inflammation never fails to excite.

The remedies to be employed in inflammation of the ear, should be regulated by the stage of the disease. When it has subsisted so long as to give reason to think that it will suppurate, which it is apt to do quickly, emollient applications prove most useful: with this view, the ear should be frequently fomented with warm emollient steams, and thereafter covered with a warm emollient poultice. But on the first approach of inflammation, we ought, if possible, to prevent the formation of matter; for

when matter has once formed in the ear, it is often difficult to remove it, and by hurting the bones of the ear, it is very apt to produce deafness: with this view a small blister should be applied behind the ear, and blood should be taken from the contiguous parts, with a sufficient number of leeches. We also have it frequently in our power to lessen or remove the pain, by pouring a few drops of warm laudanum into the ear, either by itself, or mixed with fine oil; and the pain being removed, we find, from experience, that the risk of suppuration is thereby lessened.

Our endeavours, however, for this purpose, do not always succeed: in which event, and when matter has evidently formed, we should endeavour to bring it off as freely as possible, by bathing the ear in warm water, and even by injecting a little warm milk or water into it. By these means we often put a stop to the discharge: but when it still continues to flow, astringent injections, of lime water or mild saturnine solutions, should be employed; which seldom fail when the disease is solely confined to the soft parts of the ear. When the bones of the ear become diseased, which we easily know by the matter acquiring a very offensive smell, and being of a black or dark brown colour, all that art can do is to keep the passage clear by the use of injections. The cure of deafness arising from this cause is not to be looked for, and we trust to nature alone for throwing out the diseased bones.

§ 3. *Of Angina.*

INFLAMMATION of the throat is commonly termed Angina, or Quinsy.

As abscesses in the throat prove always troublesome, and often dangerous, we should in every instance endeavour to prevent their formation, by attempting to remove by resolution every degree

of inflammation with which the parts in which they are commonly seated may happen to be attacked.

With this view, a full bloodletting should be prescribed; the quantity to depend on the strength of the patient, and urgency of symptoms. Smart purgatives prove here particularly useful; and some advantage is often derived from diaphoretics.

None of these remedies, however, can be trusted with such certainty as the local discharge of blood from the part affected, and the application of a blister to the contiguous parts. In Plate IX. figs. 1. and 3. instruments are delineated for the purpose of drawing blood from the throat by means of scarifications; and when employed with freedom on the first appearance of inflammation, suppuration may very commonly be prevented. Fomenting the throat with steams of warm vinegar proves sometimes useful; and considerable advantage has in different instances been derived from astringent gargles, of infusions of oak bark, of red rose leaves, with a proportion of alum or vitriolic acid, and of saccharum saturni dissolved in water. A general prejudice prevails against the use of saturnine applications in the form of gargles, from their being supposed to be of a poisonous nature. But although I have often used them, I never knew an instance of their doing harm; and they have frequently proved highly serviceable. In small quantities they might even be swallowed with safety; but we all know that gargles may be employed without any part of the liquor being allowed to pass into the stomach.

It will often, however, happen, that these and all other remedies will fail, either from their being applied too late, or from the inflammation being severe. When suppuration is probably to take place, it should be promoted by the application of warm poultices to the throat, and by the patient being

made to inspire the warm steams of milk, or of any emollient decoction, by means of the machine delineated in Plate IX. fig. 2. When matter is fully formed, it should be discharged by an opening of a sufficient bore being made into the abscess with one of the instruments mentioned above for scaring the throat.

§ 4. *Of Inflammation and Abscess of the Liver.*

THE substance of the liver being soft and of a yielding nature, we would not *à priori* imagine that it should be liable to inflame. We find, however, in warm climates, particularly in the East and West Indies, that the liver becomes more frequently inflamed than any other part of the body; probably from the bile in these climates being apt to become acid and thus to excite irritation in the parts to which it is applied. In some cases too, the liver inflames from external violence.

Inflammation of the liver is attended with a dull uneasy sensation over all the contiguous parts; with pains resembling those of cholic, and severe sickness at stomach; the patient is liable to frequent cold and hot fits; and for the most part, the colour of his skin, as well as his urine, is tinged yellow.

When suppuration takes place, and especially when the abscess is large, the patient complains of pain extending up the right side to the top of the shoulder. In some cases this symptom occurs even in the inflammatory state of the disease; but it happens more frequently after the formation of matter, probably from the weight of the abscess acting upon the diaphragm and pleura, with which the liver is connected. The region of the liver becomes daily more tense; and if the convex part of it is chiefly affected, a softness, and even a fluctuation of matter is often discovered through the

teguments, particularly when the parts are not much covered with fat.

In the commencement of this affection, those remedies answer best, which prove most useful in other cases of local inflammation. Hence blood-letting should never be omitted; the quantity to be determined by the severity of the symptoms and strength of the patient: but instead of taking blood from a vein, it should be drawn off by cupping and scarifying the pained part. When the scarifications are made of a sufficient depth, almost any quantity of blood may be got in this manner; and no remedy with which we are acquainted, proves so effectual in removing the inflammation. Blistering the pained part proves also useful; the bowels should be kept open with mild laxatives; and a gentle perspiration should be encouraged over the whole body.

In general, this treatment will prove successful, when employed early in the disease; but when the symptoms do not soon yield, mercurials should be advised without further delay; for in the removal of inflammation of the liver, nothing has hitherto proved so useful as mercury in one form or another. Calomel, calcined mercury, and the blue mercurial pill of the Edinburgh Dispensatory, are the best preparations of mercury that I have tried, and they act with more certainty when conjoined with small doses of opium. Frictions with mercurial ointment on the region of the liver are also occasionally employed with advantage: but whatever form of the medicine is used, it should be quickly carried so far as to affect the gums, which should be kept moderately sore for several weeks, unless the disease subsides immediately; in which case a shorter course will be sufficient.

As it is of importance in all cases of this kind to give a free discharge to the bile, if the patient does not otherwise get regular and easy stools, he should,

during the mercurial course, have a gentle saline purgative every third or fourth day, by which the discussion of the inflammation is often much promoted.

Suppuration, however, will often take place, notwithstanding all that can be done to prevent it; and when this is found to have happened, an incision should without delay be made into the abscess to discharge the matter. When the matter is seated on the convex or prominent part of the liver, and the quantity considerable, we readily discover it by the touch; and in this case there is no room to hesitate. But even where we have not this for our direction, we may very commonly judge with certainty whether suppuration has occurred or not. If along with pain in the right shoulder and neck, it is observed that the region of the liver is more bulky than it was before, and that the corresponding teguments are become soft and oedematous, and especially if the patient complains of frequent shivering fits, a symptom which very constantly accompanies internal suppuration; we may conclude with much certainty that matter is formed.

Wherever an abscess is seated, the matter should be discharged, perhaps as soon as it is known that complete maturation has taken place. But abscesses in any of the larger cavities, should be opened even before there is reason to suppose that all the effused fluids are so completely converted into pus as we might otherwise wish them to be. Indeed this should be considered as an established maxim in practice; for the chance of these collections bursting inwardly is much greater than of their opening outwardly, where the teguments which cover them are thick and strong when compared with the cyst in which the matter is contained, the only covering between them and the intestines. Abscesses of the liver have been known to burst through the diaphragm, so as to be emptied into

the thorax: in a few cases the matter has been carried into the duodenum by the common passage of the bile; and sometimes, by the great arch of the colon adhering to the liver, a communication has been formed between them; by which the matter of abscesses in this situation has been very completely discharged into that part of the gut: but for the most part, when not discharged by an external opening, the abscess bursts into the cavity of the abdomen.

With a view to prevent this occurrence, which commonly terminates fatally, the assistance of surgery should be desired as soon as the appearances and symptoms give cause to suspect that matter is collected: an incision of a sufficient length should be made with a scalpel through the external teguments in the most depending part of the tumor; and on reaching the abscess, it may either be opened with the point of the scalpel, or with a lancet; but piercing it with a trocar is preferable, as in this manner we have it in our power to evacuate the matter slowly, which in large collections is a point of importance, and therefore merits attention. Even this opening into the abscess, however, should be afterwards enlarged, otherwise there would be some risk of its closing before the cyst containing the matter collapses sufficiently for the prevention of further collections. This being done, a pledget of soft lint, covered with any emollient ointment, or merely dipped in oil, should be gently insinuated to a sufficient depth between the lips of the wound, to prevent them from uniting till the abscess collapses and fills up from the bottom; a process that will be much hastened by a proper application of pressure on the tumefied parts, by means of a flannel or cotton roller passed two or three times round the body.

When the vacuity produced by the discharge of matter does not soon fill up, it will be proper to

introduce a canula to preserve a free passage for any matter that may afterwards form. But this precaution is seldom necessary; for abscesses in the liver heal sooner, and with fewer inconveniencies, than similar affections in perhaps any other part of the body. Indeed this is so well ascertained, that I would advise an opening to be made into the abscess in every instance where there is the least cause to suspect that matter has formed in the liver. Many practitioners indeed assert, that no attempt of this kind is admissible unless the abscess is seated in the convex part of the liver. It must be allowed, that abscesses in this situation are more accessible than such as are seated in the concave part of it. But wherever they are situated, a proper vent should be procured for the matter; for if not evacuated by an external opening, we may conclude almost with certainty, that it will be emptied into the abdomen, by which, in a great proportion of cases, the patient will certainly die.

In warm climates, Peruvian bark is very commonly given on the first appearance of a diseased liver: the putrescent tendency of the bile is the ostensible reason of this. But I believe it will be found, that no dependence should be placed upon the bark during the first or inflammatory stage of this disease. During this period the bark may even do mischief; but when suppuration has taken place, and when the matter is discharged from the abscess, bark proves equally useful as in similar affections of other parts of the body.

When, by too long delay, it unfortunately happens that an abscess either bursts into the cavity of the chest or into the abdomen, the matter should be drawn off immediately; in the one case, by the operation of the empyema, described in Chapter XXVI.; and in the other, by the common operation of the paracentesis, for which see Chapter XXV.

§ 5. *Of Inflammation and Abscesses in the Breasts of Women.*

THE breasts of women are liable to suffer from the same causes which excite inflammation in other parts of the body; but abscesses in these parts occur most frequently in nurses by the gorging or stoppage of the milk, which almost constantly takes place from sudden or imprudent exposure to cold: the part becomes stiff, swelled and painful; the milk runs off in small quantities, but not so as to afford effectual relief; the patient grows hot and restless, much thirst prevails, together with a full quick pulse.

Practitioners are not agreed on the treatment best suited to cases of this kind: by some it is said, that milk tumors of the breast should always be discussed; while others assert, that when this practice does not succeed, it often does harm, by inducing swellings of a schirrous nature, which cannot afterwards be dissolved, and which are apt to terminate in cancer.

In judging of this point, from my own observation, it does not appear to me that there is room for doubt: our practice in inflamed breasts should be the same as in every case of inflammation, wherever it is seated. In the first stages of the disease, discussion of the tumor should be always attempted; while it would be in vain, and highly improper, for this to be advised when any tendency to suppurate has taken place. The risk of our inducing schirrus by this practice, seems to me to be in a great measure imaginary: it rather appears, indeed, that cancer is more apt to occur from the improper management of those sores which ensue from collections of matter in the mamma, than from any means that can be used to prevent the matter from forming; but we are further induced

to follow the practice, from the great distress which always accrues from suppuration in the mamma: indeed, the pain and misery of the patient is in such cases often so great, that no doubt can remain with unprejudiced practitioners of the propriety of endeavouring in every case to prevent it.

It is scarcely necessary to remark, that the same remedies prove useful here, that succeed in the discussion of inflammation in other parts: but it is truly surprising, that there should be almost an universal prejudice in every inflamed breast against the most powerful of all discutients, bloodletting. Afraid of this evacuation tending to diminish the quantity of milk, we avoid it entirely. In this, however, I am convinced we are wrong. In every case of this kind, I have been in the practice of bleeding freely. It has not appeared to diminish the flow of milk; while its effects in preventing suppuration, are, for the most part, evident. The quantity of blood to be taken away, must always be determined by the violence of the inflammation, and strength of the patient: but, in general, the practice will be more effectual, when as much as the patient can bear to lose, is taken at once, than when the same, or even a greater quantity, is taken at different times. Purgatives prove particularly useful; and a cooling diet is equally necessary here, as in other cases of inflammation.

As nothing tends more to prevent the discussion of inflamed tumors than pain, nothing should be omitted that can tend to remove it: and as no remedy proves so effectual as opium, it should always be given, and in such doses as are sufficient for the purpose. With a view to remove the tension of the breast, the parts should be gently rubbed with althea ointment, or with oil: but the applications on which we chiefly depend, are those of a cooling astringent kind; such as a solution of sal

ammoniac in vinegar and water; spiritus Mindereri; and all the saturnine applications. Cloths dipped in one or other of these, should be kept constantly applied to the breast; by which, and by attention to the other parts of the treatment that I have already advised, almost every tumor of this kind may be removed, unless the inflammation has been of long duration; in which case, when the pain and tension are considerable, it is more advisable to endeavour to bring the tumor to suppurate, than to attempt any other method of cure. For this purpose, we rely with most certainty on a frequent renewal of warm fomentations and poultices; and when matter appears to be fully formed, it should be discharged by an opening made in the most depending part of the collection: at least, an opening should always be advised, when it is found that the matter is pointing at an improper part, where it would not find a free vent.

In the treatment of inflamed breasts, which occur in nursing, it is a doubt with many practitioners, whether the milk should be drawn off or not. Indeed many assert, that drawing it off, either by continuing the child, or with glasses, does harm; and therefore they advise it not to be done. I have never observed, however, that any inconvenience ensued from it; and as it always gives relief, I advise it in every instance. When the breast is much swelled, the nipple cannot be laid hold of by the child: in such cases, the glasses represented in Plate LIII. may be used with advantage.

§ 6. *Of Inflammation of the Testes.*

INFLAMMATION of the testes may be induced in various ways: by the application of cold; by external violence; and by every other cause that tends to excite inflammation in other parts of the body. But the most frequent cause of it is gonorrhœa vir-

ulenta. The common opinion respecting this was, that it occurred from the matter in gonorrhœa falling down, as it was termed, upon the testes: and this appeared the more probable, from its being observed that the testes were apt to swell upon the discharge being stopped, at the same time that the infection of the testes was commonly relieved by a return of the running.

It is now however known, that no communication subsists between the urethra and testes, by which matter can be conveyed from the one to the other: and the most probable opinion is, that in the swelled testes from gonorrhœa, the inflammation is communicated from the urethra, and spreads along the vasa deferentia to the testes.

A sudden stop being put to the discharge, whether by the use of irritating injections, or by any other cause, very commonly excites an increased degree of inflammation: to abate which, nothing proves more effectual than a return of the running. In this way, we account more clearly than in any other, for the effect produced upon the testes by the state of the discharge.

Inflammation of the testes very rarely terminates in suppuration: but this should not prevent the most timely application of those remedies that we know to be the most powerful discutients. Blood-letting is perhaps the most effectual remedy; but it always proves most useful when the blood is taken directly from the pained part by means of leeches. After discharging a sufficient quantity, the swelling should be kept constantly moist with a solution of saccharum saturni; the scrotum and testes should be properly suspended; the bowels should be kept moderately open; a low diet should be prescribed; and the patient should be strictly confined to a horizontal posture. When there is cause to suspect that the constitution is tainted with lues venerea, nothing will prove serviceable if a

mercurial course is neglected. And when it appears that the disease has been induced by the discharge having been too suddenly checked, we should endeavour to promote a return of it, by bathing the penis in warm water; by injecting warm oil into the urethra; or by the use of bougies.

In this manner, we scarcely can fail of removing inflammation of the testes by discussion: but when this does not happen, either from the use of the remedies not being duly persisted in, or from the inflammation being particularly severe, and when suppuration is found to have taken place, the matter must be discharged by an opening made in the most depending part of the abscess; which in every respect should be treated like collections of pus in other parts of the body.

§ 7. Of Venereal Buboes.

SWELLINGS of the lymphatic glands from the absorption of the venereal virus are termed Venereal Buboes. 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 the absorption of venereal matter from sores in the penis. For the most part they are produced by matter absorbed from chancres, and in some cases the glands swell from sympathy in gonorrhœa: but instances likewise occur of buboes arising without any previous ulceration or discharge from the penis where the matter appears to be absorbed without any perceptible erosion of the skin. A fact highly important in practice, and of which therefore I have given a more particular account in my Treatise on the Venereal Disease.

The most material point to be determined in the treatment of bubo is, whether we should endeavour to discuss the tumor, or bring it to suppuration? While the opinion prevailed that buboes were

produced by the deposition of venereal matter from the system, it was not surprising to find practitioners advising us in every instance to promote their suppuration: for on this supposition it was probable, that nature meant by these swellings to throw off the infection. But now when we know that buboes arise, not from matter discharged from the system, but from its passing into it; that the quantity of venereal matter is increased instead of being diminished by buboes being brought to suppurate; and that the sores which ensue from them are often very difficult to cure; scarcely any will doubt of the propriety of removing them by discussion.

With this view the patient should be put upon an antiphlogistic regimen. His bowels should be kept open by the use of purgatives; leeches should be applied to the hardened gland; and it should be kept constantly wet with a strong solution of saccharum saturni. Along with these, however, mercury should be given in quantities sufficient for eradicating the disease: and as we know from experience, that mercury proves most effectual when made to pass through the diseased glands, it should always be applied in the form of unction to those parts in which the lymphatics of the diseased glands are known to originate; which never fails to prove more effectual than the direct application of mercury to the glands themselves. Thus, in the discussion of a bubo in the groin, friction with mercurial ointment upon the thigh and leg proves more successful than rubbing it upon the gland itself. To many this has been long familiar; and it would appear that the practice could scarcely fail of occurring to any who have paid attention to the discoveries made by the moderns in the anatomy of the lymphatic system.

When buboes are early noticed, the course that I have proposed very commonly answers the purpose, when the mercurial frictions are properly applied

and continued for a sufficient length of time. It often happens, however, that all our efforts fail, either from the disease being too far advanced before the mercury is applied, or from the tumor not being altogether venereal, but of a mixed nature; a circumstance not unfrequent. Thus, it frequently happens that buboes are combined with scrofula and scurvy, and in some cases with erysipelas or with common phlegmon. In such cases we are not surpris'd at the failure of mercury: and accordingly we sometimes find, that instead of forwarding the discussion of the swelling, it tends rather to bring it to suppuration. Cases of this kind prove often very perplexing both to the patient and practitioner; so that no point in practice requires more accurate discrimination: for by proceeding to throw in great quantities of mercury, as is usually done while buboes remain obstinate, if they are not altogether venereal, we seldom fail to do harm, not merely to the local affection, but to the system at large. In all such cases, the best practice, I believe, is to desist from the use of mercury as soon as it appears that no advantage is derived from it. In the mean time, by a change of diet, and other means adapted to the state of the patient for the time, such an alteration may take place in the constitution, that a second trial of mercury may prove successful: at least, in different instances, this has succeeded with me, where I had reason to think that persisting longer with mercury at first would have done harm.

When it is found that a bubo cannot be discuss'd, and that it will probably suppurate, a frequent renewal of warm emollient poultices and fomentations are the remedies on which we chiefly depend.

The opening of buboes, when suppuration has taken place, next demands our attention. Some dissuade us from opening them at all, alleging that they heal sooner when allowed to burst of them-

selves: while a small puncture with a lancet, a longitudinal cut through the whole extent of the swelling, or the application of caustic, have all had their abettors.

When a bubo is altogether venereal, and not combined with any other affection, any of these methods will succeed, provided a sufficient quantity of mercury be given: but when a bubo terminates in a sore difficult of cure, we are too apt to blame the particular method in which it was opened; for in whatever manner it is done, we know that the cure will often prove tedious and perplexing.

The object of practitioners should be nearly the same here as in collections of matter in any other part. Such an opening should be made as will afford a free vent to the matter: but there is seldom any necessity for making it larger. In large buboes, indeed, the teguments are apt to be so loose and flabby, and the texture of the skin so much destroyed, that the cure would be rendered tedious, were it allowed to remain. In such cases, it is advisable to discharge the matter with caustic, applied in such a manner as to destroy any part of the teguments that appear to be superabundant. This, however, is seldom necessary; and for the most part it will be found, that an opening made from the centre of the tumor, where the matter commonly points, down to the most depending part of it, will prove sufficient. Even a smaller opening than this would often answer; but it is better to make it of a sufficient size at once, than to be obliged to repeat a very painful operation perhaps once and again, as is often necessary when buboes of a large size are opened by small punctures. In small buboes, a mere puncture will sometimes prove sufficient; nay, in these, the matter being allowed to burst, often answers extremely well: but when the collection is large, this should never be trusted.

When buboes come forward to full maturation, without much injury being done to the skin, I have in various instances discharged the matter by the introduction of a small cord; and the practice has succeeded. This requires, however, the teguments to be firmer than they commonly are when a bubo is ready to be opened.

We all know that it is of much importance to prevent the accession of air to fores; and as we sometimes observe buboes ooze out the matter which they contain by a number of small openings over their surface, and as these commonly heal easily, I conclude that they do so from the openings being so small as to exclude the air entirely. In different cases, I have with this view attempted to imitate nature, by making a number of small punctures with the point of a lancet over the whole extent of the bubo; and for the most part with success. The matter comes slowly off; the sides of the abscess contract gradually; and when completely emptied, we commonly find the whole parts that have been affected, sufficiently firm, without any fores or sinuses remaining.

While means are employed to promote the supuration of a bubo, the patient should still continue the mercurial course, by which no time will be lost; and the sore produced by the opening, will afterwards heal more quickly than if the mercury had been interrupted. The sore, however, often proves tedious, even where we are convinced that a sufficient quantity of mercury has been given, and where there is reason to suppose that the syphilitic virus is eradicated. The edges become hard and livid; the matter, thin, sharp, and fetid; and instead of healing, the ulceration gradually becomes more extensive; or if it heals in some parts, it breaks out in others, giving a honeycomb appearance to all the under part of the abdomen and upper part of the thigh.

Patients labouring under sores of this kind, are frequently reduced to the greatest distress and danger. The pain with which the sores are attended, is often intense; the absorption of acrid matter induces hectic fever; the patients become hot and restless through the night; and almost a total want of appetite soon deprives them entirely of strength.

As I have happened to be concerned in a large number of such cases, I can speak with some confidence of the method of treatment. In the first place, we are here to suppose, that the patient has taken a sufficient quantity of mercury, and that no sinuses are left, in which matter in any quantity will be allowed to lodge. Cicuta, in such circumstances, has sometimes proved useful; and I have had different instances of sores of this kind being healed by the external use of it, when no benefit was derived from the usual dressings. In such cases, it was applied in the form of poultices, by mixing the juice of the fresh herb with the common emollient cataplasm. I have sometimes observed too, that in the internal exhibition of cicuta, the recent expressed juice has proved more effectual than any other form of it. I have given the hyoscyamus and belladonna very complete trials in various instances; but commonly with no material advantage. Sarsaparilla, guaiacum, and mezereon, all prove useful here; and they seem to act with most advantage, when used all at the same time: guaiacum and mezereon prove even serviceable when used separately; but I have, in different instances, found that they act with more advantage, when combined in the following form with sarsaparilla:

- Rx. Rafur. ligni guaiac. ℥ss.
 Radicis sarsaparillæ, ℥ifs.
 Corticis radicis mezerei, ℥i.
 Radicis glycyrrhizæ, ℥iij.
 Aq. fontanæ, lbiii. ; coque ad lbii.
 Colaturæ, adde
 Syrup. althææ, ℥i.

This quantity to be used daily, by drinking a cupful from time to time.

But the most effectual course I have hitherto tried, is the destruction of the hard edges of the fores either with lunar caustic or the scalpel. When caustic is used, it must be applied repeatedly; whereas in using the scalpel, we remove all the diseased parts at once. Opium proves in this state of these fores a very useful remedy; it not only gives temporary relief, but by lessening or removing pain, excites a tendency in the fores to heal, and ought therefore in all such cases to be used with freedom.

In the local treatment of fores in this state, I trusted for a considerable time entirely to emollients, such as wax ointment, saturnine cerate, and cerate prepared with calamine. I now, however, find, that escharotics answer better, and that in general they may be used with freedom, particularly those of the mercurial kind. After destroying the edges of the fores with the scalpel, which I now always prefer to caustic, red precipitate mercury, in fine powder, is the remedy on which I chiefly depend. In some cases it is sprinkled over the fores daily; but for the most part it acts with sufficient effect when mixed with any of the common ointments; in the proportion of one-fourth of the powder to three-fourths of the ointment. Instead of creating pain, it commonly removes it; and it seldom fails to alter the discharge from a thin sharp sanies to a thick well digested pus. Mucilage of gum arabic, impregnated with calomel, sometimes answers in the healing of these fores, when the usual dressings fail. A drachm, or even more, of calomel may be mixed with one ounce of thick mucilage.

Opium proves sometimes useful here as an external application; for although I have never had proof of its curing any symptom truly venereal, I

have had many instances of fores, remaining after the venereal disease being completely removed by it, where large quantities of mercury had previously been given in vain. It often appears that these fores, as well as others proceeding from different causes are kept up by that pain and irritation with which they are commonly accompanied when the matter is thin and acrid. Opium, by removing this state of irritability, seems to destroy the disposition in the vessels of the fore to form that kind of matter which, by its own acrimony, serves to perpetuate itself; and this being accomplished, if no other interruption takes place, nature alone will seldom fail to complete the cure. If this idea is well founded, there can be no necessity for giving opium in such large quantities as of late have been advised. On the supposition of opium being possessed of some specific powers in the cure of the venereal disease, it has been given in as large doses as the patient could possibly bear; and by beginning with small doses, and increasing them gradually, there have been instances of its being taken to the extent of half a drachm or more, two or three times a day. I have not heard, however, that any advantage has been derived from it in those large quantities, that did not accrue from a more moderate use of it: and in the course of my own experience, it has in every instance proved equally useful, when it merely lessened or removed pain, as when given in the largest doses.*

§ 3. *Of Lumbar Abscesses.*

EVERY collection of matter seated on any part of the loins, may be denominated a Lumbar Abscess. But it is that variety of the disease we are now to

* A more particular account of buboes, and of the fores which ensue from them, may be seen in a Treatise which I have published on the Venereal Disease, than could with propriety be inserted here.

consider, which originates about the superior part of the os sacrum; and in which we find, by dissection, that the matter contained in a cyst, is commonly lodged on the anterior surface of the internal iliac and psoas muscles.

These abscesses are preceded by pain and tension over the loins; which often shoots up along the course of the spine, and down towards the thighs; and for the most part they are accompanied with difficulty of standing in an erect posture. In some cases these symptoms are at first suspected to be nephritic; but for the most part the disease assumes the appearance of lumbago. When suppuration ensues, shivering fits are apt to occur; but the pain, which at first is always acute, becoming dull and less perceptible, the patient is led to conclude that he is getting better, till the matter, after falling down in a gradual manner behind the peritonæum, is observed to point outwardly, either at the anus by the side of the rectum, but more frequently on the upper and forepart of the thigh, where the large blood vessels pass out beneath Poupert's ligament, from the abdomen.

When the matter takes the course of the gut, and appears near to the anus, it either soon bursts, or is laid open, on the supposition of its being an abscess originating in the contiguous parts. But when it passes down with the femoral artery, which we find to be most frequently the case, as it lies deep, and is covered with the strong tendinous fascia of the thigh, instead of pointing at any particular part, it falls gradually lower, till in some cases it reaches near to the joint of the knee. In some I have known these abscesses first appear immediately within the spine of the ilium, and the matter burst out above the os pubis, but in general, before bursting, it falls farther down upon the thigh.

The tumor is seldom attended with more pain than might be supposed to ensue from the distension of the fascia and contiguous parts by the matter collected beneath. There is no discolouring of the skin; the teguments, for the most part, retaining their natural appearance to the last. A fluctuation of a fluid is evidently discovered through the whole extent of the tumor, particularly when the patient is erect; for at this time the swelling is always more tense than when the body is lying in a horizontal posture, when a considerable part of the matter runs along the sac towards its origin in the loins.

I have already observed, that this variety of abscess, when the matter falls down towards the anus, may be mistaken for a collection of matter originating in the neighbourhood of the rectum. But no further inconvenience can occur from this mistake, than that the sore, which ensues from laying it open, or from the matter bursting out, will not so readily heal as when the disease is local: and it is probable that this is one cause of abscesses in these parts being in some instances so difficult of cure. But in the more ordinary form of the disease, where the matter falls down beneath Paupart's ligament, the tumor exhibits appearances so similar to those of a crural hernia, that the one has often been mistaken for the other. Of this I have seen different instances, even where practitioners of experience were deceived. This proceeds, however, from inattention; for the two diseases may be clearly distinguished from each other.

The history of the rise and progress of the tumor should be first ascertained: a crural hernia usually appears suddenly, after some severe exertion, and without any previous symptom; for the most part it is attended with obstruction to the passage of the feces, with vomiting, and other symptoms of hernia; and from the first, the tumor is accompanied

with pain on pressure. But in the lumbar abscess, before the matter appears at the top of the thigh, the patient is previously distressed with symptoms of inflammation over all the under part of his back and loins. No obstruction of the bowels takes place, nor any symptom of hernia; and the patient admits of the tumor being freely handled. In the crural hernia, the swelling seldom arrives at any considerable bulk; and when it does become large, it is by slow degrees: no fluctuation is perceived in it: on the contrary, it feels either soft like dough, or knotty and unequal, according as the omentum or fæces contained in it have been long lodged in it or not. But in lumbar abscesses of this kind, the tumor commonly falls quickly down the thigh for the space of several inches; a fluctuation is always perceived; and no inequalities are observed in it. In hernia, even when not strangulated, some degree of pressure is usually necessary to make the contents of the tumor recede. But in the lumbar abscess, the tumor becomes flaccid immediately on the patient lying down, whether any pressure is applied to it or not: and it often happens, when the matter has fallen any considerable way down the thigh, and when the patient is in an erect posture, that a certain space can be discovered between the upper part of the matter and the inferior border of the abdominal muscles, which can never be done in hernia; and which, therefore, in this state of the disease, is always a certain means of distinction. It is scarcely necessary to observe, that in this kind of examination the patient should be put into different postures.

By due attention to these circumstances, we may always distinguish one of these tumors from the other. Both indeed may occur at the same time in the same thigh, by which a mixture of appearances will be produced. This, however, must be extremely rare; and when it does take place, as

the matter of the abscess and the parts protruded from the abdomen will always be contained in separate sacs, the combination will for the most part be easily discovered.

In the treatment of these tumors, the period of the disease first requires attention. While the inflammatory state continues, the strictest antiphlogistic course should be pursued, in order if possible to prevent the formation of matter. For the most part, we discover, that it has been induced by some injury done to the small of the back or loins, not unfrequently by a twist in wrestling, by carrying a heavy load, or by a severe bruise; and if accidents of this kind were immediately treated with that attention which their importance merits, those disagreeable consequences which are apt to ensue from them might frequently be prevented. Whenever a patient, who has suffered in this manner, complains of severe pain in the injured part, blood-letting should be immediately advised; and as local bloodletting proves always in such cases most effectual, it should be done by cupping and scarifying the pained part. The affected parts being deeply seated, the lancet of the scarificator should be made to go to a considerable depth; for which purpose the spring of the instrument should be stronger than usual, by which means any quantity of blood that we may wish for may be taken with ease; and I am convinced, that by carrying this practice a sufficient length, we might very commonly in the early stages of the disease, remove it entirely. It is difficult to say when injuries of these parts would terminate in suppuration or otherwise; but I have met with different instances, where, from the severity of the pain, and other symptoms, there was much cause to suspect that matter would have formed, if it had not been prevented by a timous and plentiful discharge of blood from the

injured parts; a remedy which commonly gives relief to the pain, however violent it may be. But at the same time that we depend chiefly on local bloodletting, other remedies which experience shows to prove useful in inflammation should not be neglected: of these, blisters, opiates, and gentle purgatives, are most to be relied on.

These, however, as well as every other remedy, will in some instances fail; and in others, practitioners are not called till suppuration has taken place, and till the matter has actually begun to point, either in the neighbourhood of the anus, or on the forepart of the thigh. In this situation, what are we to do? Are we to allow the matter to remain, or to discharge it by making an opening into it? In my opinion there is no room for hesitation: the matter should be evacuated as soon as a fluctuation is distinctly perceived in the tumor.

I know, however, that practitioners have formed different opinions upon this point: for it is alleged, that as lumbar abscesses are so deeply seated, it would be vain to attempt to cure them; and therefore that no advantage can be derived from laying them open; while much harm, they observe, may accrue from the air being freely admitted to them. But it does not appear that this reasoning is founded on observation. I have always held it as a leading surgical maxim, that the matter of every abscess, seated upon, or near to, any of the large cavities of the body, should be discharged as soon as its existence is clearly ascertained: so that in the treatment of the lumbar abscess, I have uniformly given vent to the matter, and without any bad consequences ensuing; while much mischief may occur from this being omitted. We find by dissection after death, that these abscesses, when of long duration, affect not only the softer parts that cover the vertebræ of the loins, but the substance of the vertebræ themselves, which in some cases have been

found carious, and even partially dissolved in the matter of the abscess. Now these accidents are surely more likely to happen when the matter is allowed to continue in the abscess, than when discharged early: at the same time, by emptying the sac, the matter is prevented from bursting into the cavity of the abdomen, which in different instances has happened, to the great hazard of the patient. The matter, however, ought certainly to be discharged in such a way as to prevent the air as effectually as possible from getting access to the cavity of the abscess. With this view a trocar may be used with advantage. By pressing the matter down to the most depending part of the abscess, the skin is made so tense, that a trocar is easily introduced. This I have done in different cases with complete success; and the patients wore a small canula in the opening for several months, for the purpose of giving a free vent to the matter. But when the case is not perfectly obvious, and where any doubt remains of the contents of the tumor; instead of pushing a trocar into it, the opening should be made in a slow gradual manner with a scalpel, in the same manner as is done in hernia; so that in the event of any of the contents of the abdomen being down, no injury may be done to them.

After the matter has continued to flow for some time, and if at the end of two or three weeks the quantity does not become less, it may prove useful to throw up with a syringe a weak solution of saccharum saturni, lime water, or any other gentle astringent; by which the discharge will be gradually diminished, and at last may cease entirely. But although this should never happen, and although the patient, during life, should submit to the inconveniency of a constant flow of matter from the fore; yet even this would be preferable to the risk

of allowing every abscess of this kind to remain unopened.

As I have happened to meet with many instances of this disease; as practitioners are divided in opinion respecting it; and as few authors have given a distinct account of it, I have judged it proper to speak of it more fully than otherwise I might have done.

§ 9. *Of the Paronychia or Whitlow.*

THE paronychia is a painful inflammatory swelling, occupying the extremity of one of the fingers, most frequently under the nail.

Many varieties of this disease are described by authors; but three only require to be distinguished, and even these are all of the same nature, the one being only more deeply seated than the others.

In the first, the patient complains of an uneasy burning sensation for several days over the point 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 be not removed by resolution, an effusion is at last produced between the skin and parts beneath. On discharging this by an incision, it appears to be a thin, clear, acrid serum; and the patient, in general, gets complete relief by the operation.

In the second variety of the disease, the same set of symptoms take place; only the pain is more severe, and attended with some uneasiness over the whole finger and hand. The effusion of matter is not so perceptible as in the other; and on laying it open, it is found to lie beneath the muscles of the finger, between these parts and the periosteum.

And in the third, the pain is still more intense in the point of the finger, at the same time that the

whole hand and arm becomes stiff, swelled, and painful. The lymphatics leading from the finger, and even the glands in the armpit, swell and inflame; and on making an incision into the effusion, it is found to lie between the periosteum and bone, the whole corresponding phalanx being very commonly carious.

Swellings of this kind may be produced by various causes. They frequently occur from external violence, particularly from punctures and contusion: but they happen more frequently without any obvious cause, and without our being able to account for them.

Two sets of remedies are employed in paronychia: the one consists of fomentations, poultices, and other emollients; the other of ardent spirits, vinegar, and other astringents.

As we find from experience that no benefit ensues from the effusion which occurs in this disease; on the contrary, that it is always productive of much additional pain; all those applications should be avoided which might tend to promote it. Some practitioners have been induced to employ warm emollient poultices on the first appearance of the swelling. This they do with a view to promote suppuration; but I have never observed that any advantage accrues from them. The matter of a whitlow is never of the purulent kind, nor is it ever converted into pus, or rendered mild by poultices, or any other remedy. We should endeavour therefore in every instance to prevent it from being effused; and this is done with most certainty by local bloodletting, and the use of astringent applications. Indeed the same remedies prove most effectual here, that we find to be so in the removal of inflammation in other parts. In various instances, I have found even severe degrees of pain almost immediately removed by the application of leeches over the diseased phalanx of the finger. But in

the more violent degrees of pain, where the arm swells, and especially when fever takes place, general bloodletting becomes likewise necessary, at the same time that large doses of opiates are indicated.

After as much blood is discharged by leeches as is judged proper, the immersion of the pained parts in strong brandy, or even in spirit of wine or alcohol, is one of the best remedies: and when the bites are somewhat healed, or when leeches have not been employed, spirit of turpentine or strong vinegar may be used in the same manner.

It is proper, however, to remark, that it is in the first stages only of this affection that remedies of this kind can prove useful: for when effusion has actually taken place, that state of the disease is produced which they were meant to prevent; and it does not appear that they have any effect in removing it. As soon as we are convinced that effusion has occurred, an opening should be made without delay: for we have already observed, that it is in vain to attempt to convert the effused fluid into pus; and being in itself acrid, it is apt to injure the contiguous parts, while at the same time the patient is kept in an extreme degree of pain as long as it remains confined. When the collection is superficial, and merely covered with skin, this is a very simple operation. A puncture with a lancet commonly proves sufficient: but when the matter is more deeply seated, it requires some attention to avoid the flexor and extensor tendons of the finger.

When the matter lies above the periosteum, all that we have to do is to make the opening sufficiently large for discharging it, and to dress the sore as if it was produced by any other cause. But, when the matter lies between the periosteum and bone, the latter is always rendered carious: hence it is the common practice to endeavour to keep the incision open till an exfoliation of the diseased parts

of the bone takes place ; but no advantage ever accrues from this. The process is not only extremely painful, but tedious. The matter is apt to lodge beneath the nail ; painful fungous excrescences sprout out over the fore, which it is difficult even with the strongest caustic to keep down ; and at last it very commonly happens, after the patient has suffered several months of distress, that instead of a partial exfoliation, the whole diseased phalanx comes away. I have long, therefore, been in the practice of removing the whole of the diseased bone immediately on its being found, by the introduction of a probe, to be carious ; by which much time and trouble are saved both to the patient and surgeon. By making a free incision along the whole length of the diseased phalanx, the bone is easily removed with common forceps. The pain attending the operation is indeed severe, but it is only momentary : and as it does not deprive the patient of the use of the joint, so much as might be imagined, it is seldom keenly opposed when the surgeon advises it. I have had several instances of people who in this manner lost the last phalanx of bone in one finger, having such a degree of firmness in the parts which remained, as to suffer very little inconvenience from the want of it.

When the diseased bone is removed, the remaining fore commonly heals easily. It requires some attention, however, to preserve the lips of the fore from uniting till it fills up from the bottom. This is most easily done by insinuating between them, at each dressing, a small pledget of soft lint, spread with any mild emollient ointment.

In almost every variety of paronychia, the nail is apt to fall off ; but this proves only a temporary inconvenience ; for when the parts are properly protected, nature never fails to supply the deficiency.

In the commencement of paronychia, the last phalanx of the finger only is affected; and to whatever extent the pain and swelling of the softer parts may spread, we seldom find that the bone of the contiguous phalanx suffers, unless from improper management in allowing the diseased bone to remain, or the acrid matter to lodge too long. In such cases, the surrounding teguments are apt to swell and inflame, and small ulcerations to occur over the whole extent of the carious bone. In this situation we are often under the necessity of advising the finger to be amputated, 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, ears, and other extreme parts of the body, are liable, on being much exposed to severe degrees of cold. The tumor is for the most part of a deep purple, or somewhat of a leaden colour: the pain with which it is attended is not constant, but shooting and pungent; and, in general, it is accompanied with a very distressful degree of itching. In some cases the skin remains entire, even although the tumefaction is considerable; but in others it bursts or cracks, and discharges a thin fetid matter. And where the degree of cold by which the disease was produced has either been great, or the application of it long continued, all the parts that have been affected are apt to mortify and slough off, by which a very foul ill conditioned ulcer is always left.

I have observed above, that it is the extreme parts of the body chiefly that are liable to be attacked with chilblains: and we likewise find, that they are more frequent in delicate children and old people than in those who are robust. It is also re-

marked, that they are particularly severe in people of scrofulous constitutions.

The best preventative of chilblains is to avoid exposure to cold and dampness; for when once a person has suffered from chilblains, if the injured parts be not protected by sufficient coverings, they are apt to return every winter. Much distress, therefore, and inconvenience, may be prevented by keeping this precaution in view.

Chilblains may be considered as a lesser degree of what is usually termed frostbiting: hence parts attacked with them should never be quickly warmed. The patient should not be allowed to approach a fire: instead of which, he should be put into a cold apartment; and the frostbitten parts should be first well rubbed with snow when it can be procured, and afterwards immersed in cold water. Nothing proves so certainly hurtful to parts in this state as heat suddenly applied. Even snow and cold water afford a warm sensation to parts attacked with chilblains; but it is found by experience, that no detriment ensues from this. After the parts have been treated in this manner, the patient may in a gradual way be brought into a greater degree of heat; but he should for a considerable time be kept at a distance from fire. Rubbing the parts with salt will in this situation prove useful; and immersion in warm wine is likewise employed with advantage.

A patient much benumbed with cold should not even have cordials given to him suddenly. A glass of cold wine may at first be allowed. Afterwards warm wine may be given, either by itself or mixed with any of the warmer spices: and when stronger cordials are required, ardent spirits may be employed.

Remedies of this kind, however, are only necessary in the more severe degrees of these affections. In common cases of chilblains occurring in this

country, as soon as the part is perceived to be affected, it should be well rubbed either with spirit of turpentine, or camphorated spirit of wine; and pieces of soft linen, moistened in one or other of these, should be kept constantly applied to it. In this manner we have it often in our power to remove chilblains, which otherwise would be productive of much distress: but I must again observe, that the best advice that can be given to patients liable to chilblains, is to protect the parts much exposed to suffer from cold as much as possible during the winter; and when by accident they get wet with snow, which proves more particularly hurtful than moisture of any other kind, that they should be dried as quickly as possible.

As some patients suffer severely with chilblains every winter, our being able to prevent them without that inconvenience to the patient which always attends confinement and much caution, would often be an object of importance; and it is a point upon which practitioners are frequently consulted. In various instances I have derived the most obvious benefit from sea bathing during summer; and in one patient who had suffered severely from the effects of cold for several winters, I advised a chamber bath to be used even during winter; by which the parts which used to suffer were so much strengthened, that several years have elapsed without any return of the disease.

- When chilblains ulcerate, by the teguments being altogether thrown off, or merely cracking and oozing out matter, warm poultices and emollient ointments are commonly employed. For the purpose of cleansing the sores, and inducing a discharge of right matter, poultices may with propriety be advised for a few days; but they should never be long continued: nor should emollient ointments be much persisted in; for they very universally induce fungous excrescences over the sores, which are of-

ten difficult to remove. The daily application of caustic to the edges of the sore, and dressing the sore itself with common digestive ointment, mixed with a due proportion of red precipitate, are the best preventatives of this. Common diachylon plaster, spread upon thin leather, makes an useful application for sores of this kind.

§ 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 pain and inflammatory swellings.

Slight injuries of this kind seldom meet with much attention; but whenever they are severe, the most distressful effects are apt to result from them, and can only be prevented by the greatest skill and attention of the practitioner, accompanied with much caution on the part of the patient.

An increased action in the arteries of an injured part, by which red globules are forced into vessels which naturally do not admit them, will account for all the phenomena which usually attend inflammation: but in the severer degrees of sprains and contusions, along with an increased action of the arteries in the part, which must necessarily result from the pain with which they are accompanied, it is evident that instantaneous effusion likewise takes place, from the rupture of a great number of small vessels. In no other way can we account for those tumors of considerable bulk, which often succeed almost instantly to sprains. For the most part the effusion must be of the serous kind, as the skin usually retains its natural colour for some time after the accident: but the tumefied parts are sometimes of a deep red, and on other occasions of a leaden colour, from the first; owing to a rupture of some of the vessels containing red blood.

In the treatment of sprains and contusions, two circumstances chiefly require attention. In the first place, we should endeavour to prevent the swelling, as far as this can be done, and afterwards those remedies should be employed which we know to prove most powerful in preventing or removing inflammation.

It is alleged, indeed, by some, that the swelling which occurs from contusions never does harm, and therefore requires no particular attention. In contusions of the cellular substance, or even of the muscles, I allow that this is often the case; for to whatever extent the tumefaction may proceed, the effused fluid is in these parts very commonly absorbed. But even here the swelling in some cases proves very obstinate; and in sprains of the tendons and ligaments, a very troublesome, painful thickness of the parts that have been injured, is apt to continue for a great length of time; in some cases, even for life: and I have commonly observed, that this has been nearly in proportion to the size of the tumor which occurred at first; for it would appear that effusions thrown out by ligamentous parts are not so readily absorbed as those which take place in other parts of the body. Hence, in accidents of this kind, it is always an object of importance to prevent the swelling from arriving at any considerable size.

With this view, we depend chiefly on astringent applications; such as the lees of red wine, ardent spirits of every kind, and vinegar. By immersing a sprained or contused part in any of these immediately on an injury being received, if the effusion and swelling be not altogether prevented, they will at least be rendered much less than otherwise they probably might have been. We also find that the immediate application of cold proves frequently useful. Plunging a sprained limb into cold water, or even into water rendered artificially cold by a

mixture of nitre, very commonly answers a good purpose, and should always be advised in the first place, till one or other of the articles that I have mentioned can be procured; for as the effusion takes place quickly, no time should be lost in the application of the remedies.

It fortunately happens, that the remedies which answer best in preventing the effusion that ensues from sprains, prove likewise useful in preventing inflammation. But as this symptom is in severe sprains apt to proceed to a great height, other remedies are required; and none that I have ever employed answer so well as local bloodletting. By the time that cold water and other discutients may be supposed to have produced any effect, which cannot be in less than an hour, a number of leeches should be applied over all the tumefied part; or, in contusions of fleshy muscular parts, cupping and scarifying may be employed. But in whatever way it is done, a quantity of blood should be drawn off somewhat proportioned to the strength of the patient and severity of the sprain.

For a considerable time past, I have been in the practice of employing local bloodletting in sprains and contusions of every kind; and whether the injury has been slight or severe, it has very commonly proved an useful, pleasant, remedy. In slight sprains, one plentiful evacuation of blood by means of leeches, in general proves sufficient. But when the injury has been severe, we are obliged to apply them once and again: they require indeed to be repeated from time to time as long as any severe degree of pain continues. Even when the inflammation and swelling of the teguments that arise in sprains are gone, a fulness or thickening is often discovered in the tendons and ligaments; and we conclude, that they continue inflamed, as long as they are much pained either by pressure or motion. In this situation nothing ever proves so

effectual as the application of leeches : this remedy indeed seems to prove equally beneficial, whether the inflammation be seated entirely in the skin, or in the more deep seated parts ; so that it should not in any case be omitted.

In violent sprains the pain is often so severe, as to induce quickness of pulse and other symptoms of fever. In such cases, along with local blood-letting, it proves sometimes necessary to take blood in larger quantities with the lancet : opiates also become necessary, together with all the remedies that prove useful in fevers arising from inflammation.

After blood has been freely taken from a sprained part, the best remedy that we can use at first, is a solution of cerussa acetata ; and afterwards, for the removal of that thickened state of the ligaments, which often succeeds to sprains, the pouring of warm water upon the part two or three times a day, for the space of a quarter of an hour or so each time, proves often useful. Even common spring water frequently answers the purpose ; but it seems to prove more useful when impregnated with sea salt, or crude sal ammoniac. There is likewise reason to think, that the warm waters of Bath and Buxton are rendered more effectual in cases of this kind, by the impregnations which they contain, than they otherwise would be.

Along with warm bathing, frictions with emollients prove sometimes useful in removing this thickening of the parts induced by sprains. But they require to be persisted in for a great length of time.

During the cure of a contusion or sprain, the injured part should be kept as much as possible in an easy posture. In every instance this should be kept in view, but more especially when the pain is very severe, which it always is when the fibres of any of the sprained tendons have been ruptured, and

which nothing will cure so readily as the limb in which it has happened being kept for a considerable time in a relaxed posture.

I have already mentioned the warm bath as a remedy in sprains. In various cases cold bathing also proves serviceable. After sprains have been of some duration, the injured part is apt to continue weak and relaxed, even when the pain and swelling are gone. In this situation, cold water being poured upon the part from a height, or being suddenly dashed on it, and repeated once or twice daily, proves more effectual in strengthening the weakened limb than perhaps any other remedy. It is for the removal of debility only, however, that cold bathing should be employed; and there is much reason to think that it has done mischief when used in the more early stages of sprains. While much thickening of the tendons and ligaments remains, and which often proves the most formidable, as well as the most obstinate symptom which accompanies sprains, a long continued use of cold bathing seems to do harm, by rendering the thickening more firm than it was before, while the contrary effect often results from a proper application of warm water.

A bandage or roller applied over the injured parts, as tight as the patient can easily bear it, proves often useful in sprains. By supporting the relaxed parts, it not only prevents pain, but the œdematous swellings also, to which sprained limbs are often liable. The roller should be of flannel, which yields more readily than linen to any variety in the size of the limb, while it serves as the most effectual preventative of those rheumatic affections with which limbs that have suffered from sprains are liable to be attacked. The roller should be carried spirally upwards from the inferior part of the limb, with an equal pressure on every part of it, in order to prevent œdema which might otherwise take place.

SECTION III.

Of Chronic or Indolent Tumors.

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§ 1. *General Remarks.*

THE general character of this class of tumors is, that they are slow in their progress, and not necessarily attended with inflammation. Tumors of every kind may eventually, indeed, induce inflammation: thus, swellings which have long remained indolent, by an increase of bulk will often distend the skin so much as to become inflamed; and all the varieties of hernia, although not necessarily accompanied with inflammation, for they frequently take place without it, tend often to induce it, for reasons too obvious to require being mentioned. But in these, we consider inflammation as an accidental occurrence only, and in no way connected with the rise or formation of the disease. Of the chronic tumors we shall first consider those that are encysted.

§ 2. *Of Encysted Tumors.*

EVERY tumor might be considered as encysted, the contents of which are surrounded with a bag or cyst, as is the case with every variety of hernia and hydrocele, as well as with some other tumors; but in common practice those tumors only are termed encysted that are contained in cysts of a preternatural formation. In common language, these, as well as various tumors of the sarcomatous kind, are termed wens.

The different parts of which an animal body is composed, are connected together by a common medium, termed the cellular substance; which is so universally diffused, that it seems to form a very considerable part of every fibre. In a state of health the cells of this substance communicate with each other; and, in like manner with the large cavities of the body; these cells are kept soft and moist by a secretion constantly passing into them by the exhalents, and returning from them by the absorbents. In some parts of the body this secretion is entirely serous; while in others it consists evidently of oil or fat.

While the absorption of this fluid is in proportion to the quantity exhaled, no accumulation takes place: but various causes may concur to destroy the equilibrium; and in whatever way this may happen, if more is secreted than is carried off by the absorbents, a fullness or swelling must necessarily ensue. Where this superabundance is of the serous kind, a dropsical swelling will be produced; when of an oily nature, obesity or fatness will take place.

A general disposition in the system to this kind of accumulation is a frequent occurrence; but causes sometimes occur by which collections are produced in particular parts. In a sound state of the cellular substance, that natural communication that I have mentioned as subsisting between the different cells of which it is composed, must necessarily prevent any partial or circumscribed collection. And accordingly we know, that all serous effusions very readily pass from one part of this membrane to another. But this communication may be interrupted by inflammation as well as other causes, and accumulation of this natural fluid may therefore take place in a particular part.

We thus account for the formation of encysted tumors; to which different names have been applied, according to the consistence and appearance of their contents. When of the consistence of honey, the tumor is termed *meliceris*: when of a soft cheesy consistence, or resembling dough, it is termed an *atheroma*; and *steatoma*, when formed of fat.

But it is proper to remark, that various degrees of consistence are observed in each of these. Thus, the *steatoma* is sometimes soft like butter, and at other times firm like suet: and the same kind of variety occurs in the contents of the *atheroma* and *meliceris*, which in some cases are equal in firmness to new cheese, and in others not firmer than the thinnest honey.

The matter forming *steatomatous* tumors, we conclude to be from the first of an oily or fatty nature; and that their different degrees of consistence will depend upon the remora of their contents, and quantity of thinner parts of them that happen to be absorbed. And I think it probable, that *atheromatous* and *melicerous* tumors are originally formed by a deposition of serum, with perhaps a considerable proportion of coagulable lymph; and that the degrees of consistence of which we find them, will depend upon various causes: upon the the particular quantity of coagulable lymph which they contain; upon their being of longer or shorter continuance; and particularly, upon their having been inflamed or not; and upon the extent to which this inflammation may have proceeded.

For the most part, practitioners accustomed to this branch of business, may be able to distinguish with sufficient exactness the nature of these tumors before laying them open. Thus, in general, the *steatoma* is of a firm consistence: it is commonly loose, and rolls more readily than the others under the skin; and its surface is apt to be unequal: the

atheroma is soft and compressible, but no fluctuation is observed in it: while, in the meliceris, the fluctuation of a fluid or thin matter is in general very distinctly perceived. It is proper, however, to remark, that neither these, nor any other means of distinction, will at all times prove sufficient: for in some cases, the steatoma, instead of being firmer than the others, is much softer; insomuch that I have met with different instances of the fat of which they are formed, fluctuating or moving between the fingers like thin purulent matter; and where, accordingly, the opinion that was previously formed of it was altogether erroneous. The atheroma and meliceris are sometimes combined in the same tumor: one part of it will be of a soft pultaceous nature, and contained in a separate cyst or cell, while the rest is perhaps of the same consistence with purulent matter. In a few cases, too, the steatoma is conjoined with these, but this is not a frequent occurrence:

In judging of the nature of these tumors, some advantage may be derived from attending to their situation. Thus we observe that in some parts of the body fat is more apt to be deposited in the cellular substance than in others. In some parts, indeed, fat is scarcely ever perceived in it; as is the case over a great part of the head; while in others, particularly over the prominent part of the abdomen, we commonly meet with it even in the leanest subjects. Now I believe it will be observed, that steatomatous tumors are seldom, if ever, met with in those parts of the body which are not usually in a state of health supplied with fat: at least this has been so much the case in the course of my practice, that I have never met with an instance of it; and it tends much to confirm the idea, which I have endeavoured to establish, of the formation of these tumors. The head, as I have observed, is

very sparingly supplied with fat, at the same time that we find it more liable than any part of the body to encysted tumors; but these tumors are very universally of the atheromatous or melicerous kinds.* Nor have I ever met with the steatomatous tumor but where fat is usually deposited in the contiguous cellular substance. They are rarely indeed, observed on that part of the body which is most plentifully supplied with fat. We seldom meet with these or any other variety of encysted tumor on the abdomen; and at first view this may be considered as an objection to our theory: on further attention, however, it will rather appear to support it. The parietes of the abdomen being formed of soft yielding parts, with no bone or hard body beneath, we may readily suppose that they will scarcely, if at all, be affected with pressure: so that this cause of obstruction will not here have the same effect as on the head and other parts where the cellular substance lies immediately above the bone.

All the tumors of the encysted kind are small at first, and increase by slow degrees. They are of very different shapes and sizes: in some they resemble a walnut; on the head they are commonly round and smooth, and do not often arrive at any great bulk; but in other parts of the body they are often of an irregular form, at the same time that they are more apt to acquire a greater size. I have met with steatomatous tumors weighing upwards of twenty pounds; and sometimes they are double this weight. They are never at first attended with pain; and the skin for a considerable time

* By atheromatous and melicerous, I mean to express different degrees of consistence of a curdy pultaceous matter. By some, the firmer kinds of this have been mistaken for, and described as, the contents of the steatomatous tumor; but they will be found to be in every respect different from the fatty substance contained in the real steatoma; nor does the one variety of these tumors ever change into the other.

retains its natural colour. But when, by long duration, 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 tumor acquires a clear red colour, similar to that which accompanies inflammation: but it seems to be different from this, as it is seldom attended with pain, unless when injured by external violence. A blow or bruise will readily, indeed, excite inflammation, by which the skin will become tender and painful, and will crack or burst, if not prevented by the contents of the tumor being discharged by an operation.

This is the ordinary progress of these tumors: but it is proper to remark that although they never advance quickly, yet in some situations they terminate much sooner, and arrive at a greater bulk, than in others. Thus, in the head they do not usually become larger than a pullet's egg. In a few cases, indeed, they are larger; but for the most part they terminate before they acquire this size, by the teguments becoming tense and thin, and even bursting if not prevented in the manner I have mentioned. But on other parts of the body, particularly on the back, on the shoulders, and thighs, the skin sometimes retains its natural colour long after a tumor has become very large. This seems to proceed from different degrees of laxity in the skin. In the head, the teguments are firm, and do not yield so readily to distention as in other parts of the body; by which any tumors lying beneath them must necessarily be more quickly brought to a period.

The situation of these tumors has likewise a considerable effect on the firmness with which they are attached to the contiguous parts. In some parts they are so loose and moveable, especially while they continue small, that they readily yield even to slight degrees of pressure: but in others, parti-

cularly where covered with any fibres of muscles, they are apt to be firmly fixed from their commencement. The attachment of tumors is also influenced by their remaining more or less free of inflammation ; for they never become inflamed, even in the slightest manner, without some degree of adhesion taking place between the cysts and corresponding teguments.

In the treatment of encysted tumors, we are directed by authors to attempt to cure them in the first place by resolution ; and if this fails by extirpation. With a view to accomplish a cure by resolution, frictions with mercurial ointments are recommended, together with gum plasters, and a variety of other applications. No practitioner, however, of the present age, will depend upon this management ; nor will he expect to be able to remove these tumors in any other manner than by the aid of surgery.

We shall therefore, suppose, that the removal of one of them by an operation is agreed on : the next point to be determined is the mode of effecting it ; and this in a great measure should depend on the contents of the sac. If they appear to be of the thin melicerous kind, which for the most part will be the case if a distinct fluctuation is perceived through the whole body of the tumor, it ought to be treated like a common abscess. In small collections the matter may be discharged by laying the most depending part of the tumor open with a common lancet, and treating it in the ordinary way till it fills up or adheres from the bottom : but as in large swellings of this kind, the free admission of air proves always hurtful, the opening should be made in a manner the least likely to be attended with this inconvenience. In a preceding part of this work, I have recommended the passing of a seton or cord through large abscesses as the best method of laying them open ;

and as the same method may with equal propriety be employed in encysted tumors formed by collections of any thin matter, we shall now refer to what was then said upon the subject.* I shall at present only observe, that the cord should pass through the whole extent of the tumor, from the superior to the most depending part of it; and that the inferior opening at which it passes out, should be sufficiently large for admitting the matter to be freely discharged. In this manner I have had many instances of large encysted tumors being healed with more ease than almost ever happens under the ordinary method of treatment. Several years ago, I gave my opinion upon this point at considerable length; and further experience of the advantages which result from it has tended much to confirm it,†

This method of cure, however, is only applicable where the contents of tumors are so thin as to be easily discharged by a small opening. When too firm to admit of this, they must either be emptied by an extensive opening into the cyst, or the cyst with its contents must be dissected out.

Where a cyst containing matter adheres so firmly to the contiguous parts as to require much time to remove it by dissection, it should never be attempted. It will be sufficient to lay it freely open through its whole extent, and to remove any portions of it that may be loose. The contents of the tumor will in this manner be completely removed; and the cure may either be effected in the usual way, by preserving the wound open till it fills up with granulations from the bottom; or it may be attempted by drawing the divided edges of the skin together, and trusting to moderate pressure and the ordinary effects of inflammation for producing a

* Vide Chap. I.

† Vide Treatise on Ulcers, &c. Part I.

complete reunion. I have succeeded in both ways; and I think it necessary to observe, that both are equally certain. To those who have been accustomed to think that it is necessary to remove the cysts of these tumors entirely, it will at first appear to be unsafe to allow any part of them to remain: many I know are of this opinion, but experience would soon convince them that it may be done with safety: when we resolve, however, on removing the cyst, it is better to open it by a longitudinal cut through the whole length of the tumor than to remove it entire. When the cyst is empty, it is more readily laid hold of with the fingers or forceps, and more easily dissected out, than when the bag remains full and distended.

When the bag is thus removed, the teguments should be laid together, and retained with adhesive plasters, or with two or three futures, as the operator may incline: and if a due degree of pressure is made over the whole, a cure may thus be obtained by the first intention. In every part of the body this is an object of importance, as it tends to shorten the cure; but it is particularly proper in the face and other external parts of the body, where the cicatrix produced by a tedious sore proves for the most part very unseemly.

The arteries which supply the cysts of these tumors are sometimes so large as to pour out much blood when they are cut. In this case, they should be immediately secured with ligatures: and if the threads are left of such a length as to hang out at the lips of the wound, they prove no obstacle to the cure being completed in the manner I have directed; for when applied with the tenaculum, as they ought always to be, they may be drawn away with ease and safety at the end of the second or third dressing. By an ill timed caution, some practitioners, from an apprehension that ligatures in such circumstances may do harm, have advised that none

of the arteries which appear in the removal of these tumors should be tied. Nay, some have gone so far as to say, that it is seldom or never necessary to apply ligatures to such arteries as are cut in the removal of tumors of any kind, not even of cancerous mammæ: but as I have known different instances of patients dying suddenly from loss of blood where this precaution was neglected, and as I never met with a single case of any harm being done by it, I would advise every artery to be secured that does not stop soon after being divided. Besides the real danger to be dreaded from this being neglected, it is apt to frustrate our intention of healing the fore without the formation of matter. In the removal of cancerous breasts, where the edges of the divided skin have been drawn together so as to cover the fore, by the bursting of an artery which had not been secured, such a quantity of blood is occasionally effused between the teguments and parts beneath, as tends either to prevent them from uniting, or to render it necessary to remove the bandages, and to lay the parts again open, in order to discover the bleeding vessel. Of this I have met with such a number of instances, that I am convinced every practitioner of experience must have done the same; and as they never fail to produce much disturbance both to the patient and surgeon, the cause from which they originate ought undoubtedly to be avoided.

In tumors of an ordinary size, there is no necessity for removing any part of the skin. By a single incision along the course of the tumor, in the manner I have directed, the sac will either be laid sufficiently open, or it may be removed with equal ease as if it were opened by a crucial incision; and although the skin may at first appear to be too extensive, yet in the course of a short time it will contract so as merely to cover the parts beneath. But in tumors that are large, where the skin is so much

distended that it will be much puckered if part of it be not removed, it ought without hesitation to be done. This is best effected by including in two semilunar cuts as much of the skin as we mean to remove; and this being done, the portion of skin thus separated must be taken away along with the cyst. In the same manner, when we are operating upon a tumor where the prominent part of the skin is either ulcerated, or rendered so thin by distention that we cannot with propriety attempt to save it, such parts of it as are thus affected should be included between two semilunar cuts, and removed in the manner I have mentioned. In other respects, the cure must be conducted as if none of the skin were taken away, by drawing the divided edges of the teguments together, and endeavouring to make them unite by the first intention, in the manner I have advised.

Where wens are so large as to render it necessary to remove any part of the skin, we are desired by some practitioners to do it with caustic; and by others caustic is used for opening every tumor. Caustic, however, should never be employed where patients have resolution to submit to the use of the scalpel.

§ 3. *Of Ganglions.*

By the term Ganglion, we here mean an indolent moveable tumor which forms 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 tumors possess a considerable degree of elasticity; by which they may in general be distinguished from the encysted tumors described in the last section. They seldom arrive at any great bulk; they are not often attended with pain; and for the most part the skin retains its natural appearance.

On being laid open, they are found to contain a tough, viscid, transparent fluid, resembling the white of an egg.

It seldom happens that ganglinous tumors become so large as to render them the objects of surgery. On their first appearance, they may often be removed entirely, either by moderate friction frequently repeated, or by gentle pressure with thin plates of lead properly secured with a bandage. In this manner, they are more readily dissolved than any other kind of swelling: but neither the friction nor the pressure should be carried too far, otherwise the skin may be so much fretted as to give rise to inflammation; by which suppuration, and abscesses of difficult cure may be induced.

When this method of removing a ganglion does not succeed, nothing further should be attempted while the tumor remains of a moderate size: but when it becomes so large as to prove troublesome, either by impeding the motion of a joint, or in any other manner, it ought to be removed by excision, in the same manner as I have advised in the treatment of encysted tumors, when the cyst is to be taken away; that is, by making a longitudinal cut through the teguments over the whole extent of the tumor; and after separating the skin on each side, to dissect it off from the tendon: or, when it is found to adhere so firmly to the contiguous parts as to render this impracticable, an incision may be made into it of such a depth as to discharge the contents of it, after which a cure may be obtained by preserving the wound open till it fills with granulations from the bottom.

In general, practitioners are averse to operate on these tumors, on the supposition of the wound being difficult to heal; but I have seldom known this to be the case.

§ 4. Of Swellings of the *Bursæ Mucosæ*.

THE *bursæ mucosæ* are small membranous bags, seated upon, or very contiguous to, the different large joints. They naturally contain a thin, transparent, gelatinous fluid, which seems to be intended for lubricating the parts upon which the tendons move that pass over the joints. They are met with in other parts of the body, but chiefly about the hip joint, the knee, ankle, shoulder, elbow, and wrist.*

In a state of health, the fluid contained in these *bursæ* or sacs is in such small quantity, that it cannot be discovered till they are laid open by dissection; but in some cases it accumulates to such an extent as to produce tumors of a large size. This is not an unfrequent effect of contusions and sprains; and I have often met with it as a consequence of rheumatism. The swelling is seldom attended with much pain: it yields to pressure, but is more elastic than where ordinary matter is contained: at first it is always confined to one part of the joint; but in some cases the quantity of accumulating fluid becomes so considerable as nearly to surround the joint. The skin always retains its natural appearance, unless attacked with inflammation.

The contents of these tumors are found to be of different kinds, and this seems to depend on the cause by which the swelling is produced; a circumstance meriting particular attention. Thus when the tumor is induced by rheumatism, the contents of the sac are commonly thin and altogether fluid, resembling the synovia of the different joints; at least this has been the case in any of those which I have opened, while in such as proceed from sprains,

* The best account that has yet appeared of the situation and number of the *bursæ mucosæ*, may be seen in a publication upon this subject by Dr. Alexander *Monro senior*, of this University.

we usually find, mixed with this transparent fluid, a considerable quantity of small elastic concretions. In a few cases I have met with those concretions of a soft texture, so as to be easily compressed between the fingers; but in general they are firm and elastic. We may commonly, however, judge of this, even before the tumor is opened, by the kind of fluctuation that takes place. When the concretions are soft, the fluctuation is usually distinct; but when they are firm, it is not so clearly perceived, while at the same time they are easily felt beneath the fingers on being pressed from one part of the sac to another.

In practice it will be found to be an object of importance, our being able to distinguish between those collections which proceed from rheumatism, and such as are the consequences of old sprains: for in the first, I believe, it is seldom or never necessary to propose an operation; as in most instances, perhaps in all, the swelling will at last disappear, merely by keeping the parts warm with flannel; by frequent frictions; by warm water being frequently pumped upon them; or by the application of blisters. At least this has happened in every rheumatic case of this kind in which I have been concerned. But in those swellings of the bursa mucosa, which originate from sprains, although the quantity of effused fluid may remain stationary, or may even lessen in quantity, it will seldom, if ever, disappear entirely. In such cases, therefore, when the tumor becomes troublesome from its size, we are obliged to lessen or remove it by an operation.

The only operation that is admissible, is that of opening the sac, so as to discharge the matter contained in it, and to preserve the wound open till it fills with granulations from the bottom. In most situations this may be done with safety; but in some parts, particularly about the joint of the wrist,

these collections are so covered with tendons, that the greatest caution is required in every operation of this kind. When the contiguity of tendons prevents the sac from being opened to such an extent as may ensure a cure, it will be better to lay it open at each end; and after pressing out the contents, to pass a small cord of silk from one opening to the other. In this manner a slight degree of inflammation will be excited on the inside of the sac, when the cord may be withdrawn, so as to admit of a cure being attempted by gentle pressure, applied with a roller over the course of the tumor. I have sometimes succeeded in this way, when a cure could not be obtained by any other means; and when the cord is cautiously introduced with a blunt probe, no harm occurs from it, even when it passes beneath some of the tendons. The cord, however, should not be continued so long as to induce much pain or inflammation; for in the neighbourhood of large joints this might prove alarming: and we know from experience, that even a slight degree of inflammation answers the purpose sufficiently well.

A considerable degree of stiffness is very apt to remain upon that part of the joint where the tumor was seated. The most effectual remedy for this, is frequent frictions with emollients, and a proper application of warm steams to the part affected.

§ 5. *Of Collections within the Capsular Ligaments of Joints.*

COLLECTIONS of various kinds are met with in the capsular ligaments of joints. Blood may be effused within them. Inflammation is here, as in other parts, frequently succeeded by the formation of matter; and they are liable to serous effusions, forming what are commonly termed dropical swellings of the joints.

These swellings should be distinguished with precision from others which they resemble. They are most apt to be confounded with collections in the *bursæ mucosæ*, or with matter effused in the cellular substance covering the joints. From the first of these they may be distinguished, by the contained fluid passing with freedom from one side of the joint to the other; and from its being diffused over the whole of it: whereas, when a fluid is contained in any of the *bursæ*, the tumor is more circumscribed; being for the most part fixed above or upon one side of the joint. Collections of matter in the *bursæ mucosæ* are seldom painful, while every tumor seated within the capsular ligaments of joints is apt to excite violent degrees of pain.

Tumors of this kind are more easily distinguished from matter collected in the cellular substance covering the joints. In the last, the collection is evidently superficial; and it is not so much confined to the joint itself, being in general found to extend in every direction further than the boundaries of the capsular ligaments.

We judge of the nature of the fluid collected in these swellings, by the circumstances with which they have been preceded as well as by the symptoms with which they are accompanied. When a violent bruise of a joint is immediately succeeded by a large effusion within the capsular ligament, it will commonly be found to consist of blood. This is not a frequent occurrence; but as I have now met with it in several instances, I conclude that it may happen in others.

When inflammation of a joint terminates in effusion within the capsular ligament, there is reason to suspect that the matter forming the tumor is of a thin ferous kind, with some tendency to purulency; for well conditioned pus is seldom met with in ligamentous or membranous parts. And, lastly, when collections within the capsular ligaments suc-

ceed to rheumatic affections, there is much reason to suppose that they are entirely ferous; for we know from observation, that effusions which take place in rheumatism are very commonly of this kind.

The importance of our being able to ascertain the kind of matter contained in these swellings, becomes obvious from the difference of practice which they require: as the making an opening into a large joint is always hazardous, from the pain and inflammation being considerable which it is apt to excite, it should never be advised but from real necessity. One of the causes that has in general been supposed to require it, is matter collected within the capsular ligaments: but when by experience we discover that a particular kind of matter may be allowed to collect in this situation, without doing harm, we rather allow it to remain, than incur the risk which might ensue from letting it out. Now this is uniformly the case, as I have already observed, with those effusions which succeed to rheumatism. Whether collected in the bursa mucosa, as mentioned in the preceding article, or within the capsular ligament of a joint, they should never be laid open. Of whatever size they may be, they will very commonly be dissolved by the remedies I have mentioned, namely, by frictions; pouring warm water upon the parts affected; proper covering with flannel; and the use of blisters; or, when these fail, supporting the tumefied parts with a laced stocking, or a roller, will commonly prove successful. But whether this shall dissipate the swelling or not, when we are convinced that it is of the rheumatic kind, it ought not to be opened. The patient may continue to complain of some uneasiness and stiffness in the joint, but this will be trifling when compared with the pain and inflammation which may occur from laying it open. But when matter is collected in the cavi-

ties of joints, which may do harm if allowed to remain, an opening should be made for discharging it. The matter which forms in consequence of high degrees of inflammation, and effused blood, are of this kind. Blood is frequently extravasated among soft parts without much detriment; but when in contact with cartilage or bone, it soon hurts them materially; and the same effect is sure to ensue from the lodgement of matter produced by inflammation.

The danger that accrues from this operation seems to depend in a great measure upon air finding admittance to the cavity of the joint, which ought therefore to be as much as possible guarded against. For this purpose the opening should be made with a trocar; and if the skin is previously drawn tight to the upper part of the tumor, by pulling it down immediately on withdrawing the canula after all the fluid is discharged, the risk of air being admitted is in this manner greatly lessened. A piece of adhesive plaster should be directly laid over the opening in the skin; and the whole joint should be firmly supported, either with a laced stocking, or a flannel roller properly applied round it.

As a further preventative of bad consequences from this operation, if the patient is plethoric, he should lose blood to such an extent as his strength will bear: he should be put upon a strict antiphlogistic regimen; and in every respect should be managed with much caution: for inflammation being very apt to ensue from it, we cannot be too much on our guard against it.

§ 6. *Of Concretions and preternatural Excrescences within the Capsular Ligaments of Joints.*

JOINTS sometimes become painful, and their motion impeded, by the preternatural formation of

substances within their capsular ligaments. In some instances these bodies are small and loose, and of a firmness equal to that of cartilage; while 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 some cases, they remain fixed, or nearly so, without being much affected either by pressure or the motion of the joint. This is particularly the case in those that are soft and membranous, which are in some degree fixed by their attachments. But the others, which have nearly the firmness of cartilage, are commonly so moveable, that their situation is altered by every motion of the limb; and they slip so easily on being touched, that it is difficult to fix them even with the fingers.

In the former, which remain fixed nearly to the same situation, the pain is constant, but seldom severe; whereas, in the latter, it is only felt in particular situations, chiefly, I suppose, when the connecting membrane passes between the ends of the bones: but in these cases it proves often so severe, as to be altogether insupportable. I have known different instances of this, where in certain postures of the leg, for it is in the knee in which these concretions seem chiefly to occur, the pain became suddenly so exquisite as to induce fainting. And where this returns frequently, the patient is so much afraid of it, that he inclines rather to avoid walking almost entirely than incur the risk of inducing it. Nay, in some cases, I have known the patient roused from the most profound sleep, by the limb being merely moved when in bed.

As these substances are of a nature that will probably for ever resist the power of medicine, and as they can only be removed by the joint being laid open, the question to be determined is, whether this ought to be attempted or not? Many have

spoken of this as an operation of so little hazard, that practitioners are apt to advise it in all cases where the pain induced by the disease is severe. In two cases, indeed, which fell under my own management, the joints of the knee were laid open; the foreign bodies were removed; and the wounds healed almost with the same ease, as probably would have happened with injuries of the same extent in any other part; but other instances, I must own, have occurred, in which the most alarming symptoms succeeded to this operation, and ultimately even required the amputation of the limb. I never observed, indeed, such high degrees of inflammation from any other cause; neither is the inflammation confined to the joint itself. The whole limb, both above and below the wound, becomes stiff and swelled in a remarkable degree, with painful inflammatory tension, extending from one end of it to the other.

The uncertain success of this operation renders it doubtful, how far, in any instance, it ought to be advised. The following is the opinion I have formed of it, drawn from a good deal of experience in cases of this kind. Where concretions formed within the capsular ligaments of joints, appear, upon examination with the fingers, to be loose and detached, if the pain which they excite is severe, rather than submit to this, we should venture, in a cautious manner, to take them out, by making an incision into the joint: but wherever there is reason to suspect that the concretions are connected with any part of the joint, the patient should rather be advised to submit to the pain which they induce, and which in general will be rendered moderate by avoiding exercise, than to run the risk that attends this operation.

The pain, indeed, even in a retired life, may become insupportable. In this case, I would advise

the amputation of the limb. The remedy is, no doubt severe; but it is less painful, as well as less hazardous, than the excision of any of those concretions when attached to the capsular ligaments.

The opening into the capsular ligament for the removal of these loose bodies, should be made in the following manner; if in the joint of the knee or ankle, the patient should be laid upon a table or on a bed; but if any of the joints of the arm are to be opened, he may be allowed to sit; only, in whatever posture he may be, the limb should be secured in the firmest manner by assistants, in that posture which admits of the body to be taken out, being felt in the most distinct manner. On this being done, the surgeon should endeavour to fix it with one hand towards the upper part of the joint, after an assistant has been desired to draw the skin as much as possible upwards from the part where the incision is intended to be made; when, with a scalpel in the other, he is now to make an incision through the teguments and capsular ligament, directly upon the substance itself, of such a size as will admit of its being easily taken out; which will be most easily done by the end of a blunt probe being passed beneath it. If it is found to be connected by small filaments, either to the capsular ligament or cartilages of the joint, they should be cautiously divided, either with a probe pointed bistoury or scissars, after drawing the substance itself as far out as can be done, with small forceps, or with a sharp hook when of a texture that admits of a hook being pushed into it. When more concretions than one are discovered, they should all be taken out at the same opening, when this can be done: but when they lie on opposite sides of the joint, two openings are required; only in this case it is better to allow the first incision to heal before attempting the second, so as to avoid as much as possible the risk of exciting inflammation.

After the concretions are removed, the skin should be immediately drawn over the wound in the capsular ligament; and the lips of the opening in the skin being laid together, they should be secured in this situation with pieces of adhesive plaster, so as to prevent the air from finding access to the cavity of the joint. Till the wound is completely healed, the patient should not only be confined to bed, but the limb should be kept as much as possible in one posture; and a strict antiphlogistic regimen should be observed. But for the further management of such cases, and of the symptoms with which they are apt to be attended, we must refer to Chap. III. Sect. VIII. when treating of wounds in the ligaments.

I have mentioned, that the incision into the capsular ligament, should be made at the upper part of the joint. The intention of this is to prevent the synovia, after the skin is drawn over the opening in the ligament, from finding such ready access as it otherwise would do to lodge in the cellular membrane immediately beneath the skin; a precaution that is easily observed, and from which some advantage may be derived.

§ 7. *Of Anasarca or Oedema.*

THE terms Anasarca and Œdema are applied to that variety of dropical swelling where the water is collected, not in any distinct cavity, but in the cellular substance. The part is generally cold, and of a pale colour; and being possessed of little or no elasticity, it retains the mark of the finger when compressed.

Anasarcaous swellings are for the most part connected with some disease of the system; but in some cases they occur in particular parts, from causes which affect these parts only. Thus, legs or arms which have been much weakened by contu-

sions or sprains, are apt to become œdematous. Tumors pressing upon any of the larger lymphatics are apt to induce them; and they sometimes occur from the lymphatics of a limb being cut, either by accident or in chirurgical operations.

In the treatment of these swellings, the circumstance of their being general or local requires particular attention. When induced by tumors pressing upon the lymphatics, the removal of these tumors alone will accomplish a cure: and when they occur as the effect of weakness from sprains or contusions, the best method of cure is to support the weakened parts either with a laced stocking or a flannel roller, to prevent their yielding to distension, till in course of time, and by the effects of cold bathing and moderate frictions, they recover their natural tone.

But in those anasarcaous swellings of the feet and legs which take place as a symptom of general dropsy, we must not venture upon removing or preventing them by compression; for if the serum is prevented from falling down to the legs, it will be apt to remove to parts of more importance. In these cases, we trust to the disease in the system being removed by medicines, for a complete cure: but when the swelling is considerable, we have it in our power to procure temporary relief by making small punctures through the skin into the cellular membrane, in the most prominent part of it. The relief which this procures is often very considerable, and it ought to be advised more early in the disease than is commonly done; for besides the present ease which it affords, it prevents that loss of tone which the cellular substance suffers when anasarcaous swellings are permitted to go to such a height as they often do.

Instead of punctures, incisions are usually employed; but small punctures made with the point of a lancet answer better: they give a sufficient

vent to the water, at the same time that they are not so apt to inflame and mortify. But as we shall have occasion to speak of this when treating of the Anasarcaous Hydrocele in Chap. X. Sect. II. I shall now refer to that part of our subject.

Where the swelling is induced by any of the lymphatic vessels of a limb being cut, as sometimes happens in extirpating indurated glands from the armpit, small punctures made in the under part of the limb afford immediate relief; while little advantage is derived from blisters or any other remedy.

§ 8. *Of the Spina Bifida.*

THE term Spina Bifida is applied to those soft swellings which sometimes appear in the course of the spine in new born children, most frequently at the inferior part of it, between the two last vertebræ of the loins. A fluctuation is distinctly perceived in them; and the fluid which they contain can in some measure be pressed in at an opening which takes place between the spinous processes of the two vertebræ on which they are seated. In some cases this opening is found on dissection to proceed from a natural deficiency of bone; in others it is the effect of the spinous processes of the vertebræ being merely separated from each other: in all of them, the tumor is produced by serum collected within the natural coverings of the spinal marrow. In a few cases this disease is connected with hydrocephalus; but this is not common. For the most part it is entirely a local affection.

This is perhaps one of the most fatal diseases to which infancy is liable; for as yet no remedy has been discovered for it. In some cases, however, children labouring under it have lived for two or three years; but in general they linger and die in the space of a few months. All the assistance that

art has hitherto been able to afford, is to support the tumor by gentle pressure with a proper bandage. In this manner it has for some time been prevented from increasing, by which life has been protracted; but this is all that we have yet been able to do.

It has sometimes happened, where the nature of these tumors has not been understood, that they have been laid open with a view to discharge the fluid which they contained. Experience, however, shows, that no attempt of this kind should be made; for hitherto it has in every instance proved unsuccessful. The patient has either died suddenly, or in the course of a few hours after the operation.

If conjecture may at any time be indulged, and proposals for innovation mentioned, it must be allowable in cases hopeless as the one we are now considering. If the swelling in the spina bifida is produced by real disease subsisting in the vessels of the spinal marrow, or in those of its membranes, it is not probable that any remedy will remove it: but if the opening between the spinous processes of the vertebræ with which it is always accompanied, be not the *effect* of the disease, as is commonly imagined, and if the want of support, which this deficiency of bone must create to the membranes of the spinal marrow, be the *cause* of serous effusions within these membranes, might not some advantage be derived from applying a ligature round the base of the tumor, not merely with a view to remove it, but also to draw the bottom of the cyst so closely together, that it may act as a proper support to the parts beneath? Whether any benefit may be derived from it or not, is no doubt very uncertain: but in a disease which we know will otherwise terminate fatally, we are warranted in proposing whatever can afford even the smallest chance of safety; so that I mean to attempt it in

the first case of this kind that falls under my care. After applying a ligature as closely as possible to the base of the tumor, and as soon as the tumor itself has fallen off, I would propose to apply a firm stuffed pad, similar to that of a rupture truss, to the opening between the vertebræ; and by means of a proper bandage, to secure it with such a degree of tightness as may serve to support the parts on which it is placed.

Whether or not this method may in any instance accomplish a cure, is very uncertain; but it appears to be the most probable way of prolonging life: for wherever the tumor has been opened, death seems to have ensued more from the removal of support from the contained parts than from any other cause. Now, no method of treatment we could advise would so readily compress the parts within, and at the same time remove the tumor.

The tumor termed *spina bifida* occurs, as I have already observed, in different parts of the spine, although most frequently at the under extremity of that bone; but a swelling of perhaps the same nature is sometimes met with on different parts of the head. A tumor is observed at birth; and on examination it is found to be formed by a fluid lodged beneath the membranes of the brain, which have been forced out at some unossified part of the skull. In some cases the swelling remains stationary for a great length of time; but for the most part it becomes quickly larger, and at last terminates in death. Hitherto the same effect has resulted from laying this kind of tumor open, as I have mentioned in *spina bifida*: the patient has commonly died in a few hours after the operation.

§ 9. *Of Scrofulous Tumors.*

THE first and most important point to be determined in the surgical treatment of scrofulous

tumors, is, whether or not we should endeavour to forward their maturation, by means of poultices and other external applications? For a considerable time, I adopted this practice in the freest manner, and applied warm poultices and fomentations to every tumor of this kind, till at last I was convinced by experience of its inefficacy. Nay, I now think, that it does harm: for scrofulous tumors being formed of matter not convertible into pus, poultices and other warm applications have little effect in bringing them forward; and when long used, they weaken and relax the parts so much, that the sores which ensue are more difficult of cure than when poultices are not employed. In all scrofulous sores, the parts are apt to remain long soft and spongy, by which they are prevented from healing. The effect of these emollient applications, is to increase this tendency to softness in a degree which often proves hurtful.

As I know of no application which in the real scrofulous tumor ever proves useful, either in retarding its progress or in bringing it forward, I now advise even every covering to be laid aside, unless the patient wishes to prevent the swelling from being seen; in which case he is desired to cover it in the manner that is most agreeable to himself. But as I do not observe that exposure to the air does harm, and as in some cases I have thought that this exposure of the tumor renders the subsequent sores more easily cured, I would prefer this mode of treatment, whenever it can be adopted. Even the external application of hemlock, which in the form of poultices is often advised in scrofulous tumors as a discutient, should be laid aside. In scrofulous sores, I have observed some advantage derived both from the internal exhibition and outward application of hemlock: but although I have often known it used in tumors of this kind, I cannot say that any advantage ever accrued from it.

The only remedy I have ever known to act with any apparent efficacy in the discussion of scrofulous tumors, is a long continued use of the cold bath, and mineral waters, especially those of Moffat : but in order to produce any effect, they should be entered upon early in the disease, while the tumors are small, and in every instance they ought to be long continued. As soon indeed as a patient is attacked with scrofula, I would advise him to enter on the use of these remedies, and to persevere for several years in applying them. In what manner the drinking of mineral waters, and of sea water, operates in preventing the formation of tumors in scrofulous patients, will be difficult to determine : but it seems to be probable, that cold bathing, particularly in salt water, proves chiefly useful by invigorating the system at large, and particularly the lymphatic system, which in scrofula appears to be remarkably weak and relaxed.

Of late, a new tonic remedy has come into notice, muriated barytes, and it seems to act with advantage in the discussion of scrofulous tumors. I have now made use of it in a great number of cases, and in many of these with obvious advantage. It excites appetite ; strengthens the constitution ; and in some instances both scrofulous tumors and sores, which previously resisted all other remedies, have disappeared while patients were using it. The medicine is prepared by dissolving aerated barytes in the muriatic acid ; evaporating the solution, and dissolving the crystals in water. Of the saturated solution six or seven drops are given at first to an adult, repeated three times a day, and the dose gradually increased to thirty or forty drops, till it excites sickness or nausea, by adding two drops or so every second or third day to each.

The next point of importance in the treatment of scrofulous tumors, is, whether they should be

opened, or allowed to burst of themselves? This in a great measure should be made to depend on their situation. When seated upon any of the large joints, or on the cavities of the thorax or abdomen, the matter should be discharged as soon as it is discovered, by a free opening with a lancet or scalpel; or in large collections, where it would prove hurtful to expose the cavity of an extensive abscess to the air, it may be done with more safety with a trocar or with a seton. But where scrofulous tumors are so situated that no harm can arise from the matter being allowed to remain, it is better that they should break of themselves: for even when managed in the most judicious manner, the sores which ensue prove often tedious and difficult of cure, while an unseemly scar takes place, whether the tumor has been opened or not; and the patient and his friends, from ignorance of the nature of the disease, as well as from other motives, are apt to blame any opening that is made, as the cause either of a tedious cure, or of disagreeable marks. As an additional reason for this practice, I believe it will be found, that sores ensuing from scrofulous tumors will for the most part heal more kindly when allowed to burst than when opened in any way whatever.

I have only to observe further, that tumors of a scrofulous nature are occasionally met with, which from inadvertency are sometimes mistaken for those of the schirrous kind. I also believe that mistakes of this kind have tended to raise the reputation of medicines, particularly of cicuta, and that they have been the cause of tumors being extirpated, which ought not to have been touched. When scrofulous tumors are deeply seated, they have commonly a degree of firmness which they do not possess in the more external parts; and when in a suspicious situation, as in the glandular part of a woman's breast, they are very apt to be mistaken on

a slight examination for swellings of a schirrous nature. These mistakes, however, may always with due attention be avoided. Even the firmest kind of scrofulous tumors are soft and compressible when compared with schirrus. They are of an equal smooth surface; they are seldom, in their early stages, attended with pain; and for the most part similar affections appear in other parts of the body: whereas the real schirrous tumor is always unequal or knotty on its surface; and although it does not for a considerable time become uniformly painful, a stinging disagreeable pain is commonly felt in it from time to time, even from its first appearance; and it is not necessarily connected with symptoms of scrofula.

§ 10. *On White Swellings of the Joints.*

Few diseases prove either more hazardous to patients, or are less understood by practitioners, than white swellings of the joints: insomuch, that when completely formed, the disease may in almost every instance be considered as incurable.

White swelling may be defined, a painful enlargement of a joint, not attended with external inflammation; but there are evidently two varieties of the disease, which it is of much importance to distinguish: the one arising from rheumatism, the other from scrofula. I shall first describe the symptoms and appearances of each, and afterwards the method of cure, which in the course of my experience has hitherto proved most successful.

The rheumatic white swelling begins with acute pain over the whole diseased joint and contiguous parts; and the pain is always increased by motion. As a relaxed posture gives relief, the limb is kept constantly bent, by which the flexor tendons become so stiff and immoveable, that from this cause

alone the motion of the limb is often irretrievably lost.

If the disease is not soon carried off, the swelling, which at first is inconsiderable, begins to augment, and goes on till in some cases it arrives at twice the natural size of the part.

The cuticular veins become turgid and varicose; the limb below the swelling decays considerably in its muscular substance, while it frequently acquires an equal or greater bulk by becoming œdematous: the pain turns more intolerable, especially when the patient is warm in bed, or is otherwise heated; and abscesses form in different parts of the swelling, and run in various directions and at different depths.

In all these abscesses, the fluctuation of matter is always obvious; but besides this they are springy or elastic; yielding to pressure, at the same time that they do not, like œdematous swellings, retain the mark, but instantly rise again as soon as the pressure is removed.

These different collections, either upon breaking of themselves, or on being laid open, discharge large quantities of purulent like matter. This, however, soon degenerates into a thin, ill digested sanies; and has never, at least in proportion to the quantity discharged, any effect in reducing the size of the swelling, which still remains nearly as large as before.

If the openings from whence this matter flows are not artificially kept open, they soon heal up; and new collections forming in different parts, again break out and heal as before: so that, in course of time, the whole surrounding teguments are marked with cicatrices of old sores.

Long before the disease has arrived at this state, the health of the patient begins to suffer; first, from the violence of the pain, and then, from the absorption of matter which takes place in some de-

gree from the time of its first formation; but which does not indeed appear so evidently, till the abscesses in which it is contained are either laid open by incision, or burst of themselves. When this takes place, the pulse becomes quick, accompanied with nocturnal sweats and a colliquative diarrhœa, by which the patient is at last carried off if the member is not soon amputated.

When the limb is taken off early, the only preternatural appearance with which we meet on laying the parts open, is a morbid thickness of the surrounding ligaments, accompanied with a contracted state of the flexor muscles of the limb, but without any disease of the joint itself. The bones and cartilages remain sound, and the synovia in a natural condition, both in quantity and consistence.

This thickening of the ligaments is in general in proportion to the duration of the disease. This, however, is not always the case; for I have met with some recent instances, in which the ligaments were more thickened, than in others where the disease had continued longer. In this case indeed the previous symptoms had been always violent.

In the more advanced stages of white swelling, when abscesses have formed in different parts of the joint; when the pain has been long violent, and the tumor large, on laying the parts open, an effusion into the surrounding cellular substance is discovered of a thick glairy matter, which appears to be the cause of that elasticity peculiar to these swellings, of which particular notice was taken in the description that I have given of the symptoms.

The different abscesses which take place here are found to run in various directions through this glairy albuminous congestion, without, however, seeming to mix with it. In some few instances, again, together with collections of pus, we meet with a number of small hydatides; and in the further progress of the disease, all these together form

such a confused mass that it is almost impossible, by dissection, to procure a distinct view of them.

Even all these appearances are sometimes found to take place without any of the bones that form the joint, or the cartilages by which they are covered, being in any degree diseased.

When, however, the ligaments are eroded by the matter, both the cartilages and bones are soon brought to suffer; the bones becoming carious, as soon as the cartilages, by the acrimony of the matter, have been destroyed.

The tendons of the flexor muscles do not, upon dissection, exhibit any morbid appearances, either with respect to hardness or enlargement, but the muscles from whence they proceed are always hard and contracted.

In white swelling arising from scrofula, the pain is generally very acute, and, instead of being diffused, it is more confined to a particular spot, most frequently to the middle of the joint. In some instances I have known the patients say, even in advanced stages of the disease, that they could cover the whole pained part with a crown piece, or less.

The swelling is never at first large; inasmuch that it requires attention to discover the difference between the diseased joint and the opposite sound one: the least degree of motion excites pain; the joint is therefore always kept in a bent position, by which the flexor muscles and tendons become stiff and contracted.

On the swelling continuing to advance, the pain becomes more violent, and the swelling more considerable, accompanied with an evident enlargement of the ends of the bones that form the joint.

In course of time, the whole circumference of the tumor becomes elastic; varicose veins appear over its surface; and collections of matter occur in different parts of it: these, upon bursting, or on being laid open, discharge large quantities of thin

ill digested matter; and if a probe is introduced, and passed to the bottom of the fores, the bones are found carious, and pieces of them are afterwards discharged at the openings.

On the farther continuance of the disease, the constitution becomes injured; and the patient is at last carried off by diarrhœa and profuse night sweats, symptoms which commonly indicate extreme degrees of weakness.

When joints affected in this manner are dissected, either after death, or after amputation of the member in the first stages of the disease, the soft parts seem not to be much injured, but in all, even the slightest that I have seen, the whole ends of the bones, or their epiphyses, are enlarged. In some this enlargement of the bones is confined to one side of the joint, but in others it appears equally in both: in some, this occurs without any other mark of disease, but in general the soft spongy parts of these bones are dissolved into a thin fetid matter, in some cases even without the cartilages which surround them being affected: this I have in different instances seen, although the cartilages for the most part are also found dissolved at last. The same thickening of the ligaments, and effusion of viscid glairy matter, is met with here that occurs in the other variety of white swelling.

The most frequent cause of white swelling is a previous disposition to rheumatism or scrofula; for although it is often induced by external violence, particularly by sprains and bruises, the disease seldom proves obstinate or severe where the rheumatic or scrofulous diathesis does not evidently prevail.

Hence white swellings of the rheumatic kind are most frequent at that period of life, and in those constitutions, in which rheumatism occurs in the most obvious form of the disease: we daily meet with it in the young and plethoric, and not often in patients of opposite temperaments, or in people advanced in

years : we also find, that it is frequently induced by cold, which may be considered as the most common cause of rheumatism, and it attacks chiefly those parts on which rheumatism is particularly apt to fix. Rheumatism for the most part attacks the large joints only, and chiefly the ligamentous parts of them : now we meet with ten instances of this variety of white swelling in the knee for one in any other joint, and we find on dissection, that in the first stages of the disease, the ligaments only are affected, as in most instances is also the case in rheumatism. The effusion into the cellular substance of that glairy matter that I mentioned in the description is probably occasioned by an exudation from the vessels of those ligaments that have been at first inflamed ; for we know that ligamentous parts never furnish a fluid proper for the formation of pus. In the course of the disease, indeed, abscesses containing purulent matter frequently form, but never till the inflammation has spread to the surrounding parts, which more readily afford a fluid fit for this purpose.

In like manner, although the other variety of white swelling commonly begins in the bones, scarcely a doubt can arise of its being scrofulous : it appears, indeed, to be the real *spina ventosa* of authors,* which there is much reason to think is a disease of the same nature in the bones, that scrofula, in its usual form, is in the soft parts. The appearances of the two diseases are exceedingly similar : they both begin with considerable enlargement or swelling of the parts which they attack, and this in both generally ends in ulceration, and they both often occur in the same person at the same time : this variety of white swelling is most frequent in early life, a period in which other symptoms of scrofula are also most frequent ; and if other symptoms of scrofula do not subsist at the time, we commonly find that they have prevailed at some

* Vide § 16, of this Section.

former period, or that the patient is descended from scrofulous parents, and therefore that the seeds of the disease are probably lurking in his constitution.

In the management of white swelling, it is a point of importance, as I have already observed, to distinguish with accuracy between the two varieties of the disease; for in the one, namely, the rheumatic, we may frequently accomplish a cure; while, in the other, no material advantage is to be looked for from any remedy with which we are acquainted. By not discriminating between the two varieties of white swelling, remedies are often employed, which, however beneficial they might prove in the one disease, in the other can be of no avail, and may even do harm; and the same want of discrimination is apt to make us despair in every instance, from finding that, in a great proportion of cases, no advantage is obtained from any measures that we employ.

In the rheumatic white swelling, we derive considerable advantage from due attention to an antiphlogistic course.

The first remedy which, with this view, should be employed, is bloodletting; but instead of taking blood with the lancet, it answers better to take it from the part affected. Cupping and scarifying proves particularly useful. The instrument should be applied to each side of the diseased joint; on each side of the rotula, for instance, when the knee is the part affected: eight or ten ounces of blood should be discharged, and this should be repeated at proper intervals, once, twice, or oftener, according to the violence of the symptoms, and strength of the patient at the time.

In the ordinary way of discharging only an ounce or two of blood by this operation, it has, in general, little or no influence; but in the quantities which I have mentioned, and which, by those accustomed to the practice, are commonly easily obtained, it seldom fails of giving relief.

It must be observed, that cupping proves here more beneficial than the application of leeches; which is not only a more tedious method of procuring the same quantity of blood, but the swelling which leeches occasion, proves often troublesome; and, what is of still more importance, it gives an interruption, for a time, to the use of other remedies. In some instances, however, when the swelling of the joint is considerable, it proves difficult, or even impracticable, to procure a sufficient quantity of blood by cupping: in such cases, we are under the necessity of having recourse to leeches.

Upon the anterior part of the joint, where the cupping glasses or leeches have not been placed, a small blister should be applied; and the part should be kept open with issue ointment, till the wounds from whence the blood was discharged are so far healed, that a blister may likewise be applied on one side of the joint; and on this being nearly healed, the other side should be also blistered.

By thus applying blisters alternately, first to one side, and then to the other, almost a constant stimulus is excited on the surface; which, in deep seated inflammation, seems in many instances to have even a more powerful effect than all the discharge which blisters produce.

Gentle laxatives, given at proper intervals, prove also serviceable; and the patient should, in every respect, be kept upon a strict antiphlogistic regimen: no animal food should be allowed, nor should he be permitted to take drink stronger than gruel or whey.

In the first stages of the disease, this mode of treatment seldom fails to prove useful: local bloodletting, when carried to a sufficient length, very commonly relieves the symptoms induced by inflammation, and the blisters often remove them entirely: these remedies, however, are not to be trusted in the more advanced stages of white swelling, nor ought they ever to be long persisted in, when they do not

soon procure relief. In this state of the disease, we depend upon other remedies.

Mercury proves here particularly useful, not given so as to salivate, but merely to affect the gums gently, and to keep them in that state for a few weeks.

In such circumstances, the best method of using mercury is by external friction; and the unctio should be of such a strength, as to admit of being used in the quantity of two drams three times a day; for friction, in order to prove useful, should be frequently repeated and continued for the space of an hour at each application.

Gentle mercurials may also be given internally, but, as all the advantages to be derived from them, are obtained from unctio, together with any benefit that may ensue from the friction used in applying it, the latter should in general be preferred.

By Le Dran, and other French writers, the pouring of warm water on swellings in this situation is much recommended; and I have found in the course of much experience in this branch of business, that more advantage is derived from it than from any other remedy; particularly from the application of warm steam: this remedy, however, in order to prove useful, requires to be applied to the parts particularly affected, and to be frequently renewed.

When warm water proves useful here, it may not only act from the degree of heat which it contains, but in proportion to the height from which it falls: hence, in some cases, I have desired it to be poured from the height of fifteen or sixteen feet, and in different instances with advantage. It is easily done by pouring the water through a leather or tin tube.

The application of steam, and the fall of warm water, proves particularly useful in the removal of that contracted state of the flexor muscles, which very universally takes place in white swellings of the joints. The stiffness of joints affected in this manner, is often in such a degree as to give cause to think that it can

only be produced by the ends of the bones forming the joint having run into one another, or by the synovial fluid of the joint becoming thick, and totally unfit for lubricating the parts to which it is applied: I believe, however, that these occurrences are both exceedingly rare: of all the diseased joints I have dissected, and the number has been considerable, I have only met with two instances of the different bones of a joint adhering to each other, and not one instance of the synovia being inspissated: neither have I met with any anatomist who ever observed it: I therefore conclude, that the stiffness of joints which succeeds to white swelling, proceeds in almost every instance from the cause I have mentioned, a morbid contraction of the flexor muscles of the diseased limb.

I have already observed, that in the removal of this contracted state of the muscles, the application of warm steam, and the fall of warm water from a height, prove particularly useful: we also derive much advantage from the use of emollients: by long perseverance in rubbing contractions of this kind with greasy emollients, I have in many instances succeeded, where the patient, after being lame for years, had despaired of ever getting better. Emollients, however, in order to prove useful, must be applied for a great length of time. They must be rubbed for the space of an hour three times a day, over all the diseased parts. The friction should not be confined, as is commonly done, to the rigid tendons, but should be extended over the whole corresponding muscles, from one extremity to the other, and more especially over the fleshy parts of the muscles, where the principal cause of such complaints is probably seated; these parts being chiefly, if not altogether, possessed of the contractile, and consequently of the resisting powers.

The affection we are now considering, is so obviously one of those requiring the use of emollients, that almost every old woman has some particular form or other of recommending them; one of which I cannot

avoid mentioning, as I have frequently known it used, and in some instances, with very evident advantages, namely, the web or omentum of a new killed sheep, or of any other animal, applied over all the diseased parts directly on being cut out of the animal.

In two of the cases to which I allude, one was in the knee, and the other in the hand; and the motion of the joints, after having been totally lost, was almost perfectly restored. The application should be frequently renewed, once a day at least, or oftner when it can be done: for on being more than four or five hours applied, it becomes disagreeable; after this indeed it commonly turns stiff, and cannot therefore be of much utility. The same kind of remedy, used in somewhat a different manner, I find recommended by Lieutaud, a celebrated French practitioner.*

I have entered more particularly into the consideration of this subject, from having often found, that, with due attention, the use of many joints might be recovered, which, from a mistaken opinion of their causes, have generally from the first been considered as incurable: and I must here also refer to some further observations which I shall find necessary to make upon the same subject, in Chap. XLIII. when speaking of distorted limbs.

Hitherto I have supposed the disease not to be so far advanced as to have occasioned the formation of matter; for, when come this length, no material benefit can be derived from any of the remedies I have mentioned; but, even in this state of white swelling, if the health of the patient is not greatly impaired, amputation of the limb should by no means be advised, as is usually done. For, by opening the different abscesses soon after they form, no essential injury will be done to the capsular ligaments of the joints; the

* M. Lieutaud says, when speaking of such affections, "Obvolvitur etiam pars affecta pelle calida vervecis, vituli, alteriusve pecudis, recens macerata, vel immittitur in anum ventrem bovis, vitali calore haud defraudata." *Synopsis Universæ Praxeos Medicæ*, Vol. I. p. 400.

destruction of which would no doubt render it necessary immediately to remove the limb.

All collections of this kind should be discharged, by passing a seton through them. This never proves hurtful, and by preventing the access of air, as I have elsewhere endeavoured to shew, abscesses opened in this manner heal more readily, than they usually do when laid open with large incisions.*

By opening the different abscesses as quickly as matter is found to form in them, and supporting the patient with light nourishing food, we often succeed in saving limbs which otherwise it would be necessary to remove. At the same time, it must be acknowledged, that instances often occur, in which none of our remedies prove successful, and in which we have no other method of saving life. In such circumstances, we have no room to deliberate, and amputation of the diseased limb ought no doubt to take place.

In Chap. XLV. I shall find it necessary to consider this subject more particularly, but at present I may observe, with respect to the most proper period of amputating limbs in white swelling, that, even in point of success from the operation, it ought never to be advised till the disease is far advanced. For though it might *à priori*, be imagined, that the more early in the disease the operation is performed, the more successful it should prove; and although this, indeed, has been made use of as an argument for amputating early in every case of white swelling; yet, however plausible the observation may appear, it will not, from experience, be found to hold good. For, in this, as well as in other diseases, I have constantly found, that amputation has more frequently succeeded, that is, a greater proportion of patients have recovered, who have previously been considerably reduced, than of such as have still remained in a full habit of body.

* Vide Chap. I. Sect. III. §. 5.

In the former, when the constitution has not been too much broken, and we have it commonly in our power to guard against its being so, the several symptoms of hectic fever, which previously took place, are usually removed in a few days after the limb is taken off: no high degree of inflammation is ever produced; the patient daily improves in health; and a complete cure, if he has not been too much reduced, is generally soon obtained. In the latter, again, the very reverse of this takes place: the patient, from being in high health at the time of the operation, is generally thrown into a smart inflammatory fever; which is, no doubt, often removed, but which frequently either carries him off immediately, or produces such effects as he never recovers from.

So that in no case whatever is it proper to advise amputation till every probable mean for saving the limb has been tried in vain.

All the means that I have hitherto mentioned, relate particularly to the rheumatic species of white swelling; and when employed in time, and duly continued, they seldom fail of success: but when the disease is so far advanced as to have destroyed the capsular ligaments of the joint, and perhaps even the cartilages and bones themselves, amputation of the limb is then our only resource.

In the more fatal variety of white swelling, namely, the scrofulous, as I know no certain remedy for scrofula, even in its milder form in the soft parts of the body, I cannot here pretend to offer any thing satisfactory upon the subject.

In the small joints, when the diseased parts of the bone begin to cast off, a cure may be sometimes promoted by assisting the efforts of nature; but in all the large joints, particularly in the knee, ankle, elbow, and wrist, it is not probable that any other resource than amputation will ever afford relief. In this variety of the disease, indeed, many are of opinion, that amputation should never be advised; for the swelling

being connected with scrofula in the constitution, the disease they conclude will appear in some other part : this in some instances will no doubt happen, but I know from experience, that in a great proportion of cases it will not ; and, were the risk of this even much greater than it is, still I would advise the operation, in preference to the constant torment with which patients in this situation are universally distressed.

When, however, amputation of the member is not to take place, we endeavour by other means to alleviate as much as possible the painful feelings of the patient : with this view, cicuta and hyoscyamus are sometimes given, both separately and combined ; but in great degrees of pain we depend upon opiates alone.

§ 11. *Of Bronchocele.*

EVERY indolent tumor, seated on the forepart of the neck, is commonly termed a Bronchocele. In the English language we have no precise denomination for it. In French this disease is termed *Goître*.

Swellings in this situation would with more propriety be termed *Tracheacele* : but with a view to prevent confusion, I think it better to retain that appellation under which they have commonly been described.

Authors mention different diseases under this denomination : some contend, that the term bronchocele should be confined to one variety of tumor ; and others, that it may be applied to swellings of very different kinds : disputes of this nature, however, answer no good purpose : and as practical observations are the chief objects of this work, I think it better to mention the varieties of the disease, which I have either seen, or which have been accurately described by authors, with the treatment suited to each, than to enter the lists of controversy upon this part of the subject.

1. The forepart of the neck, like every part of the body supplied with large arteries, is liable to swellings of the aneurifmal kind. Aneurifms do not frequently occur in this situation, but in some instances they are met with.

This variety of the disease may be distinguished by all the ordinary symptoms of aneurifm : by appearing suddenly after some violent exertion ; particularly in coughing or laughing ; being soft and compressible from the first ; by the tumor being at first seated directly on the course of one of the carotid arteries ; and a strong pulsation being discovered through the whole extent of it.

2. Encysted tumors, particularly those of the melicerous kind, are sometimes met with on the course of the trachea. They are characterized by the same symptoms in this situation by which they are marked in other parts of the body : they are soft and compressible ; the fluctuation of a fluid is perceived upon pressure ; although always small at first, they frequently become so extensive, as to reach from one ear to another ; and the skin usually retains its natural appearance to the last. The seat of this variety of the disease is evidently in the cellular membrane.

3. Instances have occurred of tumors forming in this situation, by the lining membrane of the trachea being forced out between two of the cartilages in violent fits of sneezing, coughing, and laughing. In this case the swelling is at first small ; and although soft and compressible, no fluctuation is perceived in it.

4. The lymphatic glands of the neck have in some cases of scrofula become so swelled, as to produce tumors of considerable magnitude over the whole course of the trachea. They are distinguished by the symptoms which usually accompany scrofulous swellings.

5. The thyroid gland has been known to swell to a great bulk, so as to induce tumors of an enormous size, extending from the trachea to the angle of each jaw. In this variety of the disease, the swelling is at

first soft; but no fluctuation is for some time perceived in it; the skin retains its natural appearance; and no pain takes place in it: but as the tumor advances in size, it becomes unequally hard; being firm or elastic in some parts, and perfectly soft in others: the skin acquires a copper colour, and the veins of the neck become varicose; and in this state of the disease the face becomes flushed, and the patient complains of frequent headache, as well as of stinging pains through the body of the tumor.

This is mentioned by authors as that variety of the disease which occurs so frequently among the inhabitants of the Alps and other mountainous countries, and which in general is supposed to originate from the use of snow water.

6. Whatever may be the nature of those varieties of bronchocele which occur in other kingdoms, I cannot pretend to say; but I have reason to think, that in this country the thyroid gland is not so frequently the seat of the disease as is commonly imagined. In some, this gland instead of being increased, is evidently diminished by the compression produced by the tumor; and the swelling itself is found to be formed of a condensed cellular substance, with effusions in different parts of it of a viscid brown matter. In one of the cases that I have had occasion to examine after death, the tumor was chiefly fixed on one side of the neck; but in others it occupied both sides, and reached from one ear to the other, and from the sternum to the chin. In some, the swelling had subsisted for a great number of years; and in one instance the patient died at last of another disease. At first they had no other appearance than might have been supposed to arise from a natural increase in the parts lying contiguous to the trachea; they were soft and compressible; but no fluctuation was perceived in them, and the skin retained its natural colour: but as they increased in size, they likewise became firmer; for although at last a softness, and even a fluctuation, was

discovered in some parts of them, yet the principal part of the tumor continued hard, while others had a peculiar springiness or elasticity, similar to that of a tin canister: the veins on the surface of the tumors became turgid; and the face of a livid colour, evidently from the blood being impeded in its course from the head. All of these patients complained of much giddiness: the breathing in all of them was much obstructed; and one patient who died of the disease, seemed to suffer chiefly from this circumstance.

To such varieties of bronchocele, no one mode of treatment it is obvious can be applicable. Hence the absurdity of specifics for this disease, such as calcined sponge and egg shells, proposed and strongly recommended by many: for although this and other remedies might prove useful in one variety of tumor, it would be absurd to suppose that they can do so, as by many has been asserted is the case, in all of them.

1. In the aneurismal bronchocele, the treatment suited to aneurism in general must be observed. To secure either of the carotid arteries with a ligature, must in all circumstances be a hazardous operation: but here there is no alternative; of whatever kind the aneurism may be, death will certainly ensue, if not prevented by this operation. This chance, therefore, ought always to be given; and, as is done in other cases of aneurism, the artery should be tied both above and below the tumor.

I know from experiment, that one of the carotids may be tied in other animals, and that death will not ensue: this gives cause to suppose that it may likewise be done in the human body.

2. Where the disease is found to be an encysted tumor upon the trachea, the general management of encysted tumors may be kept in view, for which see § 2. of this section. While yet small, the cysts with their contents may be removed in the manner I have mentioned: and even in the most enlarged state of

them, we need not despair of being able to afford effectual relief. The steatomatous kind, consisting entirely of fat, however large they are, may with safety be removed; for the connection of tumors of this description with the contiguous parts is so slight, that they are easily taken out: the vessels on the surface of the tumor are often indeed enlarged; but these are chiefly veins, and may be easily avoided. In tumors formed altogether of fat, I have never seen any of the arteries of such a size as when cut to give much disturbance; they are always small, and easily secured by pressure when they lie beyond the reach of ligatures.

3. When, again, the contents of a bronchocele are fluid, they may be discharged either by an incision with a scalpel, or by passing a seton or cord through the cyst; and when the contained matter is of a pul-taceous consistence, forming what is termed an atheroma, it should be discharged by a large opening in the most depending part of the tumor.

4. Where the tumor is formed by a hernia or protrusion of the lining membrane of the trachea, gentle pressure with a roller is the only remedy on which we can depend, and all such exertions should be avoided as might have any influence in producing it; particularly violent laughter, sneezing, coughing, and crying. Where the disease is scrofulous, we must depend chiefly on those remedies which prove most useful in other cases of scrofula; and with a view to remove the compression produced upon the trachea, as well as upon the veins returning from the head, the contents of the tumors should be discharged as soon as they appear to be sufficiently fluid.

5. Where the disease originates from tumefaction of the thyroid gland, frequent frictions prove useful, particularly when employed early, before the swelling has become large; and saponaceous and mercurial plasters have in some cases appeared to prove serviceable. Practitioners, however, are seldom consulted in

that stage of the disease in which remedies of this kind may be usefully applied: for as the swelling does not give uneasiness at first, it is seldom mentioned by the patient till it has subsisted for some time. In an enlarged state of this gland, I do not suppose that any remedy will ever be found sufficiently powerful to discuss it; so that the only points to be considered are, whether we should attempt to remove these tumors by an operation? and whether it should be done with caustic or the scalpel?

We know that the thyroid gland is very plentifully supplied with blood, and that the arteries which belong to it are usually much enlarged in this disease. This, together with the contiguity of the thyroid gland to the carotid arteries, which in this enlarged state of that gland are even apt to be compressed by it, renders the extirpation of it in an advanced period of the disease extremely hazardous. The arteries here are of such magnitude as to pour out a great deal of blood in a short space of time; while they lie at such a depth in this enlarged state of the parts, that they cannot be easily laid hold of with ligatures, nor can much compression be applied to them from their situation with respect to the trachea. I therefore conclude, when tumors of this description have acquired any considerable bulk, that it would be improper to run the hazard of removing them with a knife, and that the patient should rather trust to the treatment usually employed in such cases for palliating the symptoms as they occur.* And although we are informed, that in this situation the potential, and even the

* Mr. Gooch relates a case, where, in an attempt to remove a bronchocele by excision, such profuse hæmorrhagy took place, that the operator, although very intrepid, was obliged to desist before the operation was half finished. No means that were employed could put a total stop to the blood; and the patient died in less than a week.

Another case had very nearly terminated fatally; and the patient's life was only preserved by having a succession of persons to keep a constant pressure upon the bleeding vessels, day and night, for near a week, with their fingers on proper compresses, after the operator had been repeatedly disappointed in the use of the needle and ligature. Vide Gooch's Medical

actual cauteries have been employed with advantage, yet the practice has not become so general as to give us reason to believe that it has ever proved successful; nor do I think that it should ever be advised in any stage of this disease.

But although the reasons that I have given may be sufficient for preventing the removal of these tumors when they are much enlarged; yet while they continue small; when frictions and other remedies fail; and when the disease continues to advance; I think any practitioner would be warranted in advising it to be removed by excision: for in this early period of the disease, the difficulty of securing the arteries with ligatures is much less than it afterwards becomes; at least the risk occurring from this must be small, when compared with that which must probably ensue from the tumor being allowed to remain.

In the sixth and last variety of the disease which I have mentioned, frictions with mercurial ointment have in its early stages appeared to prove useful. In one case the progress of the tumor was evidently retarded by repeated blisters; but the patient going to a distance, they were neglected, and at last it arrived at a very enormous size. In this state I saw him at the distance of several years, but I did not learn in what manner the case terminated. I have reason to think, however, from the appearance of the swelling, both at its commencement and in its more advanced stages, that it proceeded from an effusion into the cellular substance of the neck, attended with that condensed state of this substance which was discovered by dissection in some of the cases that I have mentioned above.

But however serviceable blisters, as well as other remedies, might prove in the early stages of the dis-

and *Chirurgical Observations*, p. 136. And in the course of my own experience, I have met with various cases, all tending to evince the great danger of extirpating this gland. It would add, however, too much to the length of this article to give them in detail here, but they will appear in the volumes of *Cases and Consultations* that I have in view to publish.

ease, no advantage can be expected from them when the tumor has acquired any great bulk. In this situation, palliatives only should be employed; for the basis of the swelling usually runs so deep, that it could not be removed but with the utmost hazard; and it is not probable that any advantage would be derived from laying it open; for, a considerable part of it being firm and solid, the size of the tumor would not be much diminished by the discharge which might be procured, while the sore that would ensue might degenerate into cancer.

§ 12. *Of Nævi Materni.*

By *Nævi Materni* are meant those marks which we frequently find in different parts of the body at birth; and which are supposed to originate from impressions made on the mind of the mother during pregnancy. They are of various forms, being frequently found to resemble strawberries and cherries, and in other instances grapes, figs, pears, and other varieties of fruit. Their colour is various; but for the most part they are of a deep red, resembling the colour of claret or red port.

Many of these marks are perfectly flat, and never rise above the level of the skin; and not being painful, they never in this state become the objects of surgery. But occasionally we meet with them from the first in the form of small protuberances, which in some increase so quickly as to arrive at a considerable size in the course of a few months. I once saw a tumor of this kind in a child, of a year old, of the size of a goose's egg, which at birth was not larger than a pea.

No fluctuation is discovered in these tumors; on the contrary, they feel to be firm and fleshy. In some cases they are pendulous, and hang by slender attachments to the contiguous parts; but for the most part they are fixed by broad extensive bases.

Various remedies have been recommended for the removal of these excrescences; and in ancient times different charms were proposed for them. The mystery proceeding from this, is perhaps one reason of the general aversion which still prevails against any attempt being made to remove them by chirurgical operations: but it has not appeared in the course of my observation, that more danger attends the removal of this kind of swelling than the extirpation of any other tumor of the sarcomatous kind. They are supplied, indeed, more plentifully than other tumors with blood; for in many instances they appear to be entirely formed by a congeries of small blood vessels; but the arteries which go to them are in general easily secured with ligatures. It is proper, however, to remark, that the operation should never be long delayed; for as the size of the vessels depends upon that of the tumor, they sometimes become so large as to throw out a good deal of blood before they can be secured; so that the operation should always be proposed as soon as it is observed that the tumor, instead of remaining stationary, proceeds to increase.

The operation is of a very simple nature. The tumor, with all the discoloured skin, is to be dissected off with a scalpel; and the arteries being secured, the edges of the remaining skin should be drawn together, and kept in this situation either with adhesive plasters or futures: or, when they cannot be drawn completely together, they may at least be made to cover a considerable part of the fore; by which the cure will be much shortened, and the cicatrix lessened. In this case, that part of the fore which is left uncovered, must be treated like a wound from any other cause.

It is scarcely necessary to mention, that where the tumor is pendulous, and connected to the parts beneath by a narrow neck only, it may be removed by tying a ligature round it, of a degree of tightness sufficient for putting a stop to the circulation through the whole of it.

§ 13. *Of Warts.*

WARTS are indolent, hard, colourless excrescences, which appear on different parts of the body, but chiefly on the fingers and hands. They take their rise from the cutis and cuticle. They occur at every period of life, but more frequently in infancy than old age.

When from their size or situation warts do not prove troublesome, they should not be touched; for generally in course of time they either fall off or waste gradually away. But sometimes they are so large and so situated, that we are under the necessity of employing means for removing them.

When warts are pendulous, and have narrow necks, the easiest method of taking them away is with ligatures: for this purpose a hair is sometimes used, but a fine silk thread is preferable. But when their bases are broad, we remove them either with the scalpel or escharotic applications. Few patients, however, will submit to the scalpel; and as we seldom fail with escharotics, they are generally employed.

The lunar caustic, or lapis infernalis, are the most powerful remedies for this purpose; but warts commonly become very painful after being two or three times rubbed with them. The same objection occurs to a solution of quicksilver in aquafortis, otherwise it proves a very powerful escharotic. Mercury dissolved in an equal quantity, or even in double its weight, of strong spirit of nitre, would remove warts of every kind; but as the solution is apt to spread, it requires to be used with great caution. Pulvis fabinæ being daily applied to warts, will for the most part remove them in the course of two or three weeks; but the best application I have tried is crude sal ammoniac: it acts slowly, but the pain it excites is inconsiderable, and, excepting in the very hardest kind of wart, it sel-

dom fails of success. They should be well rubbed two or three times daily with a piece of the salt previously moistened in water. Liquefied salt of tartar sometimes answers the purpose; and I have known spirit of hartshorn prove successful.

Warts frequently appear upon the penis in the venereal disease; and as they are nearly of the same nature with those we have been considering, the same method of treatment will apply to them. In general, the tendency in the system to produce them does not continue long; and if the parts are kept clean, they at last often begin to decay, and go entirely off, whether any application is made to them or not. But as patients are always anxious to get free of them, practitioners are sometimes induced, to make trial of remedies too early, for till this tendency to their formation is removed, warts rise almost as quickly as they are rubbed off. Nor has mercury any influence in preventing this: I have known mercury advised for the removal of warts; but never with any advantage. When we have reason to suppose, therefore, that every other symptom of the disease is eradicated, the continuance of warts should be no inducement to the exhibition of more mercury.

When venereal warts are tender on the surface, and produce matter, as is sometimes the case, washing them morning and evening in lime water, or in a weak solution of saccharum saturni, will commonly remove this; and at last they will disappear in the manner I have mentioned. But when this delay will not be agreed to, one or other of the escharotics mentioned above must be employed; or if the patient consents to their being removed with the scalpel, the parts from whence they are cut may be touched with lunar caustic, in order to prevent them, with as much certainty as possible, from returning.

It is proper to remark, that in the treatment of warts of every kind, we should with much caution avoid every application that tends to excite much in-

flammation; for although under a slight degree of inflammation, warts very commonly decay and drop off, they are apt to spread and excite troublesome sores when severely inflamed. For the same reason, when a wart is to be removed with the scalpel, we should rather encroach a little upon the sound skin, than run any risk of injuring the wart itself, or of leaving any part of it. By want of attention to this, I have known the most formidable symptoms induced, by what at first appeared to be such a trifling excrescence, as not to deserve notice. In one case, indeed, such a painful obstinate sore ensued on the leg, from the removal of a small wart, that amputation of the limb became necessary, in order to save the life of the patient. (*a True*)

§ 14. *Of Fleshy Excrescences.*

ALMOST every part of the body is liable to the formation of fleshy excrescences. These tumors differ from warts in being softer, and in being apt to acquire a considerable bulk. They are seldom painful. They are of a more deep red colour than the skin in health, and for the most part they have a firmness of consistence resembling that of the lips. When first laid open, they exhibit nearly the same appearances with a piece of muscular substance newly divided; but on further examination, they do not appear to be fibrous. They seem to consist chiefly of cellular substance, very plentifully supplied with blood vessels infinitely ramified.

In the treatment of these tumors, no external application is found to answer any good purpose. Escharotics have sometimes been employed for removing them; but they seldom prove effectual, and they are apt to irritate and excite inflammation. Whenever it is determined, therefore, to remove a tumor of this kind, it should either be done with a ligature, or with the scalpel. When the neck is narrow, the

method by ligature should be preferred ; but when the base is broad, this is inadmissible. In whatever way it is done, care should be taken that no part of the tumor is left ; and when the scalpel is employed, the edges of the divided skin should be drawn so together, as to cover as much of the remaining sore as can with propriety be done. When any part of it does not heal by the first intention, it must be treated like wounds produced in any other manner.

§ 15. *Of Corns.*

CORNS are small hard tubercles, which form on different parts of the body, particularly on the toes and soles of the feet. In some cases they appear to be of a horny inorganic nature ; but in others they are evidently supplied both with blood vessels and nerves, as appears from their being painful, and discharging blood on being cut. For the most part they are seated in the skin ; but in some instances they pass to such a depth as to reach the periosteum ; and in this case they prove always very distressful, particularly when seated on any of the joints, or on parts thinly covered with flesh.

The best preventative of corns, is the wearing of wide shoes, so as to obviate pressure on the joints of the toes, and other parts of the feet where they are most apt to occur ; and unless this meets with attention, it is impossible in any case to accomplish a cure. Various remedies are recommended for the cure or removal of corns. One of the most simple and inoffensive of these is to pare off all the inorganic part of them, after bathing in warm water, and immediately thereafter applying over them slips of soft leather spread with gum plaster. If the soaking in water and paring the corns is repeated from time to time, and the application of this plaster continued, the corns will be kept easy, and the hard knots will often separate and fall out ; when, if pressure is avoided, the

vacancy produced by their removal will fill up with cellular substance, and no return of the disease will be experienced.

Corns may also be removed by dividing the cuticle which connects them to the surrounding parts with a small sharp pointed scalpel, and then dissecting them from the parts beneath with the same instrument and the assistance of small forceps. When done with caution, this operation gives no pain; no harm ever arises from it; and it removes the disease in the speediest manner. Much care, however, is necessary, in order to avoid the cutis vera, for in wounding the skin, we not only excite a good deal of pain, but are apt to lay the foundation of tedious and distressful ulcers.

§ 16. *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; being produced by a superabundance of callus in cases of fractured bones; or by bones being deeply wounded, or their substance eroded by ulcers. In others, it appears as the symptom of some general disease of the system, particularly of the lues venerea and scrofula. In the first of these diseases, the tumor is termed a Venereal Node. When it appears as a symptom of scrofula, we usually term it Spina Ventosa.

Exostosis, when local, and proceeding from effusion of osseous matter in fractured or wounded bones, is seldom attended with pain; and after arriving at a certain size, the tumor commonly remains stationary. But when it originates from an internal cause, it is commonly painful from the first; probably from the distension of the periosteum, which being a firm membrane, and closely attached to the bone beneath, does not readily yield to the increase of the tumor. In this case the swelling continues to advance, either till

it bursts into a sore, or till the disease in the constitution is cured by which it was produced.

In venereal nodes, the periosteum is often inflamed and thickened; and in some cases a quantity of thin acrid serum is effused between this membrane and the bone. Hence, in these, the swelling in the bone appears to be larger than it really is; for on being laid open, it is often found to be inconsiderable when compared with the previous size of the tumor. This has made some suspect, that the swelling which we term a node in lues venerea, is not originally an affection of the bone, but a thickening of the periosteum, and that the bone only suffers from its connection with this membrane. It will, however, be found, by all who observe the rise and progress of the true venereal node, that the bone is the part which in general becomes first diseased.

In scrofula, we frequently find the whole substance of a bone become swelled, particularly the extremities of the large bones forming the joints of the knee, ankle, elbow, and wrist. Various conjectures are met with in authors, of the origin of the term *Spina Ventosa* given to this swelling; but whatever may have been the first cause of it, or whether properly applied or not, I think it right to retain it, in order to prevent that confusion which ensues from different names being given to the same disease.

In *spina ventosa*, a pain is first discovered in the affected bone, and it is usually so deeply seated, that the patient is led to think from his feelings, that it proceeds from the very centre of the bone. This in some instances takes place for a considerable time before any swelling is perceived: but for the most part a slight degree of fulness is observed from the first. When this takes place along with other symptoms of scrofula, and especially when it fixes on any of the large joints, there will be cause to consider it as a symptom of that disease: but it often proves to be the first symptom of scrofula, especially in childhood:

in which case both the parents and surgeon are apt to suspect that it proceeds from a contusion or sprain; nor does the delusion in general cease with the parents, till the disease becomes evident by fixing on other parts of the body.

When spina ventosa occurs in the middle parts of bones, as sometimes happens in the bones of the hands and feet, the disease advances quickly; and on the soft parts bursting above them, a thin, ill conditioned matter is discharged, and the bones are discovered to be carious on the introduction of a probe. But when the disease fixes on any of the large joints, although it seldom fails to terminate in fores at last, yet it commonly proceeds to an ulcerated state in a more gradual manner; nor does any remedy with which we are acquainted prevent its progress. In this situation it lays the foundation of what is usually termed a white swelling; a disease we have already considered at full length.*

When these swellings burst and terminate in fores, the soft spongy parts of the bones are found to be dissolved; and on the matter which they produce being discharged, the remaining cavities have the appearance of being formed by the interior part of the bones having been scooped out, there being nothing left but a thin osseous covering, formed of the hard external lamella of the bone. In this state of the disease, the appearances which the bone exhibits bear much resemblance to scrofulous fores in the softer parts of the body: and as the spina ventosa is almost always in some of its stages accompanied with other symptoms of scrofula, I am clearly of opinion, that we should consider it entirely as a scrofulous affection, this being the same in the bones what scrofula in its more usual form is in the lymphatic glands.

In the treatment of an exostosis, the cause by which the tumor has been induced requires particular atten-

* Vide § 2, of this Section.

tion. Where perfectly local, and formed merely by an exuberance of callus, although some deformity may ensue from it, it is seldom productive of so much pain or inconvenience as to induce the patient to speak of it. But when tumors, even of this local kind, become so large as to prove painful, they necessarily excite the attention both of the patient and practitioner. Being of a nature that will not yield to medicines, we trust entirely, in those cases where it is necessary to remove them, to a surgical operation.

The patient being placed upon a table, and properly secured by assistance, if there is any risk of contiguous large arteries being cut, they ought in the first place to be secured with a tourniquet: an incision should now be made through the teguments covering the tumor; and in order to obtain freedom for the remaining steps of the operation, it should not only be carried along the whole length of the swelling, but an inch or even more past each end of it. The cut should now be continued down to the bone, at the same time that the operator should avoid as much as possible doing any injury to the contiguous muscles, tendons, veins, arteries, and nerves. With due attention to this part of the operation, much distress may be prevented which would probably occur were it to be done in a more hurried manner.

On the bone being laid bare, we are next to determine on the best method of removing that part of it which forms the tumor; and this will depend upon the size of it. When only a small knob, it may be taken off with the head of a trepan: or when too large for this, it may be removed with a common saw; and after taking away any spiculæ which might create irritation, the sore may be treated like a wound produced in any other manner. The soft parts should be drawn over the bone, and the edges of the skin being laid together, and secured with adhesive plasters, a cure may possibly be obtained by the first intention. In some cases, indeed, this may be prevented by small

exfoliations taking place from the site of the tumor. I know, however, from experience, that it will sometimes succeed, and therefore I would always advise it to be attempted; for even where small exfoliations take place, the pieces of bone will be forced to the surface, and may be afterwards taken out long after the cure of the soft parts is completed.

An exostosis, however, is sometimes found to surround a bone entirely. In this case the treatment now advised will not apply. In this situation, that portion of the bone must be taken out on which the exostosis is fixed, when the bone is of such a length, and so situated, as to admit of it: but as this can scarcely be done in the small bones of the hands and feet, when any of these are diseased, it becomes necessary to remove them entirely. In a case of this kind, which occurred in one of the metatarsal bones, and where the exostosis surrounded the whole circumference of the bone, I thought it better to take out the bone altogether, than to leave the two ends of it only. The one operation was performed easily; while the other would have been more painful as well as much more tedious, and it would not have proved more successful. For although the part did not fill up with bone, it became sufficiently firm to enable the patient to walk as well as he did before.

In the long bones, however, of the thighs, legs, or arms, we may safely venture to remove any portion of them on which an exostosis is fixed; and where the constitution is healthy, we need never despair of nature supplying the deficiency; for instances are often met with, even of entire bones being regenerated. When a portion of bone is to be removed, after laying it freely bare by an extensive incision, a piece of pasteboard, or thin sheet lead, should be passed beneath it, in order to protect the contiguous parts from the teeth of the saw. Where a portion of the fibula or tibia is to be removed, the splint must be passed between these bones; and when either of the bones of the

fore-arm are affected, it must pass between the radius and ulna. Different forms of saws have been employed for dividing bones in this situation; but the common saw used in amputations answers better perhaps than any other.

When the portion of bone is removed, the fore should be dressed with the mildest applications; a piece of soft lint spread with common wax liniment, or merely dipped in oil, should be inserted between the lips of the wound; and if any thing is employed for retaining them, it should be the many tailed bandage which can be undone without moving the limb. It is a point of importance to place the limb in a situation the most favourable for the discharge of matter; and as the operator has it commonly in his power to make the wound more or less inclined to any side of the limb, this ought to be kept in view in the first part of the operation.

When the operation has been performed upon either of the bones of the leg or fore-arm, the remaining sound bone will keep the limb at its full length, so that there will be no risk of its becoming shorter. But when a portion of a single bone is taken out, some attention is required to prevent the limb from becoming shorter during the cure. For this purpose different machines have been invented; but I have never found any assistance of this kind necessary: for if the patient is informed of the great importance of keeping the limb in a proper posture, he will give it all the attention that is requisite: and besides, much inconvenience, pain, and inflammation, are apt to ensue from any instrument used for this purpose, when applied with that degree of tightness that is necessary for keeping the limb in a state of extension.

During the cure of the fore, the chief object is to prevent matter from lodging and passing between the contiguous sound parts. If this is prevented, and the lips of the wound kept open by the easy dressings I have mentioned, till it fills up with granulations from

the bottom, nature will accomplish the rest. Those soft granulations which at first occupied all the vacancy between the ends of the divided bones, will soon acquire the consistence and strength of bone; and in the course of a short time, if the health of the patient continues good, the limb will become equally useful as it was before.

Hitherto we have supposed the disease to be seated in the extremities. But tumors of this kind are also found in other parts of the body; on different parts of the skull; on the under jaw; on the ribs and clavicles; and I once saw a large exostosis on the upper part of the scapula. But wherever they are situated, the treatment is the same. While they give no uneasiness, nothing should be done; for they will sometimes continue small and stationary for life: but when they increase and prove troublesome, the sooner they are removed the better; for the earlier the operation is performed, the more easily will it be done.

In that variety of exostosis termed a Node, proceeding from lues venerea, the first circumstance to be ascertained is the state of the system. The patient should be immediately put upon such a course of mercury, as can be depended upon for the cure of any infection he may labour under; and if the tumor in the bone is recent, and not far advanced, any pain which it has induced may be removed by mercury alone. With a view, however, as much as possible, to ensure the efficacy of the medicine, it ought to be thrown in as quickly, and in as great quantities as the patient can bear: for as the system is completely infected with the virus before nodes appear, it requires, for the most part, a very large supply of mercury to check their progress.

At the same time that mercury is given inwardly, we are commonly advised to rub the part itself with mercurial ointment, or to keep it covered with mercurial plaster. I have not observed, however, that any advantage is derived from this; and I think it

is apt to do harm. In tumors of this kind there is reason to suppose that the periosteum becomes inflamed from the first. In different instances, the inflammation has appeared to be aggravated, both by the application of plasters, and by the friction used with mercurial ointment. Till we know whether the internal exhibition of mercury is to prove effectual or not, some mild sedative application, such as saturnine solutions, or the unguentum nutritum, which is a preparation of lead, should only be employed. These keep the parts easy; and by tending to remove inflammation, they may even have some influence in removing the tumor.

But if we find, after there is full evidence of the mercury having entered the system, that the local affection of the bone still continues to advance, that the tumor becomes larger, and the pain more severe, other remedies should be advised. In this situation, I have sometimes found the pain relieved immediately by the application of leeches over the tumor; and the pain being moderate, we have it thereby in our power to delay every other remedy till a more complete trial is given to mercury. In some cases, where leeches have failed, blisters applied directly upon the parts affected have proved successful. Neither blisters, however, nor leeches, can have any influence on the original disease: they will not lessen the tumor of the bone; but by lessening the tension of the periosteum, they sometimes prove more useful than perhaps any other remedy we could employ.

When these means, however, are too long delayed; when the tumor advances with more rapidity than usual; or when acrid matter is perhaps confined beneath the periosteum; neither leeches nor blisters afford relief. In such cases, an incision made along the course of the tumor to the depth of the bone, will often give immediate ease. The matter evacuated from these tumors is frequently a thin brown sanies, at other times a viscid transparent mucus.

In some cases the incision heals kindly by common treatment, even when the tumor of the bone is by no means inconsiderable. Healthy granulations will form, and a cure of the sore will be accomplished, even before the patient has taken as much mercury as may be judged necessary for the cure of the disease. In such cases, the tumefaction of the bone is not to be regarded: it may probably, indeed, continue during the life of the patient; but no inconvenience will ensue from it. So that unless it is so situated as to produce much deformity, it should never be touched.

But, in other instances, the sore, instead of healing easily, remains obstinate, notwithstanding all the remedies we employ. In such circumstances, this obstinacy of the sore is for the most part supposed to arise from the venereal virus not being destroyed, and a further continuance of mercury is therefore advised. The mercurial course should no doubt be carried as far as there is any chance of its proving useful. But beyond this, it will commonly prove hurtful, and rather tend to protract the cure of the sore. This, however, is a point upon which no precise directions can be given, and must be determined by the judgment of the practitioner in attendance.

When the obstinacy of sores in this situation depends upon other diseases of the system, the removal of these will forward the cure. But when there is a tendency in the diseased bone to exfoliate, the completion of this process will alone prove effectual. In such circumstances, the treatment best fitted to promote exfoliation ought to be pursued: but as we shall elsewhere have occasion to consider this subject more fully, it is unnecessary to enter upon it at present.*

After all the diseased parts of the bone are removed, the sore will for the most part heal easily. But in some cases, such a thickening of the periosteum and contiguous parts has been produced by the long con-

* Vide Chap. IV. Sect. VII.

tinuance of the disease, that the cure still proceeds slowly. In such circumstances, mild emollient applications do harm, and nothing in general proves so useful, as ointments strongly impregnated with red precipitate or verdigrise. In some cases, even these do not act speedily; when touching the surface of the sore, once in two or three days, with lunar caustic, or lapis infernalis, will make the sloughs throw off; and for the most part their place will be supplied with healthy granulations; after which, the cure commonly proceeds without interruption.

In describing this variety of exostosis, I have repeatedly mentioned the pain which attends it; a symptom which always takes place; at least I never met with an instance of its being wanting. Venereal nodes, particularly those on the head, are not indeed always accompanied with much pain, but merely with a slight uneasiness. This variety, however, of node does not originate from the bone, but proceeds merely from an affection of the periosteum. In this case the tumor commonly subsides entirely, either by the effects of mercury alone, or the application of a blister: but in the other, if the bone is affected in any considerable degree, the tumor never subsides if a large portion of the bone does not exfoliate. Even after every other symptom of the disease is removed, these tumors in the bones continue equally fixed and large as they were at first. We judge that a node proceeds from the bone itself; by the pain, as I have just observed, being acute; by the tumor being considerably harder than when the periosteum only is affected; by its advancing slowly, and continuing fixed and permanent, notwithstanding all the applications that we make to remove it.

We come now to speak of the treatment of spina ventosa, or that variety of exostosis which we suppose to originate from scrofula; and I am sorry to observe, that I have nothing satisfactory to offer upon it. Fomentations, ointments, plasters, and a variety of other

remedies, have been advised for it; but I know of none that any advantage has ever been derived from. Tumors of this kind which appear formidable at first, will sometimes indeed continue stationary, either from the scrofulous disposition in the system being checked by cold bathing, or some other similar remedy; or from some change taking place in the constitution, with the nature of which we are perhaps altogether unacquainted. But this is a rare occurrence: for, in general, notwithstanding all the remedies we employ, a spina ventosa, from its first appearance, proceeds in a gradual manner to become worse.

When the disease appears at the same time in different parts of the body, all we can with propriety do is to support the constitution with a proper diet; to advise bark and cold bathing as the best strengthening remedies; and when the pain is severe, to endeavour to render it moderate by adequate doses of opium. But when one part only is diseased, as often happens with the knee and other large joints in cases of white swelling, it becomes frequently advisable to remove the diseased part by an operation. In affections of the joints, it has been the common practice in this situation, to amputate the diseased limbs entirely. But an attempt has lately been made by Mr. Park, an ingenious surgeon of Liverpool, to save limbs that are thus diseased, by removing the heads of the affected bones only, and afterwards healing the sore at which they were taken out. In treating of the operation of amputation, I shall enter more fully on the consideration of this; for it is highly deserving of notice: at present I shall only remark, that there is cause to fear that it will not prove so generally useful, as at first view might be expected. But where these swellings occur on the middle of bones, the practice may be pursued which I have already advised in those cases of exostosis proceeding from ex-

ternal violence: the swelled portion of bone may be cut out when seated on any of the long bones of the extremities; and the whole bone may be removed when any of the short bones of the hands or feet are affected.

CHAPTER III.

OF WOUNDS.

SECTION I.

Of Wounds in general.

VARIOUS definitions have been given of a wound; but few, if any of them, appear to be accurate. Boerhaave defines a wound to be, a recent, bloody solution of continuity, in any soft part, by the motion, pressure, or resistance, of some hard or sharp body. By Sauvages, it is said to be a mechanical division of any fleshy part, attended with a separation of the parts newly divided, together with a discharge of blood, and a tendency to inflame and suppurate. And Ludwig defines a wound to be a morbid division of parts which in a state of health ought to be united.

These are the definitions of this term which have been most generally adopted; but it is evident that none of them are correct. A part may be deeply cut, even large blood vessels may be divided, without any discharge of blood taking place, as sometimes happens in lacerated wounds, and in those attended with much contusion: and where the smaller vessels only are divided, the discharge of blood very commonly ceases in the course of a few hours from the time that the wound was inflicted.

The definition recited above from Mr. Sauvages is too extensive: it comprehends a period or stage of wound which does not always exist, viz. a tendency to suppurate. We know that wounds frequently ter-

minate in gangrene, and even in death, without any previous suppuration; while, in other instances, they heal by the first intention, and their edges adhere to each other without any appearances of pus.

Neither is Dr. Ludwig's definition of a wound correct: parts which ought to be united, may be divided without being wounded. Thus a blood vessel, nerve, tendon, or muscle, may be completely ruptured either by a violent sprain or a contusion; but unless the corresponding skin and other teguments are divided, we do not say that such parts are wounded. Nor are these affections confined to the smaller muscles and tendons; for instances often occur of the different parts, even of the largest muscles, being thus violently separated from each other.

Every recent solution of continuity, in whatever part of the body it may be, when attended with a corresponding division of the teguments, may be denominated a wound.

From this definition of wounds, it is evident, that they will exhibit much variety in their appearances. This will arise from different causes, but more particularly from the nature of the injured parts; from the manner in which they have been produced; and from their extent.

Thus wounds in muscular parts are different, both in their nature and appearances, from such as affect membranous or tendinous parts only. Wounds made with a sharp cutting instrument, are materially different from such as are attended with contusion or laceration: and punctured wounds exhibit very different appearances, and for the most part are productive of very different effects, from those which are more free and extensive. In the subsequent parts of this section, these varieties in wounds will be considered. In the mean time, I shall describe the phenomena which usually take place in the most frequent form of wound, what may be termed a simple incised wound; by which

both the theory and practice which I wish to inculcate will be rendered more intelligible.

On the instrument being withdrawn with which an incised wound has been made, the first appearance that we take notice of is a separation to a certain extent of the divided parts; which is always in a greater or lesser degree, according to the depth and length of the wound, and according as the fibres of the injured part are divided more or less transversely. Thus a wound even of considerable length, if it runs in the same direction with the fibres of a muscle, will be attended with little retraction of the skin, while a large vacuity will take place in a wound perhaps of less extent, where a strong muscular part is cut directly across. Nay, in this last case, the separation of the divided parts is in some cases so considerable, as to give cause to suspect that a portion of them has been removed; while in the other it is often so trifling, that even an extensive wound will have the appearance of a straight line only; a circumstance by which practitioners are apt to be so much deceived as to consider as of little importance, wounds which in their consequences prove to be formidable; by which the propriety of examining every wound with attention is strongly pointed out.

The next appearance which usually takes place in wounds, is a discharge of blood to a greater or lesser extent, in proportion to the size of the cut, and to the number and size of the vessels that are divided; at least this is the case in wounds made with a sharp cutting edge. Where the parts have been much bruised or lacerated, I have already remarked, that even large blood vessels may be divided without any hæmorrhagy taking place.

For the most part, the discharge of blood proves so alarming, that means are immediately employed to stop it; but when this is either neglected or not considered as necessary, if the arteries that have been cut are not large, the irritation produced by the wound

itself, as well as by the free access of the external air, excites in the divided extremities of these vessels such a degree of contraction, that in this way alone the hæmorrhagy is commonly soon checked. The discharge of red blood becomes gradually less: it then ceases entirely, and is succeeded by an oozing of a ferrous fluid, which in the course of a few hours likewise stops, when the whole surface of the sore is found either somewhat dry or even parched; or it is covered over with a cake of coagulated blood.

In this way nature seems to operate in putting a stop to hæmorrhagies produced by wounds. Another idea is commonly entertained indeed of this salutary process: it is supposed that small coagula of blood plug up the orifices of the vessels, and that in this manner they are preserved of the same size as before they were cut.

This, however, is by no means the case, as is clearly proved on dissecting the stumps of patients dying after amputations. Instead of the mouths of the divided arteries being plugged up with blood, they are found perfectly empty and contracted for a considerable space from their extremities; nay, in most instances, they become firm solid cords, so as never afterwards to be capable of receiving a supply of blood. Nor is this process of nature difficult to explain. It is arterial hæmorrhagies we are now considering; for wounded veins, if they be not compressed between the injured part and the heart, seldom discharge so much blood as to prove alarming. Now, as arteries are possessed of a strong contractile power, they will readily exert this power on the irritating causes which accompany wounds, being applied to them. In this manner the blood is prevented from flowing in its usual channel; but nature does not fail to provide a different route for it: it is soon forced through the contiguous anastomosing arteries, which at last become so much enlarged, as to allow it to pass with freedom; while, in the mean time, that contraction

of the divided arteries, produced at first as I have just observed, by irritation, terminates at last in a firm adhesion of their sides, in consequence of that degree of adhesive inflammation with which every wound is in some degree accompanied.

The pain attending a wound made with a clean cutting instrument, is in general inconsiderable at first, unless a nerve or a tendon has been partially divided; in which case it proves commonly severe. But in every wound the parts become painful in the course of a few hours from the time of the injury being inflicted. They become red, tense, and even considerably swelled: and where the wound is extensive, an increased degree of heat takes place, together with thirst, quickness of pulse, and other symptoms of fever.

In some instances these symptoms continue to increase, and to prove more and more severe, till at last they terminate in mortification; but for the most part they are carried off in a more favourable manner. The surface of the wound, which for some time remained dry, is gradually rendered moist and soft by a thin serum oozing into it; which being allowed to collect, is at last, by the heat of the affected parts, and in some cases by the application of artificial heat, converted into purulent matter: while in general, the preceding symptoms of pain, tension, and fever, abate more or less quickly, according as this formation of matter is more or less plentiful. From the time that serum begins first to ooze into the cavity of a wound, the tension and pain begin to abate, and for the most part these symptoms disappear on a free suppuration taking place, by which the most natural balsam is produced that can be applied to wounds.

From this history of the progress of wounds, it is evident that all the symptoms which they induce originate from inflammation. They are exactly such, indeed, as accompany a common prlegmon. The pain, redness, and tension, which always to a certain degree takes place in wounds, are the leading symp-

toms of phlegmon; and the serous effusion into the cavities of wounds, with the suppuration which ensues, are circumstances exactly similar to those which occur in all cases of abscess. A wound may therefore be considered as an exciting cause of inflammation; and some advantage, I think, may be derived in practice, from viewing it chiefly in this light. This, however, will more clearly appear, when we come to speak of the method of cure: when it will become obvious, that in the treatment of wounds, those means prove uniformly most useful which are most powerful in preventing violent inflammation.

The description that I have given of wounds relates to the most simple and least hazardous kinds of them; in which the injury has been done, as was already remarked, with a sharp cutting instrument, and where the parts have been laid freely open. In such circumstances, when no organ of much importance to life has been divided, and when the cut is seated in a fleshy muscular part, if nature be not impeded in her operation, the whole surface of the sore becomes covered with granulations almost immediately on a free suppuration taking place; and these continuing to advance, a cure is at last accomplished, in the manner to be described in an ensuing chapter.*

This happy termination of a wound, however, may be prevented by various causes. It requires, indeed, the concurrence of many circumstances. These we shall afterwards have occasion to consider in a particular manner. At present I shall enumerate those only which arise from the nature of the wound.

In a free incised wound, the inflammation that takes place is not in general more than is necessary for the production of that degree of suppuration which I have shown to be requisite; and in wounds of this description, the matter gets freely off, being commonly discharged almost as soon as it is formed;

* Vide Chap. IV. Section II. § 2.

points of the utmost moment in the management of wounds. It is known indeed to every practitioner, that the cure of wounds cannot be accomplished when the inflammation is either severe, or when a free outlet is not given to the discharge: every circumstance therefore in the nature of a wound, which tends either to excite an undue degree of inflammation, or to produce a lodgment of matter, must be considered as unfavourable: and hence punctured wounds, and those that are attended with contusion or laceration, are particularly hazardous.

Punctured wounds prove often more dangerous than wounds of greater outward extent, from large blood vessels and other deep seated parts being apt to be hurt; and they are commonly more painful, being frequently attended with a partial division of contiguous nerves or tendons; a circumstance productive of more violent pain than usually ensues from their being freely divided. But the greatest risk in a punctured wound arises from the lodgment of matter; a circumstance which takes place more readily in this than in any other variety of wound; and to obviate which the nicest attention on the part of practitioners is often requisite.

In contused and lacerated wounds, if the violence with which they have been inflicted has not been considerable, the parts will frequently recover their tone; the attending inflammation will not run high; and a free suppuration being induced, a cure will at last be accomplished in a manner similar to what I have described in cases of simple incised wounds. But it often happens that the contiguous parts are so much injured as to give no cause to expect such a favourable event. When violently contused, the texture of the injured parts is sometimes so completely destroyed, that the circulation is stopped, and mortification ensues; and where this proceeds to any considerable extent, the danger attending it is always great. Again, in wounds attended with much laceration, mortifica-

tion is apt to occur from a different cause. The pain and irritation proceeds sometimes to such a height, as to induce a great degree of inflammation; which, notwithstanding the means usually employed to prevent it, very frequently terminates in the manner I have mentioned. Indeed, so far as my observation goes, inflammation induced by this cause is more apt to terminate in gangrene than any other inflammatory affection proceeding from external violence.

In forming a prognosis of wounds, the circumstances we have just been considering merit particular attention; but there are others which should likewise be kept in view; and these more especially are, the age and habit of body of the patient; the texture of the wounded part; the part of the body in which the injury is inflicted; and the risk of parts of much importance to life being ultimately brought to suffer, although not immediately injured.

Thus, it is obvious, that in healthy constitutions, wounds will, *cæteris paribus*, be less hazardous than in people of diseased habits of body; for we commonly observe, where the system is tainted with any disease, that even the slightest wounds are apt to become troublesome, and to degenerate into sores which do not heal till the disease of the system is removed. We also observe, that the healing of sores depends in some measure upon the age of the patient; and that the cure is for the most part more quickly accomplished in youth and in middle age, than in very advanced periods of life.

There are many exceptions, however, to this; for whenever the natural firmness and elasticity of the muscular fibres are not much impaired, we do not find that old age proves unfavorable to wounds. When the constitution is such, that any wounds which take place, are found to excite a due degree of inflammation, old age ought by no means to be considered as a disadvantage. On the contrary, in such circumstances, it proves always salutary, by tending

to render the symptoms more moderate than they are apt to be in more early periods of life. This is particularly the case in extensive wounds of every kind: and we observe it in a remarkable manner in surgical operations; especially in lithotomy, and in the amputation of any of the extremities; which have commonly, in the course of my experience, proved more successful in healthy old people than at any other period of life, and evidently from the cause that I have endeavoured to point out.

With respect to the texture of a wounded part, it is well known that wounds heal not only more quickly but more kindly in some parts than in others. Thus, wounds of the cellular substance heal more easily than those of muscles; while those that are confined to the fleshy parts of muscles prove much less formidable than wounds of tendons or ligaments; for, besides occasioning less inflammation and pain, they do not so readily produce any permanent inconvenience. The deepest cuts may be inflicted on the belly of a large muscle, with little or no risk of any future inconvenience being produced; but the contiguous joints are apt to remain stiff and unmanageable when the tendons which pass over them are much injured.

When wounds penetrate to a still greater depth, so as to do any material injury to bones, they prove always more tedious and uncertain than when soft parts only are divided; for in such cases wounds seldom heal till some portion of the bone exfoliates; a process which very commonly requires a considerable length of time to accomplish.*

Wounds in glandular parts are more to be dreaded than the mildness of the symptoms which appear at first would lead us to imagine. When small glands only are divided, they often heal readily; but when the larger glands are injured, the system is not only

* Vide Chap. III. Sect. VII.

apt to suffer from the secretion for which they are intended being impeded, but the sores which ensue very commonly become fungous, and are cicatrised with difficulty.

When any of the larger lymphatic vessels are wounded, the cure often proves tedious, from a constant discharge of a thin limpid fluid, by which the formation of a cicatrix is prevented: and when at last a cure is obtained, very troublesome swellings are apt to occur in the under part of the limb, from the obstruction given to the lymph in its passage to the heart by the newly formed cicatrix. Of this every practitioner of experience must have seen some instances. I have met with many; particularly after the extirpation of scirrhus glands when deeply seated in the armpit. In such cases, the large lymphatics of the arm are very frequently cut, and very obstinate œdematous swellings of the whole member are apt to ensue.

When a large nerve is completely divided, the pain attending it is seldom great; but the parts beneath will be deprived both of their sensibility and power of motion, unless they are supplied with some other branches. But when a nerve is only punctured, the pain which takes place is commonly severe: and this is apt to be followed with a high degree of inflammation; smart fever; subfultus tendinum; convulsions; and even death. These violent appearances, however, do not often occur in northern climates; but they are frequent in warm countries, where they are apt to terminate in a symptom which often proves fatal, the locked jaw.

In wounds of the larger blood vessels, our first object is to discover, whether the hæmorrhagy which ensues proceeds from arteries or veins; for in general no material inconvenience is experienced from wounds even of the largest veins, while much danger is to be dreaded from wounds of the large arteries. If a wounded artery is large, and so situated that a ligature cannot be put round it, the loss of blood will

probably soon prove fatal: and even where the discharge of blood can be stopped with ease, if the limb has no other artery to supply it, a mortification is to be dreaded. It often happens, indeed, that even large arteries are secured with ligatures without any detriment to the parts beneath: but in this case there are other arteries or anastomosing branches of such a size as to give passage to a sufficient quantity of blood.

The site of a wound is also an object of importance. Thus wounds in the extremities, when confined to parts lying above any of the hard bones, are not to be considered as so hazardous as those which pass into any of the joints; and wounds which penetrate any of the larger cavities, prove always more dangerous than those which do not run to such a depth.

This may proceed from different causes. The danger will be increased by the chance of some organ of importance being directly injured; by air, and in some cases by extraneous bodies, finding access to cavities which nature never meant to be exposed; and, lastly, by the lodgment of matter; a circumstance always with much difficulty avoided, in wounds which penetrate to a great depth.

We have likewise to consider, that although no organ of importance may be directly wounded in such a manner as to produce immediate death, yet that much danger may eventually arise from a variety of circumstances; and that wounds may at last prove mortal, which at first were not attended with any obvious risk.

Thus wounds in the lungs and other viscera prove sometimes fatal, from continuing to discharge such quantities of blood for a considerable time, as at last destroy the patient; although at first the discharge might not perhaps appear to be of much importance. The stomach, and different parts of the alimentary canal, may be injured in such a manner as to terminate in death, without exhibiting any immediate appearance of danger. The external coat of the aorta has been

removed by the point of a small sword; and the wound has been nearly healed, when the patient died suddenly from a rupture of the artery: and wounds of the gall bladder, or of its excretory duct; of the receptaculum chyli; of the thoracic duct, and some other viscera; may for several days afford no suspicion of danger, and yet terminate fatally at last.

Wounds sometimes prove fatal from inflammation spreading to contiguous viscera, which were not at first injured; and wounds, which have at first appeared to be of little or no importance, have at last terminated in the worst manner, merely by mismanagement, either in the application of dressings or bandages, or in the conduct of the patient with respect to food, drink, and exercise; for it is well known, that much mischief has been done by improper dressings, and especially by too tight bandages; and we likewise know, that misconduct with respect to food is daily the cause of wounds going wrong, which otherwise would probably have done well.

It thus appears, that various circumstances fall to be considered in judging of the probable termination of wounds. In doing this with accuracy, practitioners of experience have frequent opportunities of shewing their superiority. This subject ought therefore to be considered as highly important by all who wish to distinguish themselves. A minute knowledge of anatomy, a cool temper, and a steady hand, will enable any practitioner, even with no great experience, to perform many of our most important operations sufficiently well: and accordingly, in different hospitals, we daily meet with good operators; but we do not often find surgeons possessed of that knowledge in the prognosis of chirurgical diseases which might be expected; that attention being seldom bestowed which is necessary to attain it.

SECTION II.

Of the Cure of Simple Incised Wounds.

IN the management of wounds, the first object requiring our attention is the hæmorrhage; more especially when it is profuse. The safety of the patient requires it: the alarm which it gives, not only to bystanders, but to the practitioner himself, renders it necessary. Nor can the real state of a wound be discovered with accuracy, till the discharge of blood is checked.

Hæmorrhagies are most immediately stopped by pressure applied to that part of the divided artery which is next to the heart: this pressure is best made by the tourniquet, when the wound is in any of the extremities;* and by the hands of assistants, in wounds of the trunk of the body or of the head.

In this manner, if the pressure is properly applied, almost any hæmorrhagy may be stopped till the wounded vessels can be secured with ligatures; which I shall hereafter shew to be the safest, as it is the easiest, method of preventing injuries of this kind to patients.† Much indeed has been said, even of late years, of the inconveniencies which ligatures are supposed to induce: but this has arisen either from the interested views of some individuals who may have wished to establish the reputation of different styptics; or from the groundless fears of young practitioners. Where the contiguous nerves, or even where much of the surrounding muscular parts, are included in ligatures, severe pain, and other troublesome symptoms, will no doubt be induced; but this is not the fault of the remedy, but of the method of using it. Indeed this is so obviously the case, that reasoning in the fur-

* Vide Chap. VI.

† Vide Chap. VI.

ther support of it does not seem to be necessary; for every practitioner of experience will admit, that a proper application of ligatures is seldom if ever productive of any material inconvenience, and that we can depend on it with more certainty than on any other remedy, for putting a stop to hæmorrhagies from wounded arteries.

In the preceding editions of this work, when treating of the method of applying ligatures to arteries, I gave it clearly as my opinion, that it may be best done by the tenaculum, an instrument represented in Plate II. fig. 1. And after much additional experience of its utility, I now think it right to say, that I am more and more convinced of its being much superior to the needle; which cannot be used without a portion of the contiguous soft parts being included in the ligature; a circumstance which in every instance we should endeavour to avoid. Many imagine that the tenaculum may be used with safety in securing arteries of a middling size, while they are afraid of cutting those of a small size asunder, if some of the contiguous cellular substance be not included along with them; and, in tying the large trunks of arteries, they suspect, that the ligatures would be apt to be forced off by the strong pulsations of these vessels, if they were not supported by being firmly fixed in the contiguous parts. I have not, however, had a single instance of observing, that either of these objections to this practice is well founded. For a great number of years past, I have laid aside the needle, for the purpose of applying ligatures to arteries, almost entirely; and in the course of that time, I have employed the tenaculum indiscriminately in hæmorrhagies from arteries of all sizes.

Wounded arteries are seldom so situated as to prevent the hæmorrhage from being stopped in the manner I have mentioned: for when they lie at the bottom of deep wounds, with narrow contracted mouths, the wound may commonly be enlarged, so as to ad-

mit of their being tied with ligatures; and for the most part it may be done with safety. Where the enlargement of a wound is not clearly necessary, no person of experience would advise it; but the practice is always safe and proper in hæmorrhagies proceeding from arteries lying so deep that ligatures cannot otherwise be applied to them. As this practice, however, has been very inadvertently condemned by some practitioners in every instance, from their supposing it to be rarely if ever necessary, a timidity has been thereby introduced, which, in various instances, has done much harm. Patients have been tormented with the application of tight bandages, and with the trial of different styptics, which seldom if ever succeed, when the hæmorrhagy might have been stopped in the most effectual manner by a small enlargement of the wound: nay, many limbs have been amputated from the same cause, which might easily have been saved; particularly in cases of compound fracture, where hæmorrhagies proceeding from deep seated arteries which cannot be easily tied, are too frequently considered as a sufficient reason for removing the limbs. From particular circumstances, in a few cases of compound fracture, it may happen that hæmorrhagies cannot be stopped without laying the injured parts so extensively open, as might induce more hazard than amputation itself. This, however, is a very rare occurrence; and it will seldom take place where the case has been properly treated from the beginning.

When a divided artery runs in the substance of a bone, no ligature, it is evident, can be applied to it; and therefore, in such a case, enlarging the wound could not be attended with much advantage. But arteries in this situation are seldom so large as to lead us to be much afraid of any hæmorrhagies that may proceed from them; nor does it often happen that they continue to bleed long after they have been com-

pletely divided. An artery thus situated, being merely wounded, may discharge a great deal of blood; but I have met with different instances of the hæmorrhagy stopping almost immediately on the vessel being cut across. Authors indeed have said, that the utmost danger has been induced by arteries surrounded with bone being wounded; nay, that death itself has happened from this cause, owing to the impossibility of including them in ligatures. I am convinced, however, that it is a partial division only of such arteries that will ever produce hæmorrhagies of any importance; for they are always small, and they never adhere so firmly to the surrounding bone, as to be prevented from contracting on being freely divided.

Where the discharge of blood proceeds from large vessels, the means that I have mentioned are the most effectual with which I am acquainted, for putting a stop to it. But when it occurs from an infinite number of small arteries over the whole surface of a wound, other remedies must be employed. I must here refer, however, to a subsequent chapter of this work, where this subject will fall more properly to be fully considered.*

The hæmorrhagy being stopped, the next object requiring our attention in the treatment of wounds, is the removal of any extraneous bodies from every part of them, and where the substances to be removed are not deeply seated, this is done both with most ease and safety with the fingers alone; for when forceps and other instruments are employed, we can scarcely fail to injure the contiguous parts.

The examination of wounds, with a view to discover extraneous bodies, ought to be made with much delicacy; for handling the parts roughly gives unnecessary pain, and is besides apt to induce a degree of inflammation, which often proves hazardous.

* Vide Chap. VI.

But although it is always proper to accomplish the removal of extraneous bodies with as little pain to the patient as possible; yet wherever we have any certainty of bodies of this kind being lodged, we ought by all means to proceed with firmness, in the first place, in discovering their situation, and afterwards in removing them, excepting in those cases where it cannot be done without much risk of injuring parts of real importance to life. In such circumstances, the judgment of the practitioner must decide between the danger that may probably ensue from the extraneous body being allowed to remain, and that which might arise from his proceeding to remove it immediately.

Modern practitioners strictly forbid the removal of extraneous bodies from wounds that are not easily discovered, for they very properly observe, that in former times much mischief was done by exploring wounds to a greater extent than was necessary; by which much pain was induced, and cures rendered more tedious than they otherwise would have been.

But in this matter the moderns seem to have gone from one extreme to another: for although much handling of sores, and a free use of probes, forceps, and other instruments, is seldom necessary, it is equally true, that by allowing extraneous bodies, which might have been removed at first, to remain in wounds, much future pain and inflammation have arisen.

In support of the practice, we are told, that various cases are on record, of extraneous bodies continuing to lodge in different parts of the body without any harm or inconvenience; that this will commonly happen when the substance is not of a stimulating nature; and when it is of such a form or texture as to induce pain, that it will soon excite such a plentiful suppuration as will quickly throw it out in a much more easy manner than if it had been removed at first. In answer to this, I shall observe, that where extraneous

bodies in wounds cannot be removed without giving the patient a great deal of pain; and especially where there is any risk in doing so of large contiguous blood vessels being wounded; we ought by no means to make the attempt. In such cases, it is better to trust to the subsequent suppuration for throwing them out; but they ought always to be taken out immediately, when it can be done with tolerable ease, or without injuring any parts of importance. In this way a more expeditious cure is obtained, and with more ease, than could be done in any future stage of the sore. For in a recent wound, while no inflammation or tension takes place, the contiguous parts easily stretch and yield to the extraction of any substance that may be lodged in them, if it be not of an angular form, and if the operation, instead of being performed quickly, be done with slowness and caution: whereas, when the contiguous parts become stiff and painful, which they always do in the course of a short time, any substance lodged in them is removed with much pain and difficulty: for even after a free suppuration has taken place, although the parts are commonly much relaxed, yet still they are more stiff and tense than they were at first; and the opening through which the substance is to be extracted is likewise diminished.

Another very material advantage is gained by the immediate removal of extraneous bodies from wounds. While a sore is recent, patients, for the most part, will allow every thing to be done which the practitioner in attendance may propose, while they frequently refuse, in future stages of the sore, to submit to any thing more than the usual dressings.

It may be remarked, in this place, that of the extraneous bodies that are apt to be lodged in wounds, some are more harmless than others. A prudent practitioner will therefore be more or less anxious in attempting to remove them. Thus we all know, that a lead ball may be lodged very deeply for a great length of time, without being productive either of

pain or trouble; while a splinter of wood, glass, or iron, or even a bit of cloth, will often excite much distress. When, therefore, it is known that a lead ball is the only substance that is lodged in a wound, if it cannot be easily removed, we have at least the satisfaction of being assured, that it will not probably do much harm. We will therefore allow it to remain, either till it is loosened by a plentiful suppuration, or till some future period, when it may perhaps be discovered in a different situation, so as to be taken out with safety at a counter opening: while, on the other hand, when such substances are lodged in wounds as will probably excite much irritation and pain, it will be much for the interest of the patient, and will be the means of preventing much perplexity and trouble to the surgeon, to have them removed as soon as possible after the injury is inflicted.

I have observed above, that in removing extraneous bodies from wounds, it should be done with the fingers alone, rather than with forceps. Some few exceptions may occur to this, which I shall afterwards have occasion to mention. But substances are sometimes lodged in wounds that cannot be easily taken out either with the fingers or forceps. This is particularly the case with sand, dust, and small pieces of glass. These are best removed by bathing the parts in warm water, or by pouring warm water upon them; squeezing the water gently from a sponge, or injecting it slowly with a syringe.

In performing even this very simple operation of washing a wound, as well as in extracting foreign substances with the forceps, or in any other way, it is proper to observe, that much advantage may be derived from placing the patient in such a posture as tends most effectually to relax the injured parts, so as to obtain as wide a separation as possible of the lips of the wound. I have seen different instances, where, from want of attention to this circumstance, patients have suffered much unnecessary pain; where, after

various trials, the practitioner has been obliged to desist without accomplishing his object; and where another practitioner has proved at once successful, merely by putting the wounded parts in a relaxed position.

We proceed now to consider the cure of wounds.

In incised wounds, a separation takes place of the parts that have been divided; and as every wound proves a cause of irritation, the separation which occurs at first continues for some time to increase, merely by the contractile power of the injured muscles. In the usual way of covering wounds with lint, or with pledgets of ointments, and where the parts have not been previously drawn together and retained in their situation, an effusion of a serous fluid soon takes place over their whole surface, from the small vessels that have been cut. This is afterwards converted into purulent matter: soon thereafter the parts are found to be covered with an infinite number of small sprouts or granulations; and these having advanced to a certain extent, a dry pellicle of scarf skin, termed a cicatrix, forms over the whole extent of the wound, and thus the cure is completed.

In this manner the healing of wounds is effected when nature is not assisted by art, or when her operations are only promoted by proper coverings, and protection merely given to such parts as are injured. But, although, in some cases, this is our only resource; and although even in this way practitioners have it always in their power to forward the cure of sores; yet it is liable to many very important objections, which may be obviated by a different treatment.

When a wound is healed in this manner, if the divided parts have separated to a great extent, the supuration which ensues will be abundant; by which, if the constitution is weak, the patient is apt to be much injured. In extensive sores, this method of cure is always tedious; when deep muscular parts are injured, the motion of the contiguous joints is apt to

be affected; and the cicatrix of a large wound, when cured in this manner, is always stiff, unseemly and disagreeable; nor is it possessed of that strength and firmness which the parts beneath require for their protection.

Patients, however, are seldom under the necessity of submitting to these inconveniences: for, in general, wounds may be cured in a more easy as well as in a more agreeable manner: we know from experience, that two inflamed surfaces of an animal body, when kept in contact, will soon adhere together. This was probably at first pointed out by accident; but practitioners now derive much advantage from the knowledge of it, not merely in the management of wounds, but in a variety of important operations: by drawing such parts as have been divided into contact with each other; and taking care to have them all as completely covered as possible with the cutis vera, very extensive wounds are in this manner often quickly cured; the power of moving and of using limbs with freedom is often preserved which otherwise would be lost; the scar or mark which remains is seldom of any importance; and the wounded parts have the advantage of being sufficiently protected.

It has long been known that parts recently divided will unite together, if kept in contact for a sufficient length of time. The cause, however, of this phenomenon has not hitherto been clearly explained: the prevailing idea is, that it proceeds from a direct inosculation or junction of the different parts that have been divided; and that those parts only will adhere together which were formerly united. Thus it is imagined in the healing of wounds in this manner, that a divided artery on one side of a cut must be made to adhere directly with its fellow on the opposite side; that veins must unite with veins, and muscular fibres with fibres of a similar nature. But although it is necessary in practice to keep this idea so far in view, as to place parts that are to be healed as exactly opposite

to each other as possible ; yet this proceeds more from a requisite attention to symmetry and neatness after the cure is performed, than from any other cause : for it is certain, that no such exactness is required for the mere adhesion of the divided parts ; and whoever doubts of the fact, may with little difficulty prove it experimentally. A membrane may be made to adhere to a bone ; and the divided end of an artery or a vein will unite with almost any animal substance with which it is kept in contact.

It is indeed true, that blood circulates through the cicatrix of a wound ; a fact which few will doubt, and which probably gave rise to the opinion we are now considering. But we have reason to believe that this circulation does not take place immediately on the formation of a cicatrix. It seems rather to be an after process of nature, and is evidently accomplished by an infinite number of small vascular sprouts or newly created blood vessels, which proceed from the larger arteries and veins on each side of the wound, and inosculate with each other, so as to form a sufficient circulation in the parts through which they pass. At least I have found, in different instances, on examining the cicatrix of a large wound, that it was always very vascular ; and I conclude that it happens from a new formation of small blood vessels, as the divided extremity of every blood vessel, whether artery or vein, when of such a size as to be easily distinguished, is always shut, and even obliterated, for a certain space from the point where the injury happened, in the same manner as in arteries that are tied with ligatures in cases of amputation and other capital operations. And if this happens in vessels of a large size, there is reason to suppose that it does so in those that are smaller.

In confirmation of this opinion, we may observe, that a circulation of blood betwixt adhering surfaces, takes place where inosculation of the kind in question can never occur, from no previous division of blood

vessels having been made. Thus, when the skin of two contiguous fingers or toes becomes raw or tender, without any blood vessels being injured, it is difficult to prevent them from adhering; and when they do adhere, a free circulation is afterwards found to take place between them. Other instances might be adduced; but I notice this one, as it is not unfrequent, and as it is perfectly applicable to the present question.

I therefore conclude, that wounds cured in this way, are healed in the same manner as adhesion is produced between inflamed surfaces, namely, by exudation of the glutinous part of the blood from the extremities of the divided vessels; which in the first place retains the parts together, and afterwards serves to support the new formation of small blood vessels, which nature puts forth as a farther and more certain means of retention.

I have entered into this physiological discussion, imagining that it tends to establish a material point in practice. It has commonly been supposed, that the space of twelve, fourteen, or fifteen days, is necessary for the complete adhesion of divided parts: a supposition which proceeds upon the idea that this adhesion is formed solely by the inosculation of blood vessels. But if agglutination alone is necessary, in the first instance, to accomplish this adhesion, it is evident that it may be effected sooner. Accordingly, I have uniformly found divided parts adhering firmly about the fifth day: nay, I have known the bandages accidentally removed from wounds on the second and third days, without any separation being produced of the parts newly united: from this it appears, that a shorter application of the usual means of retention will answer than is commonly practised. Surgeons term this treatment of fores, healing by the first intention; and as it is in every respect the most desirable method of cure, it should always be followed when it appears to be easily practicable.

In some varieties of wounds, different reasons occur to prevent them from being cured in this manner. These we shall afterwards have occasion to consider, but in the simple incised wound, where the injury has been inflicted with a clean cutting instrument, without producing puncture, laceration, or contusion, the only objection that appears to it, is our not being able to draw the divided parts into contact, and to retain them in that situation till they adhere together. This, however, will seldom happen, unless a loss of substance takes place to a considerable degree. Where a large portion of skin, with the muscles beneath, has been entirely cut out, it may in some cases be impossible to bring the retracted edges of the wound together; but we may always make them approach so as greatly to diminish the size of the sore, and may thus have it in our power in every instance to forward the cure. In deep transverse wounds, even where no substance is lost, the retraction is often so great, as to render this practice somewhat difficult: but by placing the injured part in that situation which tends most effectually to relax the divided muscles, we may effect our purpose almost in every instance. It is indeed surprising to see how completely divided parts will be made to approach, which, while the muscles were upon the stretch, were separated to a great distance. We should never therefore despair too soon; for even in the worst cases we seldom fail, by due perseverance in this mode of treatment, to obtain some very essential advantage.

When it is found that the divided parts may be drawn together, we have next to fix upon the best and easiest method of retaining them in this situation during the cure. Various means are proposed for this; namely bandages of different kinds, adhesive plasters, and futures.

The sides of longitudinal wounds, in any of the extremities, and of some wounds of the head, may be retained by the uniting bandage. But this seldom answers in the trunk of the body; nor can it ever prove

useful in wounds, either in the legs or arms, that run transversely : and even where there is reason to think that it will answer sufficiently well for retaining the sides of a wound in contact, we ought never to trust to it entirely ; for we cannot depend upon a bandage alone for preserving the skin smooth and equal ; a circumstance of much importance in the cure.

The easiest method of retaining the skin exactly in its situation, is by means of adhesive plasters applied in the manner represented in Plate LI. In some cases plasters alone prove sufficient ; but when much retraction takes place, the uniting bandage should be applied over them whenever the direction of the wound renders it admissible.

Many practitioners, in all cases of wounds, prefer adhesive plaster to the use of futures ; but it is in particular instances only that this preference is proper. Adhesive plasters may be used with advantage in superficial wounds that do not penetrate much deeper than the cellular membrane ; and where there is a loss of substance to such an extent as to prevent the sides of a wound from being drawn close together, they may be employed for the purpose of retaining the retracted parts as near as possible to each other. But in all wounds that penetrate to any considerable depth, and when their edges can be drawn into contact, the twisted future is by much the best for retaining them. For a description of this and other futures, I must refer to Chap. V. The common interrupted future is indeed more frequently employed than the other ; but it does not support the parts with such certainty ; the ligatures are more apt to tear or cut out the parts which they surround ; and they frequently leave disagreeable marks.

It is a common opinion, I may remark, that adhesive plasters and futures are admissible only in the recent state of wounds. But however desirable it may be, for various reasons, to have the application of either of them made as early as possible ; yet when ne-

glected at first, they may commonly be employed with advantage during any stage of the sore; for we are wrong in supposing, as is commonly done, that wounded parts will not adhere when in a state of purulency. I have repeatedly treated, in this manner, sores of two, three, and four weeks duration, and very commonly with advantage: inasmuch, that I believe the practice will generally succeed in every stage of a sore, when the retracted edges can be brought together.

Whether adhesive plasters or futures are preferred, we should be very attentive in supporting the parts, as far as it can be done, by the posture of the patient; for if this be not done, futures of every kind will yield so as not to answer the purpose: and along with this, when plasters are used, a further advantage, as I have already observed, may be derived from a proper application of the uniting bandage; but for the reasons that will be given in the chapter on Sutures, a point that will also be further taken notice of, when treating of the hare lip in Chap. XXXIII. neither this nor any other bandage can with propriety be employed along with the twisted future.

When a wound is treated in this manner, as soon as the retracted edges are drawn together and properly supported with plasters or futures, no other dressings are necessary, excepting a thin covering of soft lint to protect the parts beneath from cold; and with a view to prevent as much as possible any access to air, the lint should be spread either with some unctuous substance, or with mucilage of gum arabic, or any other inoffensive gum.

This being done, the patient should be made to preserve the injured parts in the most favourable posture; and care should be taken to enjoin a well regulated diet. If the patient is low and emaciated, he may with propriety have a small allowance of animal food; but when plethoric, or liable to inflammatory affections, and the wound extensive, a strict antiphlogistic course is requisite: for although inflammation

to a certain extent may be necessary for the cure of wounds; yet a prudent practitioner will always guard against excess of inflammation, as productive of much harm.

In open wounds, the most effectual remedy for the removal of extreme degrees of inflammation, is warm emollient cataplasms; but as they tend to induce the formation of matter, and as this is directly opposite to our views in the mode of cure that we are now considering, it is evident in such circumstances that they are inapplicable. But although warm emollients cannot with propriety be employed; yet much advantage may be derived from a proper use of any cold emollient oil or unguent. When the attending symptoms of pain and inflammation are moderate, the dressings should never be removed till the cure is completed; but whenever the pain becomes severe, as it would be apt to terminate in some high degree of inflammation, by which our views might be completely frustrated, the dressings should be immediately taken away, so as to admit of the pained parts being gently rubbed or even bathed with an emollient. By this being repeated from time to time, I have seen different instances of very distressful degrees of pain being alleviated, and of the contiguous parts being so much relaxed, as to admit of the cure by adhesion going on without interruption. In some cases, however, we are under the necessity of employing other means; and of these the most effectual are opiates and bloodletting, particularly local bloodletting with leeches; which often proves effectual in removing pain and inflammation, when every other application has been tried in vain.

In general, a continuation of these means will answer the purpose: but it sometimes happens, notwithstanding all our endeavours, that the pain and inflammation increase, and the tension of the wounded parts becoming more considerable, the plasters and ligatures with which they have been kept together must

be taken away, otherwise they will do harm. In such circumstances, the ligatures should be removed at once; and for the most part this will give the patient immediate relief: the pain and tension will soon disappear; and a cure must be accomplished in the ordinary way, as it might prove hazardous to attempt the same method of treatment again.

I think it right, however, to remark, that, in general, the cure goes on without any interruption of this kind; and where this is the case, our views are completed as soon as a firm degree of adhesion has taken place between the edges of the wound. I have already remarked, that this process is commonly accomplished in a shorter time than is usually imagined. In superficial wounds, the ligatures, or other means of retention, may be removed sooner; but even in deep extensive wounds, if the habit of body is sound, they may with safety be taken away on the fifth or sixth day. By this time every advantage that can be derived from them will be gained; while much inconvenience, and some mischief, might arise from their being allowed to remain longer.

I have already mentioned many of the advantages which result from this method of curing wounds. They are indeed so important, that we should seldom hesitate to advise it; for even when it fails, we know that any troublesome symptom which it may induce, will be removed by due attention to the means that I have mentioned; while much time will be gained when it succeeds. Two objections are commonly made to it, which I shall now shortly consider. It is said, that the ligatures with which it is often necessary in wounds to secure the arteries, will act as extraneous bodies, and prevent the sides of the wound from uniting. And it is likewise observed, that in the course of the cure matter is apt to form, from the lodging of which, troublesome sinuses are produced. Neither of these objections, however, are well founded; at least, I have never met with a sin-

gle instance of their being so. It seldom happens that more than one or two arteries in any wound require to be tied: but I know from experience, that wounds may be cured by drawing their edges together, even where a large number of arteries has been secured with ligatures: for the threads occupy very little space, and when applied with the tenaculum, which ought always to be done, they are easily removed without any disturbance being given to the rest of the wound. And again, with respect to sinuses being apt to form from this method of treatment, if the edges of a wound are only drawn together above, a cavity will thus be formed beneath, where matter will no doubt be apt to lodge; but this should not be attributed to the method of cure, but to the mode of putting it in practice: for in every wound treated in this manner, the whole of the sides or edges should be drawn together from the surface to the bottom, by which the formation of sinuses is effectually guarded against.

We have now to speak of those wounds which do not admit of this mode of treatment. When the edges of a cut cannot be drawn together, after the hæmorrhagy is stopped, and extraneous bodies removed, we find by experience, that the most effectual assistance we can afford, is to promote as much as possible the formation of matter: for the fact is undoubted, that in every wound of this kind, a free suppuration proves the most effectual relief to every symptom; at the same time that it appears to be so materially connected with the cure, that the healing process never begins till the sore is covered with good pus; a circumstance not difficult to explain. The cure of sores healed in this manner, is so far an effort of nature alone, that although some advantage may be derived from art, yet the chief object of practitioners in this branch of business, should be merely to remove such impediments as might tend to obstruct the operations of nature, and to protect the injured parts till

the cicatrix becomes sufficiently firm. Now, as we know that granulations do not readily form in fores as long as they remain painful ; and as nothing with which we are acquainted proves so mild an application to wounds as pus, we may conclude, that it proves chiefly useful by preserving the injured parts, in that easy, pleasant state, which seems to be indispensably necessary for the cure. It should therefore be our first object, in the treatment of fores of this description, to forward the formation of pus, as quickly as possible ; and the most effectual method of doing it is, by treating every wound in the same manner as we do a common phlegmon ; that is, by a free use of warm emollient poultices and fomentations.

In the first place, the parts should be immediately covered with a pledget of lint, spread with an emollient mild ointment, with the view of preventing the admission of air. When the pain is excessive, poultices may be directly applied above the dressings, as being the surest means of relieving it : but, when the pain is moderate, it is better to delay the use of poultices for a day or two ; for as pus cannot be produced till a serous effusion has taken place, and as we know that some degree of inflammation is required for effecting this, when the pain and tension in wounds are moderate, an immediate application of poultices is apt to do harm, either by preventing altogether, or by retarding and rendering too languid, that state of inflammation which appears to be necessary for the cure. But in every instance of wounds of considerable extent, remedies of this kind prove always useful after the first two or three days have elapsed : for by this time a sufficient degree of inflammation has commonly taken place, for effecting the wished for effusion ; and I have already taken various opportunities of shewing, that in no other way can this be so readily converted into purulent matter, as by a free application of heat ;* so that whenever we wish to advise

* See Chap. I. Sect. III.

it, we should carry it to the same extent as in cases of phlegmon.

It is proper, however, to remark, that in the treatment of wounds, this remedy should be used with caution. For although heat, whether conveyed by means of poultices or fomentations, is perhaps the most useful application in the stage of wound we are now considering; yet when long continued, it is very apt to do harm, as we have daily opportunities of observing, where it is employed by those who do not consider upon what principles it acts in the cure. When the purpose that I have mentioned is gained, namely, a free and kindly suppuration, as it is for this only that poultices are used, they should then be laid aside: for when continued longer, they almost constantly do harm, by relaxing the parts to which they are applied too much; by which they are apt to become pale, soft, and spongy, instead of being of a healthy red colour, and of a firm texture. Nay, they are at last often productive of the very contrary effect for which they are employed: for although much inflammation proves hurtful in the cure of wounds, yet in some degree it is always necessary. Now, by continuing the use of warm emollients too long, this salutary degree of inflammation is so entirely carried off, that the matter becomes thin and in too great quantity. And thus troublesome vitiated sores are produced, which under different management would not probably have happened.

The period at which the use of poultices and other warm applications should be laid aside, must be determined in every case by the judgment of the practitioner. This general rule, however, may be safely adopted that they may at all times be persisted in as long as much pain and inflammation continue; but these symptoms becoming moderate, the discharge being good, and the surface of the wound covered with granulations of a healthy appearance, they should be

left off. In this state of a fore, all the advantages are gained which poultices can produce; and when long continued, some of the inconveniencies I have mentioned are very apt to ensue.

In the ensuing chapter, I shall have occasion to enter upon a more particular detail of the best dressings for wounds. It will not, therefore, be necessary at present, to speak minutely upon this part of our subject.

I have already had occasion to remark, that a certain degree of inflammation is requisite for the cure of every fore; but as this very rarely proves deficient, and as we have more to dread from this symptom proceeding too far, especially in the first stages of large wounds, the mildest dressings only should be employed. During the progress of the cure, much advantage indeed is occasionally obtained from dressings of an irritating, or even of an escharotic nature. This, however, is only the case, when a wound has advanced to the state of an ulcer. While yet recent, the mildest application is always the best. In this country, soft dry lint is commonly employed, while some practitioners advise pieces of soft sponge; and it must be admitted, that they answer much better than any of the irritating balsams, which till of late were very universally used, and which in most parts of Europe are still continued; for it was in Britain that mild dressings to wounds were first introduced; and it is in this country only where even yet they have been generally received. But although dry lint is a mild application when compared with many others, it always creates pain and irritation on being first applied, besides being apt to adhere to the edges of wounds, so as to be with difficulty removed. With a view to prevent these inconveniencies, the lint should be thinly spread with any mild ointment; such as Goulard's cerate, or common wax ointment. By this means it gives no pain in the application, while it is removed with ease, at the same time that it serves more effectually.

ally than dry materials to prevent the air from finding access to the sores. As dry lint, however, has long been generally employed in this country, any innovation will not be readily admitted; but what I have advised, being the result of much experience, I can with confidence recommend it.

A piece of soft lint, spread with any ointment of this kind, being laid over the wound, a bolster of fine tow should be applied above it for the purpose of keeping the parts warm, as well as for absorbing any matter that may be discharged; and this being covered with a compress of old soft linen, the whole should be retained by a bandage of fine flannel or cotton, which is preferable to linen, in so far as it is commonly more agreeable to the feelings of the patient, and as it yields more easily to any accidental swelling of the neighbouring parts: whereas linen, possessing little or no elasticity, is very apt to do harm, by remaining stiff and immoveable, notwithstanding any swelling that may ensue.

Practitioners are not agreed upon the time at which the first dressings of sores should be removed; and nothing decisive can be said upon it, as in some measure it must be directed by the circumstances of every case. This general rule, however, may be kept in view, that sores should always be dressed when plentifully covered with matter. This will generally be the case about the fourth or fifth day; but as the formation of pus depends upon different circumstances, particularly upon the health of the patient, and on the degree of heat in which the parts are kept, some latitude must be allowed in it. A free use of poultices after the second day, puts it in our power to remove the dressings much sooner than we otherwise could do: for they not only promote the formation of matter, but soften all the coverings that have been used, so as to admit of their being easily taken away.

When the cure of a wound goes on without interruption, the second, as well as the subsequent dressings, should be precisely the same as the first: for our object being still the same, no variation, it is evident, can be necessary. As nothing proves more hurtful to sores than exposure to the air, one great object in the application of dressings, is to prevent any inconvenience which might arise from this. And the same reason renders it necessary to change the dressings as seldom as is consistent with cleanliness; and to be as expeditious as possible in renewing them. In general, however, no harm will occur from the daily dressing of wounds. They should not but in very particular circumstances, be dressed more frequently; nor can it often be proper to dress them seldomer than this: for when matter is allowed to lodge long, the heat in which patients with large wounds are usually kept, is apt to render it putrid and offensive. But as I shall elsewhere have occasion to speak fully upon this subject,* it is not at present necessary to consider it more particularly: I shall just observe further, with respect to the continuance of mild dressings to wounds, that it ought to be regulated by the progress of the cure. As long as the cure continues to advance, mild dressings should be continued; but when the sore assumes any vitiated or morbid appearance, some variety in the dressings becomes necessary; and the nature of any change to be thus adopted must be regulated by the state of the sore at the time. For the further consideration, however, of this part of our subject, I shall refer to the different sections of the ensuing chapter.

I have hitherto been supposing that none of the symptoms are violent; in which case the cure will, for the most part, go easily on, under the mode of management I have mentioned. But in some cases the healing of the sore is not only much interrupted, but

* Vide Chap. IV.

much hazard is induced by the unusual height to which some of the symptoms proceed ; and these particularly are, pain, inflammation, and convulsive affections of the muscles. I shall therefore offer a few observations upon the means of obviating these symptoms, when they proceed to such a height as to prove hazardous.

A wound cannot be inflicted without inducing pain : for even the slightest cut must necessarily injure some of the smaller branches of nerves ; by which pain, to a certain degree, must be induced.

It commonly happens, however, that the pain in wounds is not at first so severe as to require any particular management : and, in general, it subsides entirely, on all extraneous bodies being removed, and a plentiful formation of matter being induced. But occasionally the pain continues severe even on this having happened : in such circumstances we trust chiefly to opiates, and they seldom fail to give relief. But it frequently happens that their effect is only temporary, the pain being apt to recur after the strength of the opiate is exhausted.

In this event we are to search with much care for the cause of the pain. It may proceed from some particles of extraneous matter which have not been discovered ; from inflammation of the wounded parts ; or from some portion of a nerve or tendon being partially wounded without being divided ; or merely from irritation over the whole surface of the sore.

We should, therefore, in the first place, examine the wound with attention, so as to be as certain as possible that no extraneous matter has found access ; for when pain proceeds from any foreign body lodged in a wound, the removal of this will, for the most part, procure relief ; while no other remedy will have any effect as long as it is allowed to remain. When not readily discovered, or when the particles of any extraneous matter that may be lodged in a wound are so small that they cannot be removed with the fingers, I

have already advised the injecting of warm water, by which they will often be washed out when every other trial has failed. But when this does not succeed, the wound should be immersed for a considerable time, perhaps for an hour, morning and evening, in warm water, or in warm milk; by which particles of matter are sometimes dissolved and carried out, which would otherwise have continued to give much uneasiness.

When all the trials, however, that we make for removing pain happen to fail, we must search for some other cause of its proving so uncommonly obstinate; and it will often be found to originate from inflammation. When the external parts of a wound are inflamed, this cause of pain is at once rendered obvious; for even the slightest degree of external inflammation is readily perceived; but it sometimes happens, that the periosteum, and other deep seated parts, are inflamed, without any external marks of it taking place. This, however, is only the case for some short period after the inflammation has commenced: for even when it first attacks parts that are deeply seated, it commonly spreads in the course of a day or two, so as to be discovered outwardly; and when this does not happen, we may in general be directed to the cause, by the heat of the patient's body: by the state of his pulse; and by the degree of thirst, which in cases of this kind is always increased.

When these symptoms of fever run high, it is sometimes necessary to advise bloodletting to a considerable extent; but instead of taking blood with a lancet, our views are with much more certainty answered by the application of leeches along the edges of the wound. In such circumstances, indeed, no remedy proves so useful as the discharge of blood in this manner. I have long been in the practice of using it in wounds accompanied with much inflammation, and very commonly with much advantage. In cases of pain proceeding from this cause, I have known the

application of a few leeches to the edges of a wound procure immediate relief, even where large doses of opiates, as well as other remedies, had previously been tried in vain. And that it is not the quantity of blood, but the manner of discharging it, which proves successful, is evident from this, that the pain is often relieved immediately on a few drops being taken with leeches, which did not yield in any degree to the loss of large quantities by venesection. In using leeches for this purpose, they should be applied as near as possible to the edges of the wound; nay, when they will fix within the wound itself, the practice proves still more successful: but unless the inflammation is deeply seated, this measure is seldom necessary. It sometimes happens, however, as I have observed above, that in deep wounds no inflammation of any importance appears externally, while the periosteum and other deep seated parts are much inflamed and painful. In this situation, nothing affords so much relief as scarifications made in the inflamed parts, either with the shoulder of a lancet, or the point of a scalpel. Nor need we hesitate to advise them, under the dread of their being apt to produce exfoliations of the bone beneath. Instead of this, they tend more certainly than any other remedy to prevent them; for exfoliations seldom happen from the periosteum being merely divided; of which we have daily instances in wounds penetrating to this depth, which are rarely attended with this effect, unless the bone itself is at the same time injured. In different cases I have scarified the periosteum and other parts deeply seated in wounds, and always with advantage. It removes pain and tension in the most effectual manner, and thus tends with more certainty than any other remedy to relieve the most distressful symptoms which wounds ever excite.

After as much blood is discharged as may be judged proper, whether by leeches or scarifications, no application will prove so useful as warm emollient poult-

tices and fomentations frequently renewed; for in such circumstances nothing affords such complete relief as a plentiful formation of matter. We constantly observe, that as long as a wound remains dry on the surface, the parts are tense, much inflamed, and painful; and that they become lax and easy as soon as they are properly covered with purulent matter.

For the most part, the means that I have advised will be attended with the desired effect: and especially if the operator is not too timid in making the scarifications when they are judged to be necessary; for I must again observe, that this may be done with more safety and freedom than is commonly imagined; and when membranes in any situation are much inflamed, nothing with which we are acquainted so certainly tends to prevent the accession of gangrene as deep and free scarifications. Even this remedy, however, will not always succeed: for in some cases the inflammation, instead of abating, becomes more and more violent, till at last it terminates in mortification.

When wounds are attended with violent pain proceeding from inflammation, the cause, as I have observed above, is for the most part readily perceived. But severe pain is sometimes induced by other causes; for although much pain seldom fails to induce an inflamed state of a wound at last, it often subsists for a considerable time before this takes place. In such cases, and especially where we have no cause to suspect that the pain arises from the lodgment of matter, it will often be found to proceed from the partial division of a nerve or tendon: for we know, that in various instances the most excruciating pain is induced in this manner.

In some cases, the pain produced by this, is relieved by putting the injured parts into a state of relaxation; but, for the most part, the only remedy upon which we can depend is a complete division of the wounded nerve or tendon: and as this is a mean of cure which may at all times be practised without risk,

it should never be delayed when the pain is found to proceed from this cause; and especially when, from its violence, there is reason to suspect that it may induce convulsions and other alarming symptoms. As a free use of the scalpel, however, is necessary, patients in general do not easily submit to this remedy; nor do we commonly find that practitioners advise it. But I can say from many instances of its beneficial effects, that we ought more frequently to practise it; for it seldom fails to give relief, even in severe degrees of pain; and I never heard of its proving hurtful. It ought always, however, to be advised as soon as the other means that may be employed have failed: for when violent pain has subsisted so long as to induce any material affection of the convulsive kind, even this remedy will not always remove it. On the parts being freely divided, they should be placed in a relaxed posture; and an emollient poultice being laid over them, if the practice proves successful, the patient will soon find himself relieved, and the wound may afterwards be treated in the usual way. But when the operation does not prove successful, as will be the case, when from timidity, or any other cause, it has been long delayed, there will be much cause to suspect that the patient will at last die convulsed, notwithstanding the use of opiates, and every other remedy we can employ,

In some wounds again, the pain, instead of being deeply seated, which it always is when it proceeds from an injury done to a particular nerve or tendon, is found to originate from a peculiar degree of irritability of the nerves on the surface of the sore. The pain, in such instances, is not severe; but it often proceeds to such a height as to excite much uneasiness, by which the patient is apt to be deprived of rest, and the matter discharged from the sore rendered sharp and acrid.

For the removal of this, emollient poultices, and other warm applications, are commonly employed;

but seldom with any advantage. They often appear, indeed, to increase the irritability. Large doses of opium afford the most certain relief; and a solution of opium in water, or a weak saturnine solution, are the best external remedies. When of a proper strength, they commonly prove successful. While speaking of the cause and removal of pain, it was necessary to mention inflammation, with the means best adapted for the cure. We have now to attend to the nature and treatment of some convulsive affections which injuries of this kind sometimes induce.

Subsultus tendinum, and other spasmodic symptoms, are frequent consequences of wounds: they are more particularly apt to ensue from the amputation of limbs, when they often prove the cause of much distress; for the starting which they are apt to produce in the affected limb, excites a violence of action which muscular parts newly divided are not well fitted to support. And when these are severe, and return frequently, they prevent the dressings from being kept properly applied, at the same time that they are often the cause of hæmorrhagies from arteries which have even been tied with ligatures. We ought, therefore, in every instance, to treat this set of symptoms with attention. Indeed the risk of their producing hæmorrhages is so considerable, and the sensations which they excite are so distressful, that a prudent practitioner will at all times judge them to be of importance.

As these convulsive twitchings are evidently the effect of irritation produced by the wound, those means are most likely to prove effectual in the cure, which are most powerful in procuring ease. Hence much advantage is derived from placing the patient's body, and especially the affected limb, in the easiest posture: indeed more benefit is derived from this than we are often aware of. I have known the severest spasms almost instantly removed, by changing

the posture of a stump. But when this does not answer, opiates will seldom fail.

It is worthy of observation, in using opium for this purpose, that it answers better to give it in small doses frequently repeated, than in large doses at once. The latter often excite sickness, and even vomiting; and after their effects are over, the spasms are apt to become more severe than they were at first; which seldom happens with opiates in small doses, although frequently repeated.

These, however, are not the most alarming symptoms of the convulsive kind which arise from wounds. Tetanus and locked jaw sometimes proceed from them, particularly in warm climates. Occasionally, indeed, these symptoms originate from other causes, the nature of which we cannot always discover; but when not obviously induced by deep or extensive wounds, they may often be traced, by a more minute investigation, to some slight injury done to the surface of the body. Even the slightest scratch, not penetrating to a greater depth than the skin, has been known to induce them.

As we know that severe degrees of pain often excite involuntary contractions of injured muscles, we would naturally expect that deep and extensive wounds would be frequently attended with this effect. But we do not so readily see how the most violent affections of this kind should be most apt to occur from such wounds as are so slight as scarcely to be noticed, and which never of themselves produced much uneasiness: this, however, certainly happens.

Nor do injuries of greater importance induce these symptoms so readily while they are recent and painful: for they seldom occur in large wounds till the cure is far advanced; and in some instances, particularly after the amputation of limbs, they are never more apt to appear than when the cicatrix is nearly completed. At least this has been the case in every instance of locked jaw that I have met with in this

country ; and we are told, from very certain authority, that the same observation has been made in warm climates.*

The cause of this, it may be difficult to explain ; but our knowledge of the fact leads to some advantage in practice. We have hitherto been made to suppose, that the locked jaw, and other convulsive symptoms which sometimes succeed to wounds, are most apt to occur from the violence of pain induced at, or soon after, the time of wounds being inflicted ; and therefore practitioners have guarded with most assiduity against them, while the pain has continued severe. But when it is known that these symptoms seldom or never occur at this period, and that they frequently appear in more advanced stages of wounds, those means of prevention which are found to prove most effectual, will more readily act with advantage if applied at this time.

Practitioners, therefore, in warm climates, should have this particularly in view in the advanced stages of wounds ; and the most effectual remedy we can employ, on the first appearance of a locked jaw, is immersing the patient, so as to cover the whole body, in a warm bath. The heat of the bath should be regulated by the feelings of the patient ; and he ought to remain in it as long as he is able to bear it. Water is commonly used for this purpose ; but where milk can be procured, it should be preferred : for as the warm bath proves here chiefly useful by its relaxing powers, we have reason to suppose, that the oily particles contained in milk render it particularly proper ; and the idea appears to be well founded by the beneficial effects which in different instances have resulted from the use of it.

It may often happen, however, that milk cannot be procured in quantities sufficient for this purpose. In such situations, fat broths, or water combined with

* Vide Observations on the Diseases incident to Seamen, by Gilbert Blane, M. D. &c.

oil in any other form, may be used instead of it. When one application of a bath proves successful, the use of it need not be continued; but for the most part several repetitions of it are necessary. Nor are we to imagine that warm bathing is a certain remedy. It has frequently, indeed, proved highly useful, and many cases of locked jaw have been cured by it; but we must likewise confess that it has often failed, and that patients are daily carried off in warm climates by this and other convulsive symptoms, notwithstanding the most ample application of the warm bath, and of every other remedy that has hitherto been employed.

The failure of warm bathing has induced some practitioners to make trial of the cold bath; and in some convulsive affections it has certainly proved useful; particularly in cases of universal tetanus: but as yet it has not been so frequently employed as to enable us to judge with precision, whether it will often prove useful or not in the locked jaw, which we are to consider as the most obstinate, as it is the most dangerous, symptom of this kind.

At the same time that we persist in the use of warm bathing, other remedies should not be neglected; and of these opium is the most certain. Opium proves useful here, whether it is used outwardly or given internally. By rubbing the contracted muscles with laudanum, or keeping them covered with extract of opium, or with opium merely softened with spirits or water, the spasm has in some instances been lessened: but the most effectual relief obtained from this remedy is by giving it inwardly; not in large quantities as I have remarked above, but in small doses, frequently repeated. The doses should be such, however, as may effectually allay the pain and uneasiness produced by the disease; but more than this is unnecessary. When given in large doses, it seems to do mischief, by inducing that very state of the system which it was meant to prevent, namely, a great degree of irritability: for as soon as the operation of a large dose of opium is

over, we commonly find in all spasmodic affections, that the disease returns with double violence. But this may be easily prevented, by giving such doses as the patient can easily bear, and repeating them at short intervals, in such a manner that the effects of one may not be over before another is given. *Æther* and musk have sometimes been conjoined with opium in convulsive symptoms of this kind; but so far as my experience goes, no obvious benefit has ever ensued from them.

I have mentioned opium as an external application; but no outward application proves ever so useful here, as emollients freely laid over the contracted parts. The nature of the disease seems strongly to point them out; and experience has, in some instances, shewn, that they act with advantage. Emollients of every kind may be employed for this purpose; but animal fats of the softer kinds seem to be the best; for in all cases of contracted muscles, they relax the parts more powerfully than any of the vegetable oils; at least, in the course of my experience, this has uniformly been the case. I have elsewhere observed, that a very pure oil of this kind is obtained by boiling recent bones in water; and the fat of all kinds of fowls answers equally well.

Mercurials have been frequently given in locked jaw; but where they have ever proved useful, has been in such cases only where mercury was rubbed upon the contracted parts in the form of an ointment, and where it would probably act with advantage as an emollient.

When a locked jaw is produced by a wound in any of the extremities, if the disease does not yield to the remedies that I have mentioned, it has been proposed to amputate the limb; and in various cases this has been done. I am sorry, however, to observe, that we have scarcely an instance of the operation proving useful: for in this disease, as in almost every spasmodic affection, the effect is apt to remain after the cause is

removed. We have therefore no encouragement, from past experience, to put this remedy in practice. Instead of tending to save life, it appears rather to aggravate every symptom, and even to accelerate the approach of death. The remedies, therefore, which we have to depend on, are those that I have mentioned, namely, the warm bath, opiates, and a free use of emollients.

While we are trusting to these for effecting a cure, the patient's strength should be supported by mild nourishment given by the mouth, when this can be done; and by glysters of strong broths, when the jaws are so firmly fixed together as to prevent food from being received by the mouth: and we may, by removing a tooth or two, even in cases of this kind, convey food to the stomach; so that wherever the symptoms of locked jaw are observed to be approaching, one or two of the teeth should be taken out, as they cannot be removed but with much difficulty after the jaws are firmly clinched.

Having thus considered the various circumstances relating to wounds in their most usual form, with the means of cure on which we ought to depend, I shall now proceed to mention more particularly some varieties in wounds which require a different mode of treatment; and these are, punctures, laceration, and contusion.

SECTION III.

Of Punctured Wounds.

A WOUND is said to be punctured, when it is made with a small pointed instrument; and when the external aperture, instead of being wide and extensive in proportion to the depth, is small and con-

tracted. A wound made by a thrust with a bayonet or small sword, is of this kind.

Punctured wounds prove, in general, more hazardous than incised wounds of much greater extent; from deep seated nerves and other parts of importance being more apt to be partially hurt; from extraneous bodies being often carried to a depth from whence they cannot be easily removed; from the discharge which they afford being more apt to lodge; and from the sides of the punctured parts being with difficulty made to adhere. These are points of the utmost moment, not only from their being often productive of much distress to patients, but from the embarrassment which they give to practitioners, who are more apt to fail in their treatment of this variety of wound than of any other which falls within their management.

Much of the risk arising from punctured wounds proceeds, it is evident, from their being so contracted, that free access cannot be got to their full depth: and it is equally evident that this can be obviated only by laying them open. Indeed, this is the idea which, in the treatment of punctured wounds, we should always keep in view, that of converting them, as far as with safety can be done, into incised wounds with extensive openings. This, however, is a question about which practitioners are not agreed: some advise the openings of punctured wounds to be enlarged either with tents or with the scalpel; while others allege that this is seldom requisite: and they have also differed with respect to the time at which the dilatation should be made; for while some advise it to be delayed for a few days only, others do not make the attempt till every other means have failed.

In the treatment of punctured wounds our views ought to be the same as in cases of sinus. Indeed, this kind of wound is exactly a sinus in a recent state; and by considering it as such, the means of cure that will most likely prove successful, are at once pointed out. In every sinus, our intention is to procure a re-

union of the parts which have been divided ; but we know from experience that this cannot be accomplished till a certain degree of inflammation is induced on every part of them. For this purpose, the introduction of a cord or seton along the course of a sinus has frequently proved successful ; and some have, with the same views, employed irritating injections. When by these means the internal surface of the sinus is sufficiently inflamed, the cure is to be completed by compression, applied in such a manner as to keep the parts intended to be united in close contact, till a sufficient degree of adhesion is produced. Now, in the application of this treatment to punctured wounds, it is obvious, that the previous steps which I have advised for exciting inflammation, would at first be seldom necessary ; for one certain effect of every wound is to induce inflammation over all the parts which have been injured : so that *à priori* we should be led to conclude, that compression alone would in all such cases be sufficient ; for we know that it seldom fails in other cases of sinus where a due degree of inflammation is induced. But we are deterred, in punctured wounds, from the immediate use of this remedy ; chiefly where they penetrate to any considerable depth, from our uncertainty with respect to extraneous bodies being lodged in them or not, and from the inflammation in this variety of wound being apt to run too high. In superficial wounds, indeed, where we are certain of being able to extract any extraneous matter, and where the inflammation is inconsiderable, compression may be employed immediately ; and when properly applied, it will not often fail. But for the reasons which I have given, it can seldom be employed with safety in wounds of much importance.

The practice that I have long adopted in punctured wounds is this : when they do not run deep, and their direction is such as to prevent a cord from being carried along their whole course, I lay them open imme-

diately from one extremity to the other, or as far as it can be done with safety, either with a probe pointed bistoury, or with a scalpel and director: and this being done, the parts are dressed in the manner I have advised above, in cases of simple incised wounds. But when it appears that a seton can with propriety be used, emollient poultices are first applied and continued till a free suppuration is induced, and till there is no cause to fear that the symptoms of inflammation are to proceed too far. A cord is then introduced nearly equal to the size of the opening; and being allowed to remain till there is reason to imagine that any extraneous matter lodged in the wound is discharged, it is then gradually lessened, by taking away a thread or two every three or four days; and when reduced to a third of its original thickness, it is taken out entirely; when the remainder of the cure is for the most part easily effected, by the application of moderate pressure along the course of the wound.

When a punctured wound is laid open at both ends, a cord may be easily introduced by means of a blunt probe, with an eye in one end of it. But when the wounding instrument has not passed through the integuments on the opposite side to which it entered, a counter opening must be made, either by cutting with a scalpel on the round end of a blunt probe, or by passing a lancet pointed needle, covered with a canula, along the sinus, and pushing it out at the opposite side with the seton attached to it.

In either of these ways the cure of punctured wounds may frequently be accomplished. But wherever the practice is admissible, I am clearly of opinion, that laying them open immediately after the accident is preferable to the other: for in this manner all extraneous bodies are at once brought into view; hæmorrhagies are easily restrained; and the pain which sometimes occurs from a partial division of nerves and tendons is directly obviated. Nor is the inflammation, which often succeeds to punctured wounds, apt to run

so high, when they are treated in this manner, as it usually does when any other method of cure is adopted: so that much distress would be prevented, and a good deal of time saved, if this method of cure were more generally practised. To those not much accustomed to this kind of business, the enlarging of a small puncture, so as to form an extensive wound, appears to be unnecessary and cruel: but whoever has seen much of this branch of practice, will know, that the greatest distress often arises from the smallest punctures; that surgeons are often baffled, and much disappointed, in their attempts to cure them; and that nothing so effectually obviates this as the practice that I have advised, of laying the punctures freely open as soon as possible after they are inflicted. Indeed the sooner it is done the better. No advantage can accrue from delay; and a patient always submits to the operation most readily at first, while at the same time it excites less pain than when the parts are swelled and inflamed, which they commonly are in the course of a few days from the time of their being wounded. In every wound therefore of the punctured kind, particularly in wounds received in duels with small swords, and in battles with the points of bayonets, the enlargement should take place even before the parties are carried from the field; by which much of that inconvenience and distress which usually arise from punctured wounds would be guarded against.

Some cases, however, occur, in which this practice cannot be advised; particularly where punctures run deep among the large muscles, or contiguous to large blood vessels and nerves. As more danger would accrue from these parts being wounded, than could probably be compensated by any advantage to be gained by dilating the wounds, it is better in such circumstances to rest satisfied with laying the parts open as far as with safety it can be done; to trust to the suppuration which will ensue, for bringing off any extraneous matter that may be lodged in the wound; and

to a proper application of pressure, for completing the cure. Or the practice that I have mentioned above, of introducing a seton, may be attempted; for a cord may be passed with safety where it might be very improper and unsafe to make a deep incision.

But it is proper to observe, that there are some cases in which even a seton cannot be introduced: for a puncture sometimes runs in such a direction, as not to admit of a counter opening. We must here trust to a proper application of pressure, not merely for preventing any lodgement of matter, but for producing adhesion of the divided parts; and when this fails, injections of a moderate degree of astringency may be used with advantage: but as remedies of this kind tend to counteract the very intention for which setons are employed, they should never be advised till it appears that the latter will not succeed. Setons, as I have already observed, prove useful, by exciting inflammation along the course of a sinus. Now, one usual effect of astringent applications is, to diminish or even to remove inflammation. They should never therefore be employed, till all the ordinary means of cure have failed, when they may be used with a view to check the flow of matter when it appears to be too abundant, and to induce some degree of callosity over the sides of the sore.

It is here proper to remark, that practitioners have differed much in opinion with respect to the use of astringent injections in wounds; for while some are in the daily habit of employing them, others have said that they are always pernicious, and ought never to be used. In the early stages of wounds they can never be necessary; and as they may do harm by washing away the matter too freely, they should never be used as long as a cure is expected, either by the formation of new granulations, or by adhesion: but whenever there is reason to think that this cannot probably happen, injections may with propriety be advised. Various forms of injection are mentioned by authors; but

none of them are so harmless, and at the same time answer with such certainty, as weak solutions of saccharum saturni, in the proportion of a grain to every ounce of water. Lime water is used with the same views; and water strongly impregnated with alum, or mixed with an equal quantity of claret or port wine, is often employed with success.

It is highly necessary, however, to observe, that much caution is necessary in the use of injections for the cure of wounds, for if much force is employed, the liquid is very apt to pass between the fibres of the contiguous parts, and in this manner to do much harm; but with due care on the part of the surgeon, this inconvenience may always be guarded against and prevented.

In the treatment of punctured wounds, where setons cannot be employed, it is sometimes difficult to prevent the external aperture from closing long before any tendency to heal appears in the bottom of the sore; and, if not prevented, much mischief is apt to ensue by matter collecting beneath, and bursting out from time to time. With a view to prevent this distressful occurrence, tents are employed of prepared sponge, gentian root, and other articles that swell by the moisture of the sores, and thus serve very effectually to keep them open. But while they answer this purpose, they are very apt to do mischief. When the opening of a sore is plugged up with a tent, the matter can never be discharged but at the renewal of the dressings; whereby it must necessarily collect in such quantities, as to give rise to absorption, as well as to the formation of sinuses, by spreading between the layers of the contiguous muscles. Tents, therefore, which are of solid materials, ought never to be of such magnitude as to fill the openings of sores. They will not readily do harm when of such a diameter as to admit of the matter being discharged while they are inserted. But when employed of such a size as to fill the openings entirely, they ought always to be

hollow; by which the apertures into the fores will be prevented from contracting, while the matter will be discharged as quickly as it is formed. For this purpose practitioners should be provided with tubes of different forms and sizes, so as to be able to suit any aperture they meet with. Silver tubes are commonly employed; but those of lead answer better. Being softer than the others, they do not create so much uneasiness, and they are more readily made to take any particular shape, so as to answer for sinuses of a straight or crooked direction.

I must observe, however, that tents and tubes of every kind should be used with caution; and it is more particularly necessary that this should be held forth to beginners, for there is no point in practice in which they are more apt to err. As they are early made sensible of the danger to be expected from matter collecting in fores, they very universally fly to the assistance of tents wherever a puncture or sinus is discovered. But it is right they should know that tents are seldom necessary: for when once a vent is given to matter, the opening will in general be preserved merely by the continuance of the discharge. In a few instances, indeed, it is otherwise; and in all such cases, leaden, silver, or gold tubes should be preferred.

We come now to consider those wounds which are attended with laceration and contusion; and as both of these circumstances require nearly the same method of treatment, it will not be necessary to speak of them in separate sections.

SECTION IV.

Of Lacerated and Contused Wounds.

A WOUND is said to be lacerated, when the parts, instead of being divided with a sharp cutting instrument, are forcibly torn asunder; and when, instead of a smooth equal surface, the edges are ragged and unequal: and wounds are said to be contused which are made with a blunt or obtuse body.

Contused and lacerated wounds are in many circumstances essentially different from simple incised wounds; but in nothing more than in this, that while they are commonly more hazardous, they seldom at first exhibit such alarming appearances. Thus, a simple cut, which commonly heals with ease, is often attended with a much greater retraction of the divided parts, and with more profuse hæmorrhagy, than a contused or lacerated wound of much greater extent. It is a frequent effect, indeed, both of contusion and laceration, to prevent the effusion of blood, by which inattentive observers, in forming opinions of these wounds, are very apt to be deceived: for a hæmorrhagy is the most alarming symptom with which wounds are attended, when it does not occur to any alarming extent, they are apt to conclude that nothing dangerous can ensue. Practitioners of experience, however, will not be deceived by this: for it has long been known, that injuries of this kind prove always more dangerous than other wounds; and that the more violent the contusion or laceration is, the less blood is always poured out; insomuch that there are instances even of limbs being torn off without any hæmorrhagy taking place.*

The pain of lacerated and contused wounds is not always in proportion to the extent of the injury. Thus, in lesser contusions, the pain is often severe,

* *That's a lie*

while there is little or none where the nerves are entirely destroyed.

The immediate effect, both of laceration and contusion, is swelling or tumefaction in the retracted edges of the wound. This seems to arise from an effusion of blood or serum among the parts that have suffered: when the violence has not been severe, this effusion commonly terminates in suppuration; the contused parts separate from those beneath in the form of sloughs; and a cure of the remaining sore is obtained by the means that I have noticed when speaking of simple incised wounds. But when the parts are so much injured as to have their texture much destroyed, and especially when any of the larger arteries have been obliterated, there is always cause to suspect that mortification may ensue. In sound constitutions, and where the wound is not extensive, even this will not often prove fatal: for in such circumstances the mortified parts commonly soon fall off, and a cure is accomplished in the usual manner. But in wounds attended with contusion or laceration to any considerable extent, if the habit of body is not perfectly good, the gangrene which ensues is always to be considered as hazardous: for the gangrene does not necessarily stop with the parts which have been injured; but is apt to proceed to those which were not immediately hurt by the accident.

And again, even where mortification does not succeed immediately to wounds of this kind, if the parts have been either severely lacerated or contused, inflammation often occurs, with such severity as terminates in mortification, notwithstanding of all we can do to prevent it; and in whatever way it is induced, it proves always dangerous; for besides the risk of parts immediately necessary for life being destroyed by it, the absorption of putrid matter from a gangrenous surface proves often suddenly fatal, even when the size of the sore is so inconsiderable as to give no cause to suspect danger.

It is therefore obvious, that in the treatment of contused and lacerated wounds, our principal object is to guard against the accession of gangrene. But it is likewise clear, that this is not always to be done by the same means: for we may readily suppose, that much advantage may be derived from bloodletting, and other evacuations, where the injured parts are much inflamed, while no benefit would otherwise probably result from them. This, however, is a point of importance, and merits particular consideration.

In lacerated or contused wounds, where the parts are much injured, it is the common practice to give large quantities of bark almost immediately, and to apply warm dressings and other antiseptics to prevent the accession of gangrene. It is evident, however, that the indiscriminate application of this practice must frequently do harm: for however beneficial it may be in particular cases, where gangrene has already taken place, it must necessarily be inapplicable, and be very likely to do much harm where symptoms of inflammation still continue; and unless mortification actually exists, it is not clear that in any instance it ever proves useful; for although we have various proofs of the efficacy of bark, in putting a stop to the progress of gangrene, I have never been sensible of any advantage being derived from it, when used as a preventative.

Gangrene may arise in these wounds from two causes: from the stoppage of the circulation by the total destruction of large blood vessels; and from violent inflammation.

Gangrene proceeding from inflammation is here most to be dreaded; for that which arises from the destruction of blood vessels is by no means frequent. The inflammation therefore which takes place in lacerated wounds, demands always our closest attention.

No remedy proves more effectual in lacerated and contused wounds than a free discharge of blood from

the injured vessels; such quantities therefore should in every case be discharged as the nature of the wound may indicate, and the strength of the patient may admit. After this, if the divided arteries continue to throw out blood, they must be secured with ligatures; for till the discharge of blood is stopped, the patient will not consider himself as safe; nor can the wound be examined with accuracy. The parts are now to be cleared of all extraneous bodies, as far as this can be done with propriety, and are to be placed as much as possible in their natural situation; but no kind of future should be employed for their retention. If the violence done to the parts has been considerable, and especially if accompanied with much pain, it may be necessary to take blood repeatedly in the course of the cure; and the best method of doing it is by means of leeches, applied as near as possible to the edges of the fore. Indeed no remedy I have employed proves so certainly useful in lacerated or contused wounds as the discharge of blood in this manner; for it not only tends to prevent the inflammatory symptoms from running high, but very commonly renders the pain moderate, even when it has previously been severe. It ought never therefore to be omitted; but the practitioner should take care that it be proportioned to the violence or urgency of the symptoms, and likewise to the strength of the patient: for the discharge of a small quantity of blood will in some cases of contusion or laceration prove fully sufficient; while in others, it is necessary to repeat the operation once and again.

As soon as a sufficient quantity of blood is discharged, the parts affected, after being dressed with pledgets of any emollient ointment, should be completely covered with a warm emollient poultice; and this, together with warm fomentations, should be renewed three or four times a day, so as to promote, with as much certainty as possible, the formation of pus. To induce suppuration in lacerated wounds, is

indeed an object of the first importance : it generally relieves all the symptoms ; and till such time as it takes place, we have often reason to dread the event.

We commonly find, when sores of this description become covered with good pus, that the pain and tension abate ; and such of the parts as have been much lacerated and contused, and which hitherto have been sloughy or perhaps black with mortification, begin now to separate from those beneath ; and this being accomplished, they may in general be cured in the same manner with wounds of any other kind. Nay, when brought to this healing state, we may often attempt with safety to forward the cure by drawing the edges of the retracted skin into contact, either by means of the uniting bandage, or with adhesive plasters ; for although this would be improper in the commencement of these wounds, while there is any risk of the tension and inflammation proceeding too far, it may with much propriety be advised when there is no longer reason to be afraid of these symptoms.

When practitioners are immediately called, and have employed the means that I have mentioned in due time, they will very commonly prove successful : but it frequently happens, whether from the violence of the injury, the tendency in some constitutions not only to inflammation but to gangrene, or from the proper remedies not being timely applied, that all the symptoms become daily worse, and, notwithstanding repeated bloodlettings both general and local, all those parts which were at first inflamed become black and mortify. In this situation we do not trust to evacuations. Whatever tends to debilitate must now be avoided ; and we know from experience, that in such circumstances, no remedies prove so useful as those which invigorate and restore the tone of the system.

With this view, the patient should be desired to live upon nourishing food. He should be allowed as large a quantity as he can take, of good wine, or strong

malt liquor ; and Peruvian bark should be given in as large doses, and these as frequently repeated, as his stomach will permit. Indeed bark is perhaps the only medicine on which we ought to depend ; and as we know from experience that it may with safety be given in great quantities, this should always be done without further limitation than necessarily arises from the state of the stomach. We may remark, too, that bark proves in general useful nearly in proportion to the quantity employed ; and it often happens, that large doses are not more nauseated than those that are not half the quantity. Where a large quantity of bark should be taken in a short space of time, as is always the case in gangrene, it should never be given in less than doses of a dram, or even two drams, when the patient can bear it ; and these should be repeated every hour. Bark, in some cases, seems to prove more powerful when conjoined with the vitriolic acid : elixir of vitriol may therefore be given along with it. In gangrene arising from debility, opium frequently proves useful ; and as it does not counteract the bark, the two remedies may with safety be prescribed together.

In the mean time, the state of the fore requires particular attention. As long as any tendency prevails in the contiguous parts to inflammation, the best applications, perhaps, are warm emollient poultices and fomentations ; for, as I have elsewhere shown, that the separation of mortified parts is commonly effected by the formation of matter between them and the adjoining sound parts, we necessarily derive most advantage from whatever tends to promote suppuration.* But as no suppuration will occur where no inflammation exists, when there is no reason to imagine that it will otherwise happen, we should endeavour to promote a tendency towards it by the use of warm dressings to the fore, and the application of stimulants to

* Vide Chap. I. where this subject is more fully considered.

the contiguous parts. Mustard applied in the form of a poultice, as well as other rubefacients, have proved useful in this manner; and I have employed with advantage a strong solution of crude sal ammoniac in vinegar and water. It is proper, however, to observe, that this practice must be managed with caution: for a high degree of inflammation might often prove detrimental, while in every instance it would be unnecessary; and we know from experience, that a small degree of it is sufficient. As soon, therefore, as it is observed that the mortified parts are surrounded with a kind of inflamed ring, the stimulating applications should be removed, in order to give place to warm emollients, for the purposes I have mentioned. Any parts that are completely mortified may with safety be removed; indeed the offensive smell which they produce renders this a necessary measure; but, as I have elsewhere observed, the common practice of making incisions through the diseased parts into those beneath which are still sound, should never be followed. No advantage can be derived from it, and it may be productive of much harm. It is recommended with a view of giving more free access to ointments, and other remedies used as dressings, than could otherwise be obtained; but I have not in any instance seen it prove useful, and in different cases I have been sensible of its doing harm: it may very readily carry the putrid matter of gangrene more deeply into the contiguous sound parts than it would otherwise penetrate. In some cases it has evidently induced more inflammation than was necessary; and in more instances than one I have known scarifications prove hurtful, by exciting very troublesome hæmorrhagies.

By persisting in the use of bark, and the other remedies that I have mentioned, and especially if the strength of the patient is supported with wine and nourishing food, even bad cases of gangrene will often terminate happily; the mortified parts will separate,

and the remaining fore will heal kindly and easily with common mild dressings : but in other instances, notwithstanding all our endeavours, the disease continues to spread, and nothing tends to prevent its final termination. When gangrene is seated in any of the extremities, it is the common practice, when other means of cure have failed, and when mortification is still advancing, to amputate above the diseased parts : I have elsewhere, however, shewn, that this practice should not be adopted ; and when treating of amputation, we shall again have occasion to consider the subject more particularly.

In the treatment of mortification, it is a good general rule to advise evacuations of every kind with much caution. This is particularly the case with respect to bloodletting ; but in addition to what I have already observed, I think it right to remark, that in all cases of inflammation where the approach of gangrene is dreaded, and particularly in wounds attended with much contusion or laceration, till mortification actually occurs we should proceed with freedom in an antiphlogistic course, particularly in discharging as much blood as the degree of inflammation may appear to require ; and I insist on this point the more fully, from having often observed much mischief ensue from practitioners being afraid to advise it. Being afraid of sinking the patient too much, they avoid the only remedy that could probably save him : for, in such circumstances, it is the violence of the inflammation that we have most reason to dread ; and as we know of no remedy on which we can with such certainty depend for the removal of inflammation as bloodletting, it should always be advised in proportion to the strength of the patient and other circumstances of the case ; by which the accession of gangrene may be prevented when no other remedy would succeed.

What I have hitherto said in this and the preceding sections, may be considered as common to wounds in general : we now proceed to consider those wounds,

which, either from the nature of the injured parts, or from their situation, demand a peculiar treatment.

SECTION V.

Of Wounds in the Veins.

IT is for the most part difficult to restrain hæmorrhagies from wounded arteries, on account of the force with which the blood is propelled into them by the heart, and on account of their muscular coats, which prevent them from collapsing readily. But, in the veins, neither of these circumstances take place; the contractile power with which they are endowed is very inconsiderable; and we do not perceive that the circulation in the veins is much affected by the action of the heart.

For these reasons, wounds in the veins heal with more ease and are attended with less danger than wounds of the arteries: indeed we know, that the largest veins are often much injured, and that no bad symptom will ensue; while very troublesome consequences will succeed to wounds even of small arteries. In general, therefore, there is no cause to be afraid of wounds in veins: for while we have it in our power to check the hæmorrhagy, we never observe any detriment to ensue even from the obliteration of the largest external veins; for the anastomosing branches so readily admit of dilatation, that they soon become sufficient for carrying on the circulation beyond the parts that have been injured.

We commonly find, that a longitudinal cut in a vein heals with ease when only slightly covered with a piece of dry lint or soft old linen: when this fails, the hæmorrhagy may be always stopped by the application of a piece of dry sponge or agaric to the bleeding

orifice, and securing it with moderate pressure. But in transverse cuts in the large veins, or when veins are cut entirely across, it may sometimes happen, either that pressure cannot be properly applied to the wound, or that it does not prove sufficient for stopping the discharge: in such cases, escharotics are commonly advised, and by some practitioners the actual cautery is employed; but none of these can be depended on; and they are apt to create a great deal of distress. The same remedy therefore should be employed here that we daily use in hæmorrhagy from wounds in arteries, namely, ligatures; which, when properly applied, never fail to answer the purpose. In using ligatures, I have elsewhere shewn, that the crooked needle should seldom or never be employed, and that the tenaculum ought in almost every case to be preferred.

SECTION VI.

Of Wounds in the Lymphatics.

THE lymphatics are equally liable to injuries with other parts of the body: as they often lie contiguous to veins, they are sometimes wounded in the operation of bloodletting; and not unfrequently they are cut in opening buboes and other glandular collections of matter.

When the smaller branches only of lymphatics are opened, they heal along with the rest of the wound; but a wounded lymphatic is sometimes so large, that it does not heal so soon as the other parts, but continues to pour out its contents, and in this manner to prove hurtful to the future health of the patient. We should never hesitate therefore in putting a stop to the discharge.

Various means have been proposed for effecting this. In some cases we succeed by compression alone: astringents have been advised, together with the application of dry sponge, agaric, and common puff ball; and both the actual and potential cauteries have been used. But when moderate pressure fails, our most effectual remedy is to take up the injured lymphatic with a ligature, in the same manner as is done with wounded arteries. No objection can be made to this; and it answers the purpose in the most certain manner.

SECTION VII.

Of Wounds in the Nerves and Tendons, and Ruptures of the Tendons.

IN different parts of this chapter, I have had occasion to speak of the partial division of nerves and tendons, and of the means which answer best for the removal of those consequences that are sometimes found to result from it; and when treating of blood-letting, I shall find it necessary again to consider the subject further.

It must often happen, that nerves and tendons are partially divided along with other parts; but when no pain ensues from them, practitioners seldom hear of it: in such cases, they heal along with the other parts of the wound: but in various instances, either from some singular degree of irritability in the injured parts, or from a peculiarity of constitution, the cause of which cannot perhaps be explained, the slightest puncture of a nerve or of a tendon will induce very severe pain, inflammation, convulsions, and even death.

Whenever there is cause, from the violence of the pain, to suspect that the other symptoms may supervene, the most effectual means should be immediately used for preventing them : for when once convulsions take place, we are never sure of its being in our power to allay them. In some cases, large doses of opiates answer the purpose : but when they do not soon prove successful, no time should be lost in putting the only remedy in practice, on which we can place much dependence ; and that is, the complete division of the injured nerve or tendon. By this we may indeed induce a certain degree of insensibility in the parts beneath, or they may even be deprived of the power of voluntary motion ; but any inconvenience which this may induce will be of little importance, when compared with the advantages which result from the operation : for I can from experience assert, that when timously employed, and properly done, it seldom fails of complete success ; while in various instances, wounds of these parts have terminated in death, where this operation has been omitted.

In this manner we may obviate the effect of punctures and partial wounds, either in nerves or tendons : but here it is necessary to mention the method of treatment to be pursued in the healing of wounds or ruptures of large tendons, when completely divided. As a complete division of any of the large tendons is always attended with much retraction, it was long ago inculcated by practitioners, to draw the retracted extremities of the ruptured tendon into contact, and to retain them in this situation by sutures : and this being done, and the limb placed in a favourable situation, the rest of the fore was treated in the usual way.

There is no reason to doubt of cures having been often accomplished in this manner : nay, where tendons have been merely ruptured, without any external wound, as often happens with the tendo achillis, the retracted ends of the tendon have been laid bare by an incision, for the very purpose of retaining them

by futures. This, however, is a very painful operation; and as the same intention may be accomplished in a more simple manner, it ought to be laid aside. When it was first proposed to unite ruptured or wounded tendons by means of futures, it was the common opinion, that, in order to insure a reunion of the divided parts, it was absolutely necessary to bring them into close contact; and the same idea prevailed, not merely with respect to tendons, but with regard to bones, as well as other parts.

In the treatment of fractured bones and ruptured tendons, it is no doubt a good general rule to bring the divided parts as nearly in contact as possible: but we now know that cures may be accomplished where the retraction of parts is so considerable as to render it impossible to draw them together; nay, that it has often been done, even where a portion of a tendon or of a bone has been completely removed. Very considerable portions of bone have been regenerated; and although we are not certain that any part of a tendon has ever been renewed, yet such adhesions always take place between the retracted ends of the divided tendon and contiguous parts, as tend in a great measure to supply the deficiency. Thus, I have known different instances of the tendon of the rotula being ruptured, as well as of the tendo achillis: and although the ends of the retracted tendons could never be brought within an inch of each other; yet in all of them where proper attention was given, the cures have been so far complete, that the use of the limbs has been very perfectly restored. Some degree of stiffness has often, indeed, remained for a considerable time; but at last even this symptom has very commonly been removed.

Wherever a wounded tendon is situated, or even when a tendon is only ruptured, and no injury done to the external parts, the limb should be placed in such a manner as will most readily admit of the retracted ends of it being brought nearly together; and

when, in this situation, the muscles of the whole limb in which the injury has happened, should be tied down with a roller, in such a way as to prevent them from being in any degree thrown into action during the cure, at the same time that the parts should be placed in such a position, as will tend most effectually to keep them easy and relaxed. Thus, in a wound or rupture of the tendon of the rectus muscle of the thigh, the patient's leg should be kept as much as possible stretched out during the cure, while the thigh should be in some degree bent, or elevated into an angle with the body, so as to relax the muscle itself as far as it can be done: while in similar affections of the tendo achillis, the knee should be kept bent, so as to relax the muscles of the leg; at the same time that the foot should be stretched out, so as to admit of the ends of the ruptured tendon being brought nearly together. In applying a roller to secure the muscles and tendons in this situation, it should be done with a firmness sufficient for the purpose, while care is taken that it does not impede the circulation: with this view, fine soft flannel or cotton should be preferred to linen: for being more elastic, they more readily yield to any swelling with which the limb may be attacked.

The late Dr. Monro was the first who gave accurate directions for treating a rupture of the large tendons; and he has probably done it with the more precision, from having himself experienced the effects of this misfortune in the tendo achillis. As the method which he points out, and the instruments which he recommends, are simple and judicious, and as they have in various instances been found to answer the purpose, a description of them will be considered as a proper addition to this article.

The different instruments used by Dr. Monro, with the several parts of each of them, are represented in Plate LXXIX.

Fig. 9. Is a foot sock or slipper, A, of double quilted ticken; from the heel of which, B, the quilted

strap, D, is of such a length as to reach above the calf of the leg.

Fig. 1. A strong quilted calf piece, E, with pye holes, FF, on each side, through which a lace, fig. 2. is to be passed, and with a buckle, G, so placed on its back part, that when the lacing is on the outside of the leg, the buckle will be in the middle of the lower part. Two rows of pye holes are here represented, one on each side; either of which may be used according to the size of the leg.

In Dr. Monro's case, the foot and leg were first wrapped in soft flannel finoked with fumes of benzoin, when he put on, as in fig. 3. the foot sock A, and calf piece E; and bringing the strap H, through the buckle G, he could by it extend the foot, and pull down the calf to what degree might be judged proper, and there it was secured with the buckle.

This bandage answered the intention perfectly well; and it was worn night and day. It should be drawn tighter during sleep, and relaxed when the patient is awake, and on his guard; during which the foot should be placed upon a stool, as at I; and the calf piece should be frequently stuffed, or made easier by loosening the lace, so as to prevent the foot from swelling, which is apt to happen if this is omitted. To prevent the toes from becoming uneasy, the foot sock should be left open at the end K.

During the first fortnight, the Doctor made no motion or effort with his foot, but was carried in a chair, running on castors, from one part of his house to another: after this he began to move the foot backwards and forwards, so gently as not to give pain. In a gradual manner the motions were increased; the extension of the leg and flexion of the foot were always stopped on their producing any uneasiness.

On beginning to walk, the affected leg, which was the left, was always put before the right, so that the left foot might be as well extended as possible. To

prevent any danger from falling, a cane was used in the right hand.

The void between the two ends of the divided tendon became insensible in a few days, except that a softness was felt there more than any where else; but this part turned gradually thicker and harder, till a knot was formed in it of the size of a middle sized plum. At first this tumor was equally hard with a piece of cartilage; but it gradually became softer, and diminished so much, that at last it was scarcely perceptible.

With a view to strengthen the leg and foot, cold water was poured upon them, and immediately thereafter they were well rubbed. This was first employed some weeks after the accident: but no advantage being derived from it, the parts were afterwards strongly rubbed twice a day with unguentum althææ, or some other emollient; and this was continued till the limb could be used with freedom.

In about two weeks from the time of receiving the injury, the Doctor was obliged to go abroad, when he used a pair of shoes with heels two inches high, and applied the machine, which we shall presently describe, through the day, instead of the former bandage; which, however, was always put on at night for a month longer.

This machine, fig. 8. is a piece of steel, the middle stalk of which, L, is narrow but strong; the ends, MM, are thin and concave, and must be adapted to the convexity of the foot and forepart of the leg. Three staples, *a, a, a*, stand up from the forepart of the steel; one in the middle of each of the broad ends, and the third in the middle of the stalk. All the steel, except the stalk, should be covered with soft leather, and the concavities of MM should be well buffed, as the softer rupture bandages commonly are.

After putting on the shoes and stockings, one end of this machine was put upon the broad part of the foot, nearer the toes than the buckle of the shoe, and

the other end placed upon the forepart of the leg; then one ribband, or a thong of leather, fig. 5. was put round the foot, and another, fig. 6. round the leg, to pass through the two staples near the ends of the machine, and there secured with straps or buckles, but without being drawn tight. A third strap or ribband, fig. 7. with its middle, N, applied to the hollow of the foot immediately before the heel, had its ends passed on each side of the foot through a noose, *o o*, of a fourth thong of leather, P, that came round the quarter heel of the shoe, to be afterwards put through the middle staple; where, after these ends, *q q*, were drawn as tight as was thought convenient for extending the foot, they were secured with the buckle or with knots. See the application of this machine in figure 4.

This was continued for the space of five months; but those who may find it inconvenient, might use instead of it a thong of leather, sewed at one end to the upper and middle part of the quarter heel of the shoe, and fastened at the other end to a garter or strap put above the calf of the leg. The high heeled shoes were continued for a considerable time: two years elapsed before they were thrown aside; by which means, and by treating the injured limb during all that period with great caution, a very complete cure was obtained; while others, who have not been so attentive to the management of matters of this kind, have not been so fortunate; some of them having the tendon ruptured a second, or even a third time, and others remaining stiff and lame for a great length of time.

SECTION VIII.

Of Wounds in the Ligaments.

BY Ligaments, we understand those flexible bodies which serve to cover the different articulations, and by which many of the bones are firmly tied to each other. The bones of the pelvis are united by strong ligaments; and we know, that several other bones are chiefly connected by the same means. But as all these ligaments lie deep, they are not much exposed to the effects of external violence; and the same cause puts it out of our power to apply any particular treatment for injuries which may accidentally be done to them. Our observations at present will therefore be chiefly applicable to wounds of the ligaments of joints, commonly termed Capsular Ligaments.

As ligaments are not so plentifully supplied with nerves as some other parts of the body, several anatomists have been induced to believe that they are not possessed of sensibility; by which we might be led to conclude, that injuries done to them would not probably require much attention: but although nature, for obvious reasons, has not made the ligaments highly sensible; and although in a healthy state they will bear much fatigue, without suffering so much as other parts of the body; yet the fact is undoubted, that they are rendered extremely sensible by disease; and that wounds inflicted on them are frequently productive of very alarming consequences. We have often indeed known the ligaments of joints much injured, nay violently lacerated or torn, with the heads of the bones which they surround being pushed through them, as well as by other causes, without any important consequences taking place; nay, in some cases, the wounds have healed as easily as if no harm had

been done to the ligaments. Occurrences of this kind, however, are rare; for in a great proportion of cases, the symptoms which ensue from wounds of the joints are severe and hazardous.

The effects produced by this kind of injury are often deceitful: in general, nothing alarming appears at first, nor for several days after the accident; and when the patient is treated with attention and care, I have known a week pass over before any other symptom has been observed than usually takes place in the most simple wounds. But, at length, the patient begins to feel an uneasy sensation over the affected joint, which by degrees turns more severe; when the parts become swelled, tense, and somewhat inflamed. In this situation the pain is often so severe, that he cannot allow the joint to be touched; he complains of a tightness round the whole, as if it was firmly tied or girded; and the inflammation, which at first was confined to the joint itself, is now apt to spread over the whole limb.

If the wound or laceration in the capsular ligament is large, the synovia is often discharged in considerable quantities at first; but the swelling induced by the inflammation gradually puts a stop to this, till at last the wound becomes sloughy and dry. In the course of a few days, however, extensive suppurations begin to form over the joint; and on these being laid open, large quantities of pus are discharged, together with synovia. By this the tension and sensation of girding are immediately removed, and the patient obtains relief; but successive suppurations commonly take place, which from time to time excite a renewal of all the symptoms, and by which the patient's health is at last greatly impaired.

When wounds of ligaments do not heal quickly, and almost without the formation of matter, this is in general the manner in which they terminate; at least it is the case in the larger joints, and it is in these chiefly that they commonly prove alarming.

From this history of the rise and progress of the symptoms, some advantage may be derived in conducting the cure. From this it is evident, that it is not merely the injury done to the ligament which we have to dread, but a secondary train of symptoms, which are apt to result from it. Although none of the lining membranes of cavities, which are naturally shut up from the air, seem to be endowed with much sensibility, it seems to be a common effect of air being admitted to give them a high degree of it. Of this we have frequent proofs in wounds penetrating the thorax and abdomen; and it is chiefly to this cause that we are to attribute those consequences which result from wounds in the capsular ligaments of joints.

This points out a very important circumstance in the treatment of these wounds, namely, the prevention, as far as is in our power, of air finding access to the cavities of capsular ligaments. In large lacerated wounds, this will, for the most part, be impracticable; but in common incised wounds it may often be very completely effected.

It ought never to be attempted, till we are certain that all extraneous bodies that have been carried in are extracted. This being done, we may very commonly cover the wound in the capsular ligament entirely, by pulling the skin so far over it, that the wound in the one may not correspond with that in the other; and as the skin about the joints is sufficiently lax to admit of this, it may for the most part be easily done. We are now to fix the skin in such a manner that it may not retract, either with futures or adhesive plasters; but, in general the latter will prove sufficient, if assisted by the application of a proper bandage; and they are preferable to futures, which in this situation are apt to excite inflammation. After the plasters are applied, the skin and cellular substance should be supported in their situation by passing a flannel roller spirally round the joint, so as to produce an equal degree of compression over it, of

a tightness sufficient for gently compressing the parts to which it is applied without interrupting the circulation. The patient should be in bed while the dressings are applied, so that they may not afterwards be liable to be moved; and the limb should be put upon a pillow, and placed in such a situation as admits of the skin and other teguments being relaxed, which will be found to be different in different parts even of the same joint. Thus, in wounds on the anterior part of the knee, the leg should be kept extended during the whole progress of the cure; for in this situation, the skin which covers the forepart of the joint is most effectually relaxed; while, for a similar reason, in penetrating wounds entering from the ham, the leg should be kept bent.

In the mean time, in order to prevent inflammation, the patient should be put upon a low diet; his bowels should be kept open; a moderate perspiration should be excited; and he should lose a quantity of blood suited to his age and strength.

By wounds of the joints being treated with this strict attention, I have known many of them terminate easily, which otherwise, there was cause to think, would have produced both distress and danger. But when these means do not prove effectual, or when too long neglected, and not thereafter admissible, which is the case when inflammation has taken place, other remedies must be employed.

In this situation, our chief object is to lessen or remove the inflammation; for if not speedily done, it will scarcely fail to spread over the whole joint, and terminate in an extensive formation of matter; and this being always hazardous, nothing should be omitted by which it can probably be prevented. The most effectual remedy which I have ever employed for this, is local bloodletting; but, in order to prove useful, it must be carried to a considerable length. In very robust patients, eighteen or twenty leeches should be applied as near to the injured part as they will bite,

and repeated daily as long as the continuance of the inflammation may render it necessary. Any of the simple ointments may be applied to the wound itself; but one of the best applications to the joint is the steams of warm vinegar, which prove often useful in preventing the formation of matter. And as the pain in wounds of the joints is in general severe, large doses of opiates are commonly required to allay it. In a few cases, I have known the pain much relieved by the external application of a strong decoction of white poppy heads, in the form of fomentation: but for the most part nothing proves effectual but the internal use of opium.

A due attention to these means will commonly answer at last, if they have not been neglected too long, or too sparingly administered. From either of these causes, however; from the injury having been particularly severe; or from some constitutional disease; the inflammation will in some cases still proceed to increase; and, notwithstanding all our endeavours, will at last terminate in very large collections of matter, either within the capsular ligament of the joint, in the substance of the ligament itself, or in the cellular substance of the contiguous parts. In such circumstances, all that art can do is to give free vent to any matter that may form; which can only be done by making an opening in the most depending part of the collection, as soon as the existence of pus is ascertained. In this manner, and by a proper use of emollient poultices and fomentations, whenever a new collection appears to be forming, we have it often in our power to save limbs, which otherwise it would be necessary to amputate: but when wounds in any of the larger joints terminate in suppuration within the capsular ligaments, all who have had experience in this branch of practice will know, that the risk attending them is great; and that we can never, even under the best management, have any dependence on their terminating but with great distress and hazard. The

principal reason, as I have already observed, of their continuing obstinate, is the inflammation becoming violent; which when not obviated by the means that I have ventured to advise, is apt to produce such large collections of matter; and one abscess is so apt to succeed to another, that the patient is at last exhausted, when we are often under the necessity of removing the limb in order to save his life. In such circumstances, indeed, there is no room to hesitate; for when the strength is much impaired by the frequent formation of abscesses, if the same disposition continues, and especially if any degree of hectic fever has taken place, the risk attending any attempt to save the limb will now be considerable, while the chance of succeeding will be so small, that it should never be advised.

But although I am decidedly of opinion, in circumstances such as we are considering, that it is the safest course to amputate the limb; yet I by no means agree with those who say, that almost every case of a wounded joint requires this remedy. By many it has been asserted, that wounds in any of the larger joints almost universally terminate so unfavourably, that, in order to save much pain and trouble, as well as risk to the patient, it would be the most advisable step to amputate immediately after the accident, before inflammation takes place. I am convinced, however, that this opinion is founded in error; and my reasons for it are these:

Although a complete cure is not often obtained where the capsular ligaments of large joints are extensively wounded, yet in some cases it is otherwise. Of this I have met with various instances: and although such injuries will not often be so effectually cured as to prevent much stiffness in the joints in which they are seated; yet even a complete ankylosis is an inconvenience to which patients ought rather to be advised to submit, than to the pain and hazard arising from the amputation of any of the extremities.

As it must be admitted, however, that the proportion of limbs that are saved by this practice is not great, when the injury done to the capsular ligaments of joints is extensive, this argument would not merit attention, if the delay which it occasions were to produce any additional hazard, or if it should preclude amputation, if at any future period of the fore it might be judged advisable. This, indeed, has been alleged by practitioners : but there is much cause to suspect that they are wrong ; for many who have been accustomed to amputation in the late stages of these wounds, have had more success than usually attends the practice immediately after the injury is inflicted. And this, in the course of my experience, has been so uniformly the case, that scarcely any have died who were not previously so much reduced as to render their chance of recovering very small indeed ; a situation which we have it always in our power to guard against, by advising the operation before matters are so far advanced.

Where the capsular ligament of a joint has not only been wounded, but much lacerated and contused, it may, in a few cases, be proper to advise immediate amputation. But such instances are rare ; inasmuch, that I have scarcely met with any, excepting where the ends of bones have been perhaps much shattered, and even splintered at the same time. Where this has not been the case, I have uniformly attempted to save the limb ; and as, in a great proportion of cases, the practice has proved successful, without adding to the risk of the patient where the trials have failed, I shall certainly think it right to continue it.

SECTION IX.

Of Wounds in the Face.

IN chapter XXX. I shall enter upon the consideration of wounds of the head, which either primarily or eventually may affect the brain: and in chapters XXXI. and XXXII. we shall treat fully of diseases of the eyes, nose, and mouth; referring, therefore, to what is said in these chapters, on these parts of our subject, I shall at present offer a few observations upon external wounds of the face.

In the treatment of wounds in every part of the face, one important object is to prevent deformity. This is indeed an object in every part of the body; but in the face it is so essential, that the slightest injuries done to it require attention.

As every cicatrix is apt to leave some degree of deformity, we should endeavour, in all wounds of the face, to have the divided parts laid as exactly and neatly together as possible, and to retain them by those means which will produce the least mark. In all superficial wounds of the face, as well as in those which run deep, when of a longitudinal direction with respect to the fibres of the injured part, we should trust to adhesive plasters alone for retaining them. But wherever the edges of a wound retract much from each other, as we cannot in any other manner retain them, futures ought without hesitation to be employed: and of these the twisted future, to be described in chapter IV. section V. ought in general to be preferred; for it prevents retraction with more certainty than the others, at the same time that it does not excite a great degree of pain. In this manner it is more especially necessary to manage all wounds of the lips, which cannot indeed in any other way be prevented from leaving much deformity: I

shall, however, refer to chapter XXXIII. for some further observations upon this point, when treating of the operation for the hare lip.

Wounds in the cheeks are apt to penetrate the salivary ducts leading from the parotid glands; and as this is frequently productive of much inconvenience, by the divided duct continuing to pour out the saliva long after the rest of the wound is healed, it becomes often an object of importance to accomplish a cure. But as we shall have occasion to speak more particularly of this in chapter XXXIV. section XIV. I must now refer to what will then be said with regard to it.

In the forehead, wounds sometimes produce hæmorrhagies which occasionally are the cause of much distress, from our not being able, in the usual manner, to apply ligatures upon the divided arteries, owing to their running in a groove of bone; as is the case with a small branch of the internal carotid which passes out on each side immediately above the eyebrows. In all such cases, we should, in the first place, employ sponge, agaric, or any mild astringent, along with gentle compression; and when this fails, we may endeavour to pull out the bleeding vessel with a tenaculum, and in this manner may tie it with a ligature. I once succeeded in this way with perfect ease, when every other method had been tried in vain.

It may sometimes, however, happen, that even this will fail. In such cases, when the hæmorrhagy continues so profuse as to endanger the patient, it may be proper even to remove that portion of the skull in which the vessel is incased; or, in the hands of a nice operator, the intention may be answered by taking away the outer table of the skull only: for, in some cases, these arteries run for a considerable space between the two lamina of the bone; and in such instances our object may be accomplished by the removal of one of them: and thus the risk of exposing the brain will be avoided.

SECTION X.

Of Wounds in the Trachea and Oesophagus.

IT is necessary in some cases to make openings into the trachea and œsophagus, for allowing food and air to pass to the stomach and lungs, when these passages are obstructed. I shall refer, however, for the method of effecting this, to chapters XXVII. and XXVIII. where these operations will be particularly described: at present we are only to consider the method of treating wounds in the trachea and œsophagus, inflicted in some cases by accident, but more frequently by design; as often happens where suicide is attempted.

The trachea is seldom divided longitudinally. Transverse wounds running between two of the cartilages of which it is composed, are more frequent. In some cases these wounds are superficial, and only penetrate the anterior part of the tube; in others, they run so deep as to divide the tube entirely.

In longitudinal wounds of the trachea, a cure may be obtained by the use of adhesive plasters. The lips of the wound are easily brought together; and as the retraction is never considerable, they may very commonly be retained by adhesive plasters. In such cases, therefore, this should be preferred to futures; and bandages are here inadmissible, as they cannot be applied with such tightness as to have any effect upon the wound, without compressing the trachea so much as to impede respiration.

Even in slight transverse wounds of this part, a cure may be often obtained with adhesive plasters; assisted by a proper posture of the head, which, in every wound of this kind, should be kept as much as possible bent down upon the breast. Where this does not

indeed meet with proper attention, we often find it impossible to make the divided parts reunite, either with plasters or any other means : it ought not, therefore, to be left in the power of the patient. The head should be fixed with a bandage ; and the most simple, as well as the most effectual, method of doing this, is by fixing a common nightcap upon the head, and a piece of broad tape or ribbon being sewed on each side of it above the ear, it may now be pulled down and fixed as low as is necessary, by tying the tapes to a circular roller put round the chest. In this situation the head should be kept for several days, till there is reason to think that the parts are firmly united.

But in transverse wounds of the trachea, which penetrate deep, we should not trust to adhesive plasters ; the interrupted suture made with broad ligatures answers better. I am doubtful, however, if the ligatures should ever be passed into the trachea, as some have advised ; for the irritation and cough which they excite is very apt to do mischief, by tearing asunder the very parts they are meant to unite ; at least this has been the case in different instances where I have known this method practised. A troublesome cough was induced in all of them ; the stitches were torn out ; and much perplexity was thus given both to the patient and surgeon.

Instead of passing the ligatures round any of the cartilages of the trachea, and thus carrying them into the cavity of the tube, I have in different instances succeeded merely by external stitches done in the following manner : the surgeon being provided with a number of needles and ligatures in proportion to the extent of the wound, and the patient being properly placed, one of the needles should be inserted at one side of the wound, and being passed slowly up for the space of an inch between the trachea and skin, so as to include all the cellular substance and muscular fibres which lie between them ; it is now to be pushed out along with one end of the ligature ; and the other ex-

tremity of the thread being also armed with a needle, must in like manner be passed through the teguments of the other side of the wound, by entering the point of the needle at the wound, and pushing it out on the opposite side, at a proper distance from the edge of it. None of the ligatures should be tied till they are all introduced; when this is done, and the divided edges of the cut properly supported by an assistant, the ligatures should be secured with running knots, so as to admit of their being easily untied, if this should be necessary; adhesive plasters should be applied over the whole; and the head should be firmly secured in the manner that I have mentioned.

In passing the ligatures, care should be taken to run the needles close to the cartilages of the trachea, so as to include whatever may afford them any support: for which purpose, flat needles should be employed, with a slight degree of curvature, as is represented in Plate IV. fig. 5.

Whether or not this method will succeed where the trachea is completely divided, I cannot as yet determine, having had no opportunity in such a case of putting it in practice: but as it has succeeded where all the anterior part of the tube was divided, there is reason to imagine that it would not often fail. At any rate, it should always be proposed in the first place; for even when it does not succeed, we are not thereby prevented from employing other means of relief. In such instances we are reduced to the necessity of passing the ligatures round one or more of the cartilages of the trachea, which, with a curved needle, may be easily done: care should be taken, however, to enter both ends of the ligature from the inside of the trachea, when by pushing the point of the needle outward all risk is avoided of doing harm.

To give the practice as much chance as possible of proving successful, as many ligatures should be introduced as may seem fully necessary for retaining the

divided ends of the trachea in contact: in general, three stitches will be sufficient; one in the middle of the prominent part of the trachea, and another on each side towards the ends of the cartilaginous rings.

Wounds of the œsophagus are to be managed nearly in the same manner with those of the trachea: but they are more dangerous, on account of the difficulty of reaching the œsophagus from its deep situation; from the under part of it, when entirely separated from the rest, being apt to fall altogether within the sternum; and from the difficulty of supporting the patient with nourishment.

These wounds are likewise to be considered as dangerous, from their vicinity to large arteries and nerves. If the recurrent nerves are divided, the voice may be destroyed; and if any of the deep seated branches of the carotid arteries are wounded, the patient may die from loss of blood.

In wounds of the trachea and œsophagus, our first object should be to secure the blood vessels that have been cut, not only in order to prevent the loss of blood, but to obviate the cough and sickness, which greatly aggravate the injury, and which are often the consequence of blood finding access to the stomach and lungs. Every vessel therefore that pours out blood, whether artery or vein, should be tied with a ligature whenever it can be accomplished.

When wounds in this situation are not extensive, but confined nearly to the boundaries of the trachea and œsophagus, the artery which goes to the thyroid gland will probably be the largest that is cut; for it is commonly in this situation, immediately below the thyroid cartilage, that attempts are made upon the throat. But in wounds of greater extent, the jugular veins, and even the carotid arteries, are sometimes divided. In almost every instance, wounds of these arteries prove quickly fatal; but when one of the carotids is only partially hurt, it may be possible to save the patient by securing the bleeding vessel with a liga-

ture both above and below the cut : this at least should always be attempted ; and I think it probable, when one artery only is cut, that the attempt would succeed. There is no reason to doubt of its proving successful in wounds of the jugular veins : but where these veins are only wounded, without being cut entirely across, we may with propriety endeavour to effect a cure by compression. When slight compression only is necessary, it may be applied by a circular roller round the neck ; but when much pressure is required, as this cannot be employed without impeding respiration, we are under the necessity of using a machine for protecting the trachea. In Plate III. fig. 1. an instrument is delineated, which answers this purpose very effectually.

As soon as the hæmorrhagy is stopped, we should proceed to unite those parts of the œsophagus which have been divided ; and in doing it, if the wound is not very extensive, it will be of much importance, both to the operator and patient, to have it enlarged in every direction that may be necessary for bringing the injured parts easily and completely into view, by which the ligatures will be introduced with more accuracy than can otherwise be done. In passing the threads, the needles should be entered from within, and pushed outwards, in the manner directed above for wounds of the trachea : and in both cases, the ends of the ligatures should be left of a sufficient length to admit of their hanging out of the external wound in the teguments. The interrupted suture appears to be best adapted for this operation.

In longitudinal wounds of the œsophagus there is reason, from the result of different cases, to imagine that cures might frequently be accomplished without the assistance of ligatures. But in transverse wounds of this part, it is the safest practice to employ one or more stitches, according to the extent of the injury, by which the food will not so readily escape during

the cure, and by which a reunion of the divided parts will be more readily obtained.

SECTION XI.

Of Wounds in the Thorax.

§ 1. *General Remarks on Wounds in the Thorax.*

TO the consideration of wounds of the thorax, it will be proper to premise a short account of the boundaries of this cavity, and of the viscera which it contains.

The thorax is an extensive cavity, of an irregular oval figure, bounded anteriorly by the sternum, laterally by the ribs, behind by the vertebræ of the back, above by the clavicles, and below by the diaphragm, a firm muscular expansion, which serves as a partition between it and the cavity of the abdomen.

The diaphragm does not pass in a direct line from one side of the chest to the other: in some parts it falls much lower than in others, by which the extent of this cavity is in different parts very unequal. On cutting the thorax directly across about the middle of the sternum, and looking down upon the diaphragm, we find it round and prominent in the middle, with its edges stretching down to its several attachments. In its highest and most anterior point, it is fixed to the cartilago ensiformis; from whence it descends obliquely, and is attached as it goes along to the seventh, eighth, and all the inferior ribs; while, behind, it is fixed to the upper vertebræ of the loins. From this it is evident that the back part of the thorax is much more deep and capacious than the anterior part of it:

a point with which practitioners should be very exactly acquainted, otherwise their ideas of wounds in these parts will often be erroneous. Thus, were this not to be kept in view, we would be apt to imagine that no injury would be done to the lungs by wounds running directly across the body, after entering any part of the cavity of the abdomen: whereas no instrument can pass in this direction even at the distance of several inches beneath the upper part of the abdomen, without penetrating the cavity of the thorax; and, for the same reason, all wounds which pass directly across the body from the inferior and back part of the thorax, must necessarily pass through the abdomen.

The whole cavity of the thorax is lined by a firm membrane termed the Pleura, which adheres every where to the sternum, to the ribs, intercostal muscles, and diaphragm. Each side of the chest has a distinct pleura; which uniting together near the middle of the breast, and running transversely from the sternum to the vertebræ, form two cavities which have no communication with each other. This membranous partition is termed the Mediastinum. It adheres firmly, as one membrane, to the sternum through its whole length; but the two pleuræ recede from each other near to the vertebræ, to admit of a passage for the aorta and œsophagus. The heart, inclosed in the pericardium, occupies a considerable part of the left cavity of the thorax: the rest of this division, with all the right side of the chest, is chiefly filled with the lungs. The only other parts lodged in the thorax are, the aorta, œsophagus, thoracic duct, thymus, and large blood vessels about the heart. In a state of health, the lungs do not adhere to the pleura; but it often happens, that very firm and extensive adhesions are produced by inflammation of these parts.

The thorax is exposed to every variety of wound; but the distinction that chiefly merits attention, is that which arises from their depth. Superficial wounds,

not running deeper than the common teguments, when rightly treated, are seldom productive of any important consequences; but even the slightest injury which penetrates the chest, will, in some instances, be attended with the most alarming symptoms; and those again are still more dangerous, that are accompanied with wounds in any of the viscera of the thorax.

Wounds in the thorax may therefore be divided into three kinds: those which affect the common teguments only; such as merely penetrate the cavity, without doing any further injury; and those by which some of the viscera are likewise hurt.

Our first object in these wounds is, to discover whether they have penetrated the chest or not; which in general may be done by attending to the following circumstances: by the patient being put into that situation in which the wound was inflicted, and in this state making a particular examination with the fingers, or probe, of the direction and depth of the wound; by the form of the instrument, and the length to which it seemed to be pushed; by any mild liquid which may be injected returning immediately or lodging in the wound; by air being discharged during respiration by the wound; by an emphysematous swelling appearing over the contiguous teguments; by the quantity of blood discharged from the wound being considerable or otherwise; by the appearance of the blood; by blood being discharged from the mouth; and by the state of the pulse and respiration.

Each of these circumstances we shall consider in the order they are mentioned.

It is obviously a matter of importance to pay attention to the posture of the patient during the examination of every wound; but in none more than in wounds of the thorax, where, from the variety of muscles which may be injured, and from the mobility of the ribs, wounds may in one posture appear to be superficial, which in others are found to penetrate to a

great depth; for if any part of a rib, of a muscle, or even of the cellular substance, is forced by the posture of the patient into the course of a wound, neither the finger, probe, nor injections, will pass with that ease which the free examination of such injuries requires. In all such cases, therefore, before we proceed to examine the direction and depth of the wound, the patient should be placed as nearly as possible in the posture he was in at the time of receiving it.

In some cases, the opening is so large, that we distinguish with the eye whether a wound has penetrated to the depth of the cavity or not; or we introduce one of the fingers, which is better than any probe, when it can be passed forward without lacerating the contiguous parts; but when the opening is too small to admit of this, we are under the necessity of using a probe; and the best substance for this purpose is a common bougie. When we mean by probing a sore to discover whether any extraneous body is lodged or not, or whether the bones beneath are carious or in a sound state, a metallic probe is better. But for examining the depth and direction of a wound, nothing answers so well as a firm and tolerably thick bougie; which neither gives so much pain to the patient, nor is it so apt to be pushed beyond the depth of the wound into the contiguous soft parts, as the common small probe. This, indeed, will not often happen with practitioners of experience, as they will not only make use of probes in every case with caution, but will be sensible that they are often employed unnecessarily: for even in wounds of the thorax, we should not search for their depth with too much anxiety; as, by doing so, more harm may be done than could be compensated by any advantage to be derived from the discovery. It is highly proper to examine, in a cautious way, into the direction and depth of such wounds; but the younger part of the profession should know, that much harm has been done by examinations of this kind being carried too far: and

they should likewise know, that it is perhaps of more importance to be acquainted with the direction of an external punctured wound, which does not run deeper than the cellular substance above the ribs, or perhaps to the intercostal muscles, than to know, by means of the probe, whether a wound reaches to the cavity of the chest or not: for even where we find, in the most evident manner, that a wound goes to the depth of this cavity, if no bad symptoms occur, little or no advantage is obtained from the discovery; and where such symptoms take place as are known to proceed from a penetrating wound, and of which we shall afterwards treat, we are thus rendered equally certain of the nature of the case as if a probe had passed easily into the thorax.

Some advantage may be obtained in these inquiries, from our attending to the size and figure of the instrument; the direction it seemed to take; and the depth to which it was pushed: these are points of which we cannot always receive exact information; but it is sometimes otherwise, particularly in duels, where a surgeon is frequently attending, and where the bystanders are often so much interested, as to be able to give a distinct account of this and of every other point that relates to them.

When by either of these modes of inquiry, we are made certain of the depth of a wound, it would be unnecessary as well as improper to carry our researches further: but when this remains in doubt, it may in some cases be ascertained by the injecting of mild liquids. If the liquor returns immediately, there will be reason to think that the wound is superficial, or at least that it does not pass into the thorax; but when it lodges either altogether, or in considerable part, without raising any outward tumefaction, there will be no cause to doubt of its having reached the cavity. In throwing in liquids for this purpose, it should never be done with much force, as in this manner parts might be torn asunder, which were not previously

hurt; and the mildest liquor only should be used, as it might prove dangerous to apply any thing possessed of stimulating powers to the surface of an irritable part. Honey and water are commonly used for this purpose; but warm water alone is less irritating, and should therefore be preferred.

When air is discharged by the wound during inspiration, there is cause to suspect that the lungs are wounded. But although this is usually considered as one of the most certain proofs of a wound having penetrated the chest, it is proper to remark, that it is far from being decisive. Wherever the lungs adhere to the pleura, a wound may penetrate to a considerable depth; nay, it may pass entirely across the body, without entering what is properly termed the cavity of the chest; and we know that air is frequently discharged at wounds in the thorax where there is no reason to suspect that the lungs are hurt; for when no adhesions take place between the pleura and lungs, the external air, if it gets access by a penetrating wound, will pass between them, and will necessarily be forced out at every inspiration; a circumstance which invalidates the certainty of this test. In judging, therefore, of the weight which is due to it, we should, in the first place, cause the patient to make several full inspirations, in order to force out any air from between the pleura and lungs; and at the end of each, the contiguous skin should be so drawn over the wound, as to prevent any more from finding access. In this manner nearly the whole will soon be discharged; when, if we still find that air rushes forcibly out during inspiration, we may with certainty conclude that the lungs are injured.

Emphysematous swellings sometimes appear as the consequences of wounds of the thorax, by the air from the lungs finding access to the surrounding cellular membrane. This, however, will seldom happen in extensive wounds; as in these the air from the lungs will readily be discharged outwardly: but it is

by no means unfrequent in punctured wounds, especially in such as have an oblique direction. It is obvious, however, although this is a certain proof of the lungs being injured, that it may sometimes happen without any communication with the cavity of the chest, for the reason mentioned in the last paragraph.

When the quantity of blood discharged from these wounds is considerable, we may with good reason conclude, that they have not merely passed into the chest, but also that some of the viscera are wounded; for, excepting the intercostal arteries, which run upon the inferior border of each rib, all the blood vessels of the muscles and teguments are small; and as we can by compression easily put a stop to hæmorrhagies from the intercostal vessels, we may in almost every instance discover immediately whether the blood comes from the chest or not.

Even the appearance of blood discharged from these wounds may lead to a knowledge of their depth. It is a known fact, that blood coming directly from a wound in the lungs, has a more red, and particularly a more frothy appearance, than blood from any other part, owing probably to its being mixed with the air in the bronchiæ; so that when blood assumes this appearance, we have much cause to conclude that the lungs are injured.

When blood is spit up by the mouth, immediately after a wound in the thorax, there is little reason to doubt of the lungs being hurt. For although we ought not to conclude from the absence of this symptom, that the lungs have not suffered, for they may be wounded without any blood being discharged by the mouth; yet we may be convinced, that some injury is done to them, when blood is actually discharged from them.

In our inquiries into the nature of these wounds, the state of the pulse and respiration require particular attention. In wounds which do not penetrate deeper than the common teguments, neither the pulse nor

breathing are at first affected, nor do they produce any other consequences for the first two or three days, than wounds in other parts of the body: but wounds which go to the depth of the thoracic cavity, and more especially such as affect the lungs or other parts contained in it, may often be distinguished by the immediate effect which they produce both upon the pulse and breathing. When the lungs are injured in a part which adheres to the pleura, the wound may pass to a considerable depth without any extravasation taking place into the cavity of the chest; in which case, no immediate effect may ensue: but when either blood or air finds access to this cavity, the lungs are immediately compressed, by which the breathing becomes difficult, and the pulse feeble, oppressed, and intermitting; so that when these symptoms take place, we may at once give a decided opinion of the nature of the case.

By due attention to these circumstances, we may, in almost every instance, determine with much certainty whether a wound has reached the cavity of the thorax or not: and this being fixed, we are next to proceed to the method of treatment. We shall first advert to those wounds which do not go deeper than the common teguments or muscles, and afterwards to those which penetrate deeper.

§ 2. *Of Wounds in the external Teguments of the Thorax.*

WOUNDS of the thorax not going deeper than the skin and cellular substance, do not give any cause for anxiety, as they heal with the same ease, and are to be treated in the same manner with similar wounds in other parts of the body: but when they reach the muscular substance between the ribs, and especially when they run among these parts for a considerable way like sinuses, there is always reason to fear that at last they may penetrate the cavity of the thorax; for

when fores in this situation are not in every respect properly treated, and if any matter that forms in them is not regularly discharged, it is apt to pass deeper and deeper, till at last it penetrates the pleura itself. In all such cases, therefore, it should be our first object, to give a free vent to the matter. In open incised wounds, all that is necessary is, by means of easy dressings, to preserve their lips or edges from adhering till they fill with granulations from the bottom: but punctured wounds should either be laid open through their whole extent, or a seton passed from one end of the sinus to the other. When not very extensive, the shortest and easiest method is to lay them freely open with a scalpel and director, and then to heal them from the bottom like incised wounds from any other cause: but when a puncture runs to any considerable length, the method of cure by a seton answers better. By passing a seton along the course of the sinus, we prevent it from healing outwardly till the whole is equally filled up; and this being done, if the cord is gradually diminished, and at last removed, a moderate degree of pressure continued upon the parts for a few days longer, will seldom fail to effect a cure. Some, indeed, advise the cure of fores of this kind to be in every instance attempted with pressure alone. But although pressure often proves successful in other parts of the body, particularly in the extremities, where it can be applied with exactness along the whole course of a sinus, and continued for a sufficient length of time without risk; yet in wounds of the thorax, the same advantages do not result from it: for here a continued equal pressure cannot be applied in a sufficient degree, without impeding respiration. When a cure is, however, to be attempted by pressure, it must be done with a roller passed firmly round the thorax, supported by what is termed a scapulary put over the shoulders: but when a seton has been previously used, the pressure may be applied with slips of adhesive plaster

laid along the course of the wound, and fixed upon the contiguous skin.

This method of cure, by laying the sinuses open, or by the insertion of a seton, to those not much versant in this branch of practice, may appear to be unnecessarily severe; for by many of the older writers we are told, that our object may be accomplished in a more easy manner, namely, by keeping the external openings of the fores pervious, by the use of tents, till they are firmly healed from the bottom. In wounds which penetrate to the cavity of the thorax, tents, especially those that are hollow, prove often useful; and as they may be used with safety, they should not be so generally condemned as some modern practitioners have affected to do. But in punctured wounds which do not go to this depth, as our great object is to avoid every risk of the matter finding access to the thorax, whatever can tend to impede the discharge of it, should by all means be avoided. So that in such cases tents should never be used: they would frequently do harm, in the manner I have mentioned; in many cases they would fail entirely; and if they should ever succeed, the cure would prove much more tedious, and often more painful, than the mode of treatment that I have advised.

In every wound of importance, diet and other parts of regimen merit particular attention: we frequently find, indeed, that practitioners fail entirely, where otherwise they would succeed, merely from patients being allowed more freedom in food, drink, and exercise, than is consistent with safety. In wounds of the thorax, attention to these points is still more necessary than in similar affections of other parts: for as the parts contained in the thorax are highly essential to life, and as they are very liable to inflame, even from injuries that do not penetrate deep, every precaution should be employed by which it can be prevented. Hence, for several days at least, or even till there appears to be no further chance of the parts

becoming inflamed, the patient should be kept upon low diet; animal food and strong liquors of every kind should be avoided; the bowels should be kept open with mild laxatives; and when the pulse requires it, a due proportion of blood should be taken. Rest of body and perfect quietness is of much importance in these wounds; for they are affected by the least degree of motion; even coughing, laughing, or much speaking, is apt to do harm, and should therefore be as much as possible avoided.

§ 3. *Of Wounds which penetrate the Cavity of the Thorax.*

WOUNDS that penetrate the thorax, are always hazardous, and therefore merit particular attention: even such as merely penetrate the chest, are often attended with important consequences, for the mere contiguity of the lungs and other viscera adds much to the danger. At present, we are to treat of simple penetrating wounds, not connected with any injury done to the contained parts.

It is now known, that in a state of health the lungs fill the spaces allotted for them in the two sides of the thorax, so completely, that they are every where in contact with the pleura, both in the state of inspiration and expiration: and it is also known, that great distress in breathing is induced, by air, blood, or any extraneous matter being admitted between them. Now, in penetrating wounds of the thorax, excepting where the lungs morbidly adhere to the pleura, it is scarcely possible to prevent both air and blood from being admitted: the external air rushing in at the wound soon spreads over the whole corresponding cavity; and when the intercostal artery or any other blood vessel is divided, if the external opening be not sufficiently large, any blood that is evacuated is apt to fall down between the pleura and lungs to the very bottom of the chest; by which, difficulty of breath-

ing immediately takes place, along with all the other symptoms which usually attend a compressed state of the lungs.

In Chap. XXVI. I shall find it necessary to consider fully, not only the symptoms which fluids collected in the chest are apt to induce, but the method of relieving them by the operation of the paracentesis: to avoid repetitions, I shall now refer to what will then be said upon this part of our subject, and at present shall offer a few observations upon the means of preventing such collections as may require the assistance of that operation.

In wounds which do not penetrate to the depth of any of the viscera, but which merely pierce the pleura, almost the only artery which can be cut, that can afford any quantity of blood, is the intercostal; and being of a considerable size, no time should be lost in tying it whenever it is found to be wounded. As it runs in a groove in the inferior edge of the rib, it is difficult to put a ligature round it; but, with due attention, it may in every instance be done.

In free incised wounds, the bleeding orifice will be brought clearly into view; but in small punctured wounds, as the artery cannot be distinctly seen, there is a necessity for laying the parts sufficiently open with the scalpel. When the artery is thus laid bare, various means have been proposed for securing it. For the reason that I have just mentioned, a crooked needle cannot be passed round it. We are therefore told by some, that the only method of doing it is to pass a firm broad ligature round the rib, and by means of it to tie a dossil of lint upon the orifice of the artery; while others condemn this practice, from the injury which it must necessarily do to the pleura; for this membrane cannot in this operation be separated from the rib, so as not to be included in the ligature; so that instruments have therefore been proposed for obviating this inconveniency. The intention, however,

of these instruments, is to compress the intercostal artery, without hurting the pleura ; but as none of them I have met with answer this purpose, I do not think it necessary to delineate them : those who wish to see them, may look into the second volume of *Memoirs of the Royal Academy of Surgery at Paris*.

It is luckily, however, in our power to secure this artery in a much more simple manner. By dilating the wound sufficiently, we may with a tenaculum, somewhat more bent at the point than usual, draw the bleeding vessel out of its groove, so as to tie it in the ordinary way ; at least in thin people this may be easily done : and where it is found, either from the ribs being deeply covered with fat, or from any other cause, that it cannot be secured in this manner, it may always be done in the manner I have mentioned, by passing a firm broad ligature round the rib, and thus tying a small doffel of lint upon the bleeding artery. In this way a portion of the pleura will no doubt be included in the ligature ; but it does not appear from experience, that this proves hurtful, and with sufficient caution we may always avoid the lungs. When the lungs do not adhere to the pleura, they collapse in some degree immediately on the external air being admitted through the wound to the cavity of the chest. And even when they adhere, we may easily separate as much of them with the point of the finger as will admit of the passage of the ligature.

When a practitioner is called immediately, he may in this manner prevent any great quantity of blood from being emptied into the thorax ; and as soon as the hæmorrhagy is stopped, he should endeavour to expel all the air that has found access by the wound to the surface of the lungs ; for till this is done, the breathing will remain oppressed, nor will the patient be able to bear the application of the necessary dressings. In Chap. XXVI. different methods of expelling air from the surface of the lungs will be mentioned ; but the simplest and easiest is this : while the wound

yet remains open, let the patient in a slow gradual manner, make a full inspiration, by which a considerable part of the collected air will be discharged at the wound : this being done, the skin must be instantly drawn over the fore, so as to cover it completely during expiration ; and if the wound is again moderately opened during inspiration, the whole quantity will in this manner be soon expelled. After which the lips of the wound should be drawn exactly together, and in this situation should be secured with slips of adhesive plaster, care being taken to support the whole with the napkin and scapulary bandage.

In this manner, wounds of the thorax will frequently heal, which, if left to themselves, or if treated in the usual way by allowing them to remain open, might produce much distress : but in some cases, either from a considerable quantity of blood having been thrown out from the intercostal artery before the ligature was applied ; from the oozing of blood from the smaller ramifications of the intercostal arteries ; or perhaps from a subsequent formation of pus ; oppressed breathing will supervene, notwithstanding all that can be done to prevent it.

When this takes place from the formation of matter, an opening should be made to discharge it in the manner to be hereafter advised in the chapter on Epyema ; and in this case the opening should be made in the most depending part of the thorax. But when it occurs immediately after a wound, and while the blood yet remains fluid, we may often be able to discharge it at the wound itself, and when this can be done, it should always be preferred ; for we are not to imagine that the thorax can in any part be laid open but with some risk of harm being done by it. When symptoms, however, of oppressed breathing occur from a wound in the upper part of the thorax, as the effused blood cannot be discharged by it, we are obliged to make a perforation in the under part of the

chest as soon as the symptoms become severe: it is proper, however, to observe, that this operation should never be advised while the symptoms are moderate: for we have daily instances of small quantities, not only of blood but other fluids, being absorbed; and as the risk attending a perforation in this place is probably greater than would occur from small quantities of blood being allowed to remain, it should not be advised as long as the breathing continues tolerably free.

§ 4. *Of Wounds of the Lungs.*

IN a preceding part of this section, I have enumerated the symptoms which indicate a wound in the thorax to have penetrated the lungs: and although the danger in this case is greater than in wounds which merely penetrate the pleura, yet the method of cure suited to the one is so nearly the same with what I have advised for the other, that it is scarcely necessary to enlarge on it further.

It is proper, however, to observe, that as the hazard arising from wounds in the lungs is considerable, the caution with which they are treated should be proportionally great. Instances indeed have occurred of their healing with ease and safety; but they are so rare, that I do not hesitate to say, that every injury done to the lungs is to be considered as extremely hazardous.

The danger arising from wounds in the lungs, originates, in the first place, from the hæmorrhagy being apt to proceed farther than the strength of the patient will bear; and, afterwards, from abscesses forming in the substance of the lungs which frequently terminate in phthisis.

The hæmorrhagy is most readily checked by plentiful venesection; by the patient being kept in a cool apartment, and at perfect rest; by the use of mild laxatives; and by low regimen. Besides rest of body, it is of much importance to keep the lungs as free

from action as possible. Hence coughing, laughing, and even much speaking or deep inspirations, should be rigidly guarded against. Due attention to this is necessary in every wound of the thorax, particularly in those affecting the lungs; for when the lungs are wounded, they can never be fully distended with air without stretching every blood vessel that has been hurt.

Notwithstanding, however, of our utmost attention, the patient will sometimes sink under the loss of blood; in other cases, blood will be collected in large quantities between the pleura and lungs, so as to impede respiration; or abscesses will form, as I have already observed, in the substance of the lungs.

I shall now proceed to offer a few remarks on the management of abscesses in the lungs.

Matter collected in the substance of the lungs from a wound, may be discharged in three different ways. It may be spit up by the mouth; it may be discharged by the abscess bursting into the wound itself; or it may be emptied into one or other of the cavities of the chest between the lungs and pleura.

When an abscess in this situation opens into the bronchiæ, there may be some risk at first of immediate suffocation; but when this danger is over, by a considerable quantity of the matter being discharged, if there is no hereditary tendency to phthisis, a cure will often be accomplished by the means usually advised in such cases, namely, by a diet that is light and of easy digestion, and at the same time sufficiently nourishing; and by daily moderate exercise, by which any matter collected in the abscess is brought up with more ease than by any other means. A sea voyage too proves useful in this view, at the same time that it tends to brace and invigorate the system; or when a voyage cannot be obtained, we advise riding on horseback. When pus collected in the lungs is discharged in this manner, the business of a surgeon becomes nearly unnecessary; but when the abscess eith-

er empties itself into the chest, or points outwardly at the wound, we have it often in our power to save the patient by an operation, when otherwise he would inevitably die.

When an abscess bursts into the chest, the matter should be discharged in the manner we shall advise in chapter XXVII. But when the wound by which the collection is produced remains open, so as to admit of the matter to point towards it, as soon as this is discovered, either by a small oozing of pus taking place, or by the introduction of the finger between two of the ribs, we should at once determine on treating it on the same principles, and in the same manner with abscesses in any other part of the body, namely, by making an opening into it of a sufficient size for discharging all that it contains. The delicate nature of the part in which the matter is seated may deter some from adopting this practice; but it does not require much argument to show, that a patient in such circumstances runs much more risk of suffering by the matter being allowed to remain, than by making an opening into the abscess. By this he avoids the hazard of immediate death, which commonly happens from large abscesses bursting into the bronchiæ; at the same time that it prevents the matter from passing into the cavity of the chest between the pleura and surface of the lungs; and thus obviates the necessity of a second operation. Nay, in cases of this perilous nature, I would even go farther: when from a previous discharge of matter we know that an abscess has formed in the lungs as a consequence of a wound; when a stoppage of this discharge takes place, and is succeeded by all the usual symptoms of a fresh collection of matter; such as an increased difficulty of breathing; difficulty in lying on the sound side; frequent shivering fits; and a hectic pulse; as in such a situation there will be no reason to doubt of matter being collected, and as the patient must remain in the utmost hazard till it is discharged, I should think it ad-

vifable to enlarge the external wound not only of the common teguments, but of the intercoftal mufcles, and to extend the opening for the fpace of two or three inches ; by which more freedom will be given for fearching with the finger for the feat of the abfcefs ; and whenever this is difcovered, I would not hesitate, at whatever depth it may be, to open it, by running a biftoury along the finger, and pushing it slowly into it. In the courfe of my own experience, I have had different cafes of this kind ; in which, by this decisive practice, I had the fatisfaftion of faving lives, which otherwife there was much caufe to think would have been loft. This was the opinion of other practitioners who attended along with me ; and I was fo much convinced in all of them, of matter being collected internally which produced the danger, and of nothing being able to fave the patients but the difcharge of it, that after warning them of their danger, and receiving their approbation, I was refolved to carry the opening into the fubftance of the lungs to the full length of my finger, rather than leave them to their fate. In every inftance I found it neceffary to go to nearly the length of my finger ; and at this depth I was fo fortunate as to reach an abfcefs containing at leaft half an Englifh pint of matter. The patients were inftantly relieved ; and although they were previously fuppofed to be in the utmoft danger, with fcarcely a poffibility of recovering, they are now, after feveral years have elapfed, in perfect health.

In making an opening into fuch a deep feated abfcefs, the incifion fhould be carried forward in the moft gradual manner, fo that no more of the lungs may be hurt than is neceffary : but when once the matter appears, the abfcefs fhould be laid as freely open as may be proper for an entire difcharge of it.

In the fubfequent treatment of thefe abfcefles, our chief object is to preferve a proper aperture for the difcharge of the matter : for if this be not done till the abfcefs fills from the bottom, a new collection will

take place, and the patient will soon be reduced to the same state of uncertainty and danger as before. In wounds which do not penetrate deeper than the teguments or muscles of the thorax, I have observed above, that no kind of tents should be employed; and that they should rather be laid open through their whole length, or be treated by means of a seton, as is done with sores of a similar nature in other parts of the body. But as this is impracticable in penetrating wounds, we are in these under the necessity of inserting a tube into the opening, and of causing it to be continued of a sufficient size and length during the whole course of the cure: the tube ought, indeed, to be continued as long as any matter is discharged. Tubes of lead being more soft and pliable than those of any other metal, are therefore to be preferred: they should be broad, and of a round oval form, rather than altogether round; and they should always be furnished with a brim considerably broader than the opening of the sore, to obviate every possibility of their falling into the chest. By inattention to this point, a tube of four inches in length, and of a corresponding thickness, passed altogether into the cavity of the breast of a gentleman who had used it for some time; and notwithstanding various attempts to extract it, it still remains lodged. It was fixed in the usual way, by a thread, to a bandage going round the body; but the thread breaking, it immediately slipped in. This happened upwards of eight years ago. It does not indeed excite much uneasiness, but it had an evident effect in increasing the quantity of matter discharged from the wound.

I have met with some cases of wounds in the chest, where solid tents have answered the purpose equally well with tubes; and they may always be used when the parts do not contract so closely round them as to prevent the matter from being freely discharged: but whenever they stop up the passage so much as to produce any collection of matter between one dressing

and another, they should undoubtedly be laid aside, and tubes used instead of them.

As tents had been used for a great length of time in almost every wound which penetrated beyond the common teguments, Belloste, and some other surgeons of observation, ventured at last to lay them in a great measure aside. I have already had occasion to observe, that this, to a certain length, was highly proper; but I cannot agree with some modern practitioners who assert, that tents and tubes do mischief in every case, and that they should never be employed. Where the discharge from a wound or abscess continues free and uninterrupted till a cure takes place by the parts filling up from the bottom, I would never advise either a tent or a tube to be used. But when the external opening of a wound heals up long before the parts beneath are united, and matter collects and again bursts out, as has happened in different instances with me in penetrating wounds of the chest, it must be from want of experience only, or from a desire of appearing singular, that we refuse to employ the only certain method with which we are acquainted of obviating this inconvenience, and of saving the patient a great deal of pain, trouble, and danger.

In extensive wounds of the thorax, where any part of the sternum or ribs have been removed, a portion of the lungs sometimes protrudes, and does not readily recede. When a practitioner is called soon after the accident, the protruded part should be replaced as quickly as possible; but when a portion of the lungs has been long exposed to the air, and especially if much hurt by the accident, we should, in the first place, see whether it is in a state of mortification or not; and all that is clearly and completely mortified should certainly be cut off before the sound parts are replaced. If the incision is confined to a part that is entirely gangrenous, there will be no risk of inducing either hæmorrhage or any other symptom; and by

removing parts which are in this state of disease, we prevent all the bad consequences which might ensue from their being returned into the thorax.

§ 5. *Of Wounds of the Heart and large Vessels connected with it, and of Wounds of the Thoracic Duct.*

WOUNDS of the heart and large vessels connected with it, are at all times attended with much danger, nor is the greatest exertion of practitioners able to lessen it. Of such a hazardous nature indeed are injuries done to these parts, that in every instance we may pronounce that they will terminate fatally: for although we are told in books, of the heart itself being wounded without any fatal consequences having ensued, there is much cause to suspect that these accounts are founded on fallacy or error. We can, however, conceive that the heart may be slightly injured without proving instantly fatal; but even the slightest wound in it must probably at last end in death: for the weakness induced in this manner upon a particular part, will render it very liable to yield to the strong and constant action of this organ; and when once an aneurism is formed in it, it will not fail to proceed quickly to a fatal termination.

The most likely method of preventing this, or at least of delaying it, is to lessen the action of the heart by copious bloodletting; by low diet; keeping the bowels moderately open; and avoiding bodily exertion: if in such circumstances it is possible to save a patient, these will be the most certain means of doing it; at any rate they will tend to prolong life, which in some cases is of so much moment that a few days or even a few hours may be of great importance.

The same observations are applicable to wounds in the large blood vessels about the heart. They are to be considered as nearly of equal importance and danger, and to be treated in the same manner with wounds of the heart itself.

There is still another organ of importance seated in the chest, which it is proper to mention here, namely, the thoracic duct; for although wounds in this canal will in most instances terminate in death, yet some advantage may, in particular circumstances, be derived from their being properly treated. The thoracic duct, after leaving the receptaculum chyli, runs along the spine near to the aorta: and at the fifth or sixth vertebra of the back, it passes behind the aorta; and ascending to the left subclavian vein, it there discharges the chyle.

We judge of the thoracic duct being wounded, from the part at which the wounding instrument entered; from the discharge being either altogether white like chyle, or mixed with a considerable proportion of chyle; and from the patient becoming daily weaker than he ought to be from a wound of the same size in any other part, owing to the nutritive part of his food being carried off before any advantage is derived from it.

With a view to prevent the diameter of this canal from being distended, which at the same time will tend to lessen the extent of the wound, the patient should be kept upon a very spare diet; any food which he takes should not be at regular meals, but in small quantities frequently repeated; nor should he be permitted to take a large draught even of the weakest liquor. The bowels should be kept open; bodily exertion of every kind, and much speaking, or whatever tends to quicken respiration, should be avoided.

§ 6. *Of Wounds of the Diaphragm, Mediastinum, and Pericardium.*

WE judge of the diaphragm being injured from the situation of the wound, and from the nature of the attending symptoms. As this muscle is in constant action during respiration, any injury done to it is necessarily attended with difficult breathing; and with

much pain during inspiration, not merely in the wound itself, but over all those parts of the chest to which the diaphragm is attached: the patient complains of pain over all the region of the stomach: sickness, vomiting, and a troublesome degree of hickup take place; pains in the shoulders sometimes occur, together with cough, delirium, a quick hard pulse, and other symptoms indicating inflammation and fever. Involuntary laughter is mentioned too as a symptom which injuries done to the diaphragm sometimes produce; but I have not in the course of my experience perceived that the observation is well founded.

It is a common idea among practitioners, that wounds in the tendinous part of the diaphragm will in every case prove mortal, but that injuries done to the muscular parts of it do not so readily end in danger. There is much reason, however, to believe, that few wounds in the diaphragm are cured, whether in the tendons or muscular parts of it; nor is it evident from observation, that there is more danger to be dreaded in the one case than in the other.

The symptoms of which we have most reason to be afraid, are those which proceed from inflammation. With a view to prevent their accession, or to render them moderate when they have already appeared, bloodletting is to be chiefly depended on; together with gentle laxatives; large doses of opiates conjoined with musk; warm fomentations over the abdomen and thorax; quietness; and low diet.

By these means strictly pursued, a patient, in such circumstances, will have perhaps a better chance of doing well than by any other mode of treatment; but his recovery will by no means be certain. A strict antiphlogistic course, and large doses of opium, may probably obviate all the primary symptoms. But however small a wound in the diaphragm at first may be, the constant action and tension of this muscle will be apt to render it daily wider; and we know from various histories of wounds in this part, that they sel-

dom arrive at any magnitude, without admitting a portion of the stomach, of the colon, or some other part of the bowels, to pass from the abdomen into the thorax; by which the most violent pain is produced, together with some other symptoms which usually accompany a strangulated gut in cases of hernia: in such circumstances, a strangulated gut is greatly more dangerous than hernia in its more ordinary form; for were we even able to remove the stricture, by making an incision into the cavity of the abdomen, as the passage into the thorax would still remain pervious, a return of the strangulation might soon be looked for.

Wounds in the mediastinum require no peculiarity of treatment. The circumstances which we have most cause to dread are, a lodgment of blood in one or both cavities of the chest, inflammation and suppuration with their usual consequences. But the observations that I have had cause to suggest, on the management of penetrating wounds in other parts of the chest, apply with equal propriety to these; so that we need not enter further upon them at present.

Nor is it necessary to enter minutely on the consideration of wounds in the pericardium. As this bag contains a fluid which we suppose to be necessary for the easy motion of the heart, wounds of this part may prove dangerous, from their tendency to prevent this fluid from being collected, as well as from their allowing it to spread through the cavity of the chest. It appears, however, from various observations, that wounds of the pericardium do not prove so hazardous as at first sight might be supposed. They require the same general method of treatment with penetrating wounds of the thorax, which we have already had occasion to consider.

All penetrating wounds of the chest, where the cure does not happen without the formation of matter, are apt to heal slowly; and in some cases, especially where abscesses have formed, a discharge of matter will continue for a great length of time, nay, in

some cafes, for life, notwithstanding all our endeavours to prevent it. As this is an inconveniency which patients are at all times anxious to remove, practitioners become neceffarily much interefted in the method of treating it. With a view to leffen the difcharge, and even to heal the fore through its whole extent, astringent, and what are ufually termed vulnerary injections have been advised. But although I have known them frequently employed even by furgeons of reputation, and under the beft and moft cautious management, I have feldom feen them ufed without producing harm; and I do not recollect a fingle inftance of their producing any advantage. They are apt to irritate and inflame the lungs and contiguous parts; and, inftead of healing the fore or abfcels, they often extend it further, by tearing open the furrounding cellular fubftance.

For this reafon, in penetrating wounds of the thorax, I do not hesitate to fay, that injections fhould be laid entirely afide: and, however difagreeable a tedious difcharge in this fituation may prove, we fhould truft entirely to the means that I have already advised for preventing the matter from lodging, by preferving as free and depending an opening as the nature of the cafe will admit.

SECTION XII.

Of Wounds in the Abdomen.

§ 1. *Anatomical Description of the Abdomen and Parts contained in it.*

THE Abdomen, or lower belly, is the largeft cavity of the body: above, it is bounded by the diaphragm, which divides it from the thorax; behind,

it is supported by the vertebræ; the upper part of both sides is covered by the inferior ribs; the rest of it is all bounded by the abdominal muscles, excepting the most depending part of it, which terminates in the pelvis, from the contents of which it is only separated by the peritonæum, a firm extensive membrane, which not only lines all the cavity, but affords a coat to all the viscera contained within it, being reflected in a very singular manner over them.

Anatomists divide this cavity into different regions. The middle and upper part of it, reaching from the xiphoid cartilage to within a small space of the umbilicus, is termed the Epigastrium; the spaces on each side of this are termed the Hypochondria; the umbilical region extends from three inches above the navel, to the same distance beneath it: and all the parts between this and the pubes are termed the Hypogastric region.

In the treatment of wounds in the abdomen, a minute acquaintance with the parts contained in it, and of their relative situation with respect to each other, and to the divisions or regions which we have just described, is a point of much importance. I shall here give a general description of the different viscera: a more particular knowledge of them is best acquired from dissection.

The parts contained in the abdomen are, the stomach and intestines; the mesentery, omentum, liver, gall bladder and ducts; pancreas, receptaculum chyli, spleen, kidneys, ureters, and upper part of the urinary bladder; the aorta, vena cava, and other large blood vessels and nerves.

The stomach is a large membranous bag, placed in the upper part of the abdomen, immediately below the diaphragm: it stretches from the left hypochondrium, where the most capacious end of it is seated, obliquely across the epigastrium, and terminates before it reaches the right hypochondrium. The stomach has two openings; one termed the superior orifice or

cardia, where the œsophagus terminates ; and the other the pylorus, or inferior orifice, where the duodenum, the first of the small intestines, begins. The cardia lies nearly on a line with the eleventh vertebra of the back, the large extremity of the stomach stretching considerably to the left ; and the pylorus lies somewhat lower, and nearly two inches to the right of the vertebræ. It is proper, however, to observe, that the situation of the stomach and of these two openings is considerably affected by the quantity of food contained in it : so that a wound of the stomach, when full, may be directly opposite to an external wound in the teguments, and yet be several inches lower when empty.

The intestines commence, as I have just observed, at the pylorus, and are continued by many turnings or convolutions to the anus. This canal is in different parts of it distinguished by different names : the upper part of the tube is termed the small intestines ; and the under part of it the larger, from its diameter being larger in the one part than in the other.

Even different parts of these great divisions of the intestines have received different names ; the upper part of the small guts, extending about a foot in length from the pylorus, is termed the duodenum ; the next portion of the canal, from being commonly found empty, is termed jejunum. This, in an adult of full growth, is supposed in general to be about four feet and a half long ; and is chiefly situated in the umbilical region. All the under part of the smaller intestines is distinguished by the name of ileum, from its lying almost entirely within the cavity formed by the ossa ilea on opposite sides of the abdomen. After making several convolutions from one side to the other, it at last terminates in the cœcum, the first of the great intestines situated under the right kidney. From the cœcum, which is a round short sac with a small vermiform process, the colon originates : this is the largest of all the intestines ; and as it occupies a consid-

erable part of the abdominal cavity, the course of it merits particular attention. After leaving the right kidney, to which it is attached, it rises and passes under the liver, so as to be in contact with the gall bladder, by which it is tinged of a deep yellow colour; from this it is continued in the form of an arch over the duodenum to the under part of the stomach; and passing into the left hypochondrium, it is there attached to the spleen and to the left kidney. This curvature is termed the great arch of the colon. It now runs downward and backward; and again turning up, so as to form the figure of S, terminates at the top of the os sacrum in the last of the great guts, termed the rectum, from its running nearly in a straight line, till it terminates in the anus.

The intestines being very pliable, and of a great length, have necessarily much freedom of motion; but as this would render them liable to be entangled in each other, nature has provided a thin membranous web, termed the mesentery, which running along the course of the intestinal tube, serves to connect it with sufficient firmness to the vertebræ. The mesentery is evidently a production of the peritonæum: in its duplicature we meet with a number of small glands, which often become so enlarged by disease as to be felt outwardly through the abdominal muscles; and serves as a support to the lacteals, blood vessels, and nerves of the intestines. The omentum is a fine thin membrane, which comes into view on dividing the muscles of the abdomen and peritonæum. In general it does not pass beneath the umbilicus: but in corpulent people, when much filled with fat, it sometimes descends to the very bottom of the belly; and in cases of hernia, we frequently meet with it in the scrotum.

This membrane is evidently intended as a protection to the bowels; to afford them an additional warmth; and probably by the fat which it contains

to lubricate their external surfaces, so as to admit of their playing with more freedom on each other.

The liver is a large glandular body, situated in the right side, immediately under the diaphragm : it is divided into two lobes ; one termed the great, and the other the small lobe. The great lobe lies in the right hypochondrium, which it fills almost entirely : it rests on the right kidney, and covers a portion of the great arch of the colon : a considerable part of the small lobe lies in the epigastrium ; the rest of it passes over the stomach towards the left hypochondrium.

The liver is of a very irregular figure ; its outer surface is arched, corresponding to the figure and size of the arch of the diaphragm. On the under side, it is in some parts flat, and in others concave, according to the figure of the parts with which it is in contact. It is of a considerable size and thickness on the right side ; but towards the left its thickness decreases, so that at last it terminates in a thin edge.

The liver is kept in its situation by several ligaments attached to the diaphragm and contiguous parts.

The gall bladder is a pyriform bag, seated in the concave side of the liver. The bile, after being secreted by the liver is lodged in this bag, from whence it is conveyed into the intestines through the ductus choledochus, which enters the duodenum by piercing its coats in an oblique direction, about five inches below the pylorus.

The pancreas is a conglomerate gland, lying in a transverse direction between the liver and spleen, immediately under the stomach. The liquor secreted by this gland is carried into the duodenum by a small duct, which in some cases terminates in the gut itself, and in others near to the extremity of the ductus choledochus.

The receptaculum chyli is a small membranous bag, through which the chyle passes from the intestines to the left subclavian vein by means of the thoracic duct.

This bag, or sac, lies upon the first vertebra of the loins, a little to the right of the aorta.

The spleen is a large spongy body, seated in the left hypochondrium, between the stomach and false ribs, under the diaphragm, and immediately above and contiguous to the left kidney.

In Chap. XV. Sect. II. I shall find it necessary to give a particular description of the kidneys, ureters, and bladder; so that we shall not enter upon it at present. But, besides the several viscera which I have mentioned, the aorta, vena cava, and the large blood vessels and nerves which supply the bowels, lie all within the cavity of the abdomen.

The same distinctions may be enumerated of wounds of the abdomen, that I have mentioned of wounds of the thorax. They may either be confined to the common teguments and muscles, or they may penetrate the cavity; or a penetrating wound may be complicated with wounds of one or more of the viscera.

§ 2. *Of Wounds of the Teguments and Muscles of the Abdomen.*

In one point of view, wounds of the teguments and muscles of the abdomen do not merit more attention than similar injuries in other parts of the body; but they become highly important from the contiguity of the abdominal viscera, and from the danger of these being ultimately injured by the neglect or mismanagement of an external injury.

Our first object is to discover, whether a wound has penetrated the abdomen or not; and whether any of the viscera are injured. When the wound is extensive, and any portion of the viscera protrudes, the nature of the case is evident; but in smaller wounds, where no part of the bowels appear, it is often difficult to judge whether they penetrate the abdomen or

not. In general, however, this may be determined by attention to the following circumstances : by a proper examination with the fingers or probe, after putting the patient as nearly as possible into the posture in which he received the wound ; by attending to the form and size of the instrument, the depth to which it run, and the direction it appeared to take ; by the quantity of blood discharged at the wound being considerable or not ; by the state of the pulse and other attending symptoms ; and by the discharge of fæces, bile, or any other of the abdominal secretions.

When the wound is of such a size as to admit the finger, we may always determine with certainty whether it reaches the cavity of the abdomen or not ; as in this case the finger will come into contact with the viscera : but probes should be used with much caution ; and unless the instrument passes easily in, without force, in a direct line, and to such a depth as to convince us that it has reached the cavity, little or no dependence should be placed on it : for the parts here are so soft, and of such a yielding nature, that a probe with very little force will pass among them almost in every direction to a considerable depth. It is scarcely necessary to observe, that it is particularly proper, in every inquiry of this kind, to put the patient as nearly as possible into that posture in which he received the wound. And the loose texture of the parts should prevent us from using injections, as is frequently done with a view to determine this question. In wounds of the thorax, where the parts are firmer and more intimately connected, injections may be used for this purpose more safely ; but in the abdomen they are apt to spread among the muscles and cellular substance, by which the test is rendered uncertain, at the same time that mischief is apt to ensue from the pain and inflammation which it excites.

The depth to which the instrument has passed, or the direction in which it run, cannot always be ascertained ; but when this information can be obtained,

it will assist us in judging of the nature of the wound. By comparing the size of the external opening with the size of the instrument, we may be led to determine the depth to which it has passed.

When the quantity of blood discharged from a wound in the abdomen is considerable, we may with much certainty conclude, that some of the large internal vessels have been hurt; for excepting the epigastric artery, which runs in the interior part of the abdomen in the course of the rectus muscle, none of the teguments or muscles of these parts have arteries of such a size as to afford much blood. It is proper, however, to observe, that even the largest artery in the abdomen may be wounded without any blood being discharged externally; for if the outward opening is not large, and especially if the wound runs in an oblique direction, the blood, instead of being discharged at the opening, will be extravasated into the cavity of the belly, where large quantities may be collected, even without any remarkable degree of tension taking place.

In such cases, however, we are soon led to suspect what has happened, by the symptoms which ensue. The patient complains of debility and faintness; his pulse becomes low; he is seized with cold sweats; and if the discharge of blood is not stopped, all the other symptoms of approaching death soon make their appearance.

It sometimes again happens, that we become certain of a wound having penetrated the abdomen, by the discharge of fæces; of bile; of the pancreatic juice, or even of chyle: and in some cases, the same certainty is obtained by large quantities of blood being thrown up from the stomach, or discharged by the rectum. Urine may be discharged by a wound which does not penetrate the belly; for the kidneys and ureters, as well as a considerable portion of the bladder, may with propriety be said to lie behind the peritonæum; but

they are in general to be treated in the same manner with penetrating wounds of the abdomen.

When, again, none of these symptoms take place; when neither the finger nor probe can be easily introduced; when there is no discharge from the wound that leads to suspect the viscera to be wounded; when the pulse remains natural, and the pain is moderate; there will be much cause to hope that it has not passed to a greater depth than the common teguments or muscles.

In the treatment of these wounds, we are to be entirely directed by the depth to which they penetrate, and by the symptoms which take place.

When a wound in the abdomen does not run deeper than the common teguments or muscles, if none of these parts have been removed, none of these symptoms will be of much importance, at least this is commonly the case, where the habit of body is good, if the patient has not suffered from misconduct or neglect. Our views here should be nearly the same with what has been already advised in wounds of the thorax. The principal object is to prevent inflammation and the lodgment of matter. This we do by blood-letting; a low diet; the use of laxatives; rest of body; and proper attention to the wound. But for a more particular detail of the proper treatment of such a wound, I shall refer to the last section.

It is proper, however, to remark, that wounds in the boundaries of the abdomen, in one circumstance, differ materially from similar injuries in the thorax. As the muscles and other soft parts of the chest, are every where supported by bone, the lungs and other viscera contained in the breast do not readily push out at the wound: but as the coverings of the abdomen are of a soft yielding nature, having anteriorly no bone to support them, and many of the contained parts having no very close attachments, they are apt to push forward and protrude wherever any unusual degree of weakness is produced. In all wounds, there-

fore, of the abdomen, even where they do not penetrate, some caution is necessary on this consideration alone; especially when any portion has been removed of the teguments or muscles. The patient should be kept as much as possible in a horizontal posture during the cure; and when he attempts to sit or walk, the weakened parts should be supported by a proper compress, and a firm, somewhat elastic bandage of flannel, passed two or three times round the body; a caution which ought to be persisted in for a considerable time after the cure of the fore is complete. Want of attention to this, has been the cause of many distressful cases of hernia, which otherwise would not have happened.

§ 3. *Of Wounds which penetrate the Cavity of the Abdomen, but which do not injure any of the contained parts.*

ALTHOUGH an instrument may have penetrated the abdomen to a considerable depth, we have much reason to hope that none of the viscera are wounded, as long as the parts remain free from much pain and tension, the pulse soft, and the skin of a natural heat: but even in this state of such a wound, we are not to conclude that there is no hazard; for wounds in these parts, which at first exhibit no appearance of danger, often terminate fatally at last.

It is proper, however, to observe, that this may often be traced as an effect of improper management, which practitioners have it frequently in their power to prevent: for although some instances will occur of these wounds ending fatally, where no symptoms appeared of the viscera being hurt, and where after death this was found to be the case, yet this will not usually happen when the wounds have been properly treated from the first.

The danger here arises chiefly from two causes: from the air finding access to the cavity of the abdo-

men, by which the different viscera are apt to become inflamed; and from the subsequent formation of matter, which, not finding an opening, will necessarily collect within the peritonæum.

In every wound, therefore, of this kind, after securing any blood vessel of the teguments or muscles that may be divided, we should endeavour, with as much certainty as possible, to prevent the air from getting access to the abdomen. In small wounds of these parts, this will be done with most ease and certainty by the lips of the cut being drawn together, and secured with slips of adhesive plaster: and as a further security, a compress and flannel roller, such as I have mentioned above, may be put over the whole: the same precautions with respect to blood-letting; a strict antiphlogistic regimen, and rest of body, already pointed out as necessary in more superficial wounds of the abdomen; should be here very carefully observed, where the danger is still more considerable.

Under this management, these wounds, when small, will often heal by the first intention; but when they continue open for some time, they should be dressed as seldom as possible, and the dressing renewed with as much expedition as the nature of the case will admit, so that the unnecessary admission of air may as much as possible be avoided.

It will sometimes, however, happen, even that the most exact attention will not prevent the accession of bad symptoms. At first, these will be such as proceed from inflammation, and will be removed with most certainty by further evacuations of blood, and attention to the other circumstances that I have enumerated; or they will prove fatal, by ending in mortification; or they may terminate, as I have mentioned above, in the formation of matter. It is this last occurrence which we have now to advert to.

In any other part of the body we would advise an opening to be made immediately for the purpose of

discharging the matter: but in these depositions in the abdomen, we can never discover with certainty, whether any collection has taken place or not, till it has continued for a considerable time: for the matter here lies so deep, that a small quantity cannot be distinguished; nor would it be proper for the discharge of a small quantity of matter to incur that danger which always attends the free admission of air to the abdomen; and in small collections this could not be avoided, as the opening would require to be made in a slow gradual manner with a scalpel, as in such cases the trocar could not be plunged in without much risk of hurting the viscera. Instead of such an attempt, therefore, we should do nothing as long as the quantity of matter continues moderate, and while no bad symptoms have yet taken place. Indeed this should be a general rule in all wounds of the abdomen, never to inquire with much anxiety either for collections of matter, or for such parts as from the nature of the wound there might be cause to suspect should be injured, till the accession of bad symptoms renders it necessary: for much handling often does mischief; while frequently no danger ensues from wounds which at first were attended with very alarming symptoms. Nay, we know, that in different instances a person has been run through the body with a small sword without any of the viscera being injured, and the patient has done well, without any bad symptom taking place. And we likewise know, that violent inflammation will sometimes terminate favourably, without the formation of matter; and even when matter is formed, that it is sometimes carried off by absorption, so as to leave no vestige of its having ever existed. It is the actual presence, therefore, of bad symptoms produced by these collections of matter, or the quantity of matter becoming so considerable as to prove inconvenient to the patient, that should indicate the propriety of letting it out by making an opening into it. But as soon as we find this

to be the case, we should not hesitate; and whenever the quantity will admit of the trocar being employed, we may draw it off with ease and safety: for by inserting the instrument in an oblique direction, no air will be admitted; by which the chief risk which attends this operation will be avoided.

I have been the more particular upon this, from having known different instances of these collections ending fatally, where the matter contained in them was discharged, and where there was not previously any appearance of danger. As it was in all of them evident that matter was collected, an opening was made to discharge it; and as in all of them the matter was supposed to be seated either in a particular cyst, or in the substance of the muscles, and not in the cavity of the abdomen, it was done by making a small opening into it with a scalpel. But the most violent symptoms of inflammation occurred in the course of the first two days; and the patients soon died; and I conclude that it was by the free admission of air to the cavity of the abdomen that these symptoms were induced; for after death the matter was found to be lodged in that cavity; and I have since that time, in three similar cases, drawn large quantities of purulent matter off with a trocar, where it was evidently seated in the abdomen, without any bad consequences taking place.

In drawing off matter from the abdomen, we do it in the same manner, and under the same caution, as will be hereafter advised for the discharge of serum by the operation of the paracentesis, of which a particular account will be given in chapter XXV.

Penetrating wounds of the abdomen may prove dangerous from another cause. Considerable portions of the bowels are sometimes protruded, without any other injury being done to them; and this of itself may be productive of fatal consequences.

The most certain method of preventing danger in such cases, is to return the protruded parts quickly

into the abdomen. By many we are desired in the first place to foment the parts with warm emollient decoctions, or to cover them for some time with the web or omentum of some new killed animal: but these authors do not recollect, that during the time lost in making these preparations, the protruded parts may probably suffer more than can be gained by applying them; while surely the most natural, as well as the best fomentation for parts injured in this manner, is the heat and moisture of the patient's belly. In recommending these applications, it is said, that they not only remove the dry parched state of the parts which exposure to the air is apt to induce; but that they enable us to judge with more certainty whether they are in a state that admits of their being with safety returned into the abdomen or not: for it is alleged, even by writers of reputation, that parts which are apparently in a state of incipient gangrene, and which otherwise we might be afraid of pushing into the abdomen, may, by a proper use of these fomentations, be so far recovered as to render it safe and proper to return them.

But although this opinion has been very generally received, and the practice followed which it inculcates, it appears to me to be so fraught with impropriety and danger, that I did not judge it right to pass it over without mentioning in strong terms the idea I entertain of it. Much mischief may be produced by it, and I see no advantage that can accrue from it.

By many it is said, that no part of the intestines should be returned into the abdomen that have once acquired any tendency to gangrene, on account of the *fæces* being likely to burst into the abdomen, which undoubtedly would end in the death of the patient: when we are certain that this would happen by the parts being actually in a state of gangrene, to return them to the abdomen would no doubt be highly improper, as it would be depriving the patient of his only chance of recovering, that of securing the ends

of the found parts of the gut at the mouth of the wound, by which there might be some possibility of their uniting afterwards, as in different instances has happened; and by which he would at least be certain of having at all times a free discharge for the fæces. But although in this situation the practice to which I allude is to be considered as the only one to be adopted, yet when gangrene has not actually taken place, as there will still be cause to hope that the natural heat of the belly may tend to prevent it, the parts should be instantly returned.

When parts protruded from the abdomen are covered with sand, dust, or any other extraneous matter, it will no doubt be proper that this should be removed before they are replaced; and with this view, bathing them in warm milk, or in milk and water, may answer better than any other method. But this is perhaps the only cause that can render the practice necessary.

Some address is necessary in returning such parts of the intestines as have been protruded in the easiest manner. The patient should be put into that posture which will most effectually relax the parts in which the wound is seated, with his head and chest somewhat lower than the abdomen and buttocks, so that the weight of the bowels may tend to drag in the protruded parts. When in this situation, the surgeon having his fingers dipped in warm oil, should endeavour to replace the parts by beginning his pressure at the one end of the gut, and continuing it along the doubling or curvature to the other. In this manner, when the opening is not very small, any portion of the bowels will be replaced without any further enlargement of the wound: and when any part of the omentum, or any of the other viscera, are protruded, they will be still more easily returned. But considerable parts of the intestines are frequently pushed out at such small punctures, that they cannot be returned but with much more pressure than should ever be ap-

plied to them. In this case, our object will be more easily accomplished, and with less hazard to the patient, by enlarging the opening, than by the application of so much force as is generally required in pushing any considerable portion of gut through a small aperture. Some dexterity, however, is necessary in enlarging an opening in this situation. When the aperture is of such a size as to admit the finger of the surgeon, it may be done with ease and safety: but in some cases it is so completely filled with the parts which pass through it, that this is impracticable. In this situation, we are advised by authors to insert a director between the bowels and parts to be divided, and to enlarge the opening by cutting upon it, either with a scalpel or bistoury. This, however, must be attended with much hazard; for we can never distinguished with certainty whether some plies of the bowels are elevated by the director or not, as this will sometimes happen notwithstanding all our care to prevent it. Instead of following this method, I have in different cases enlarged the opening, by making an incision through the teguments and muscles with a scalpel, in the same gradual manner that we operate in cases of hernia; taking care, as soon as the peritonæum is laid bare, to introduce the end of a probe pointed bistoury between it and the cut, and dividing it as far as may be necessary, which now may be done with safety. If in this manner the opening is enlarged so as to receive the point of the finger, it may afterwards be increased at pleasure, by inserting the finger so as to act as a conductor for a bistoury or scalpel: but till it can be done in this way, no cutting instrument should ever be passed into the abdomen; for although much ingenuity has been shown in the invention of instruments with wings to protect the bowels in this part of the operation, yet none of them answer any other purpose than to render the operation more complex.

In enlarging a wound in this situation, it should be done as much as possible in the direction of the muscular fibres of the parts ; and, for an obvious reason, the incision should not commence at the top but at the bottom of the wound, and be carried downwards.

We may thus enlarge the opening to any necessary extent, always taking care not to make it larger than the nature of the case may require. And this being done, the protruded parts should be replaced with as much expedition as possible in the manner I have advised. In returning bowels to the abdomen, it has sometimes happened, through confusion or mistake in the operator, that they have been pushed in between the layers of the abdominal muscles. This should be guarded against with the utmost attention ; for when left in this situation, the patient will be nearly in the same danger as at first. Indeed this will be the case, if they be not placed altogether within the peritonæum.

The accident to which I allude may happen in any part of the belly, when a surgeon is not sufficiently accurate and attentive : but it is most likely to occur in wounds that pass through either of the recti muscles, owing to the sheaths of these muscles being particularly loose and flaccid ; and it will more readily happen in corpulent people than in others, owing to the great depth of fat and cellular substance, which, in subjects of this description, lie above and between the different muscles of the abdomen.

Instead of enlarging the opening in the abdomen, it has been proposed to discharge the air contained in the protruded portion of gut, by making holes in it with a needle, by which it may be so much diminished as to admit of its being easily replaced at the same opening. As this has been mentioned by writers of experience, I think it right to speak of it ; but it is chiefly with a view to caution the younger part of the profession against it. It may indeed be done with more ease to the operator ; but this appears to be the

only argument in its favour : for although some may have recovered on whom it has been practised, yet surely the smallest opening made into the gut must be attended with more danger than is likely to arise from the external opening in the teguments and muscles being somewhat enlarged. And besides, in reducing a portion of gut, however distended it may be with air, we may often render it perfectly flaccid, by pressing the air back into that part of the gut which remains in the abdomen ; and if done with caution, it may with entire safety be attempted. Indeed no trial should ever be made for the reduction of a portion of intestine much inflated, till we have endeavoured in this manner to reduce the size of it.

After the bowels are replaced, our next object is to preserve them in their situation till the wound is so firmly cicatrized that they may not again fall out. When the opening is small, this may be done by laying the patient in a proper posture, with his head and buttocks elevated ; by preventing costiveness ; and by a firm roller of flannel passed several times round the body, so as to support the injured parts till they are united. But in extensive wounds of the abdomen, it is found, even when they are treated with every possible attention, that it is difficult, and in some cases impossible, by ordinary dressings and bandages, to prevent the bowels from falling down. In such cases, we are under the necessity of drawing the sides of the wound together with sutures ; an operation commonly termed *gastrography*.

Various methods have been proposed for making this suture ; but the common interrupted suture, or the quilled suture, which is merely a variety of the other, answers the purpose better than any of them. Much care and attention, however, is necessary in passing it, particularly in avoiding the bowels, which every where lie contiguous to the parts to be united.

The surgeon being provided with a number of broad flat ligatures, sufficient for the extent of the

wound, and of a strength that will retain the parts together, each ligature should be armed with two large curved needles, one towards each end; and the patient being laid in a posture that most effectually relaxes the injured parts, the surgeon should now insert the forefinger of his left hand into the wound, and being sure that it is in contact with the peritonæum, without any of the bowels lying between them, he should now pass the point of one of the needles along his finger to the distance of an inch from the edge of the wound; and having secured the other end of it with the thumb and forefinger of his right hand, he must now push it outward, so as to make it pierce the skin at a similar distance from the wound in the teguments. One of the needles being passed, the other must in like manner be pushed through the opposite side of the wound, by passing it also from within outward. Both needles might indeed be passed by entering them outwardly, and pushing them in upon the finger; but we could not in this manner avoid the bowels with such certainty; a point of great importance, and therefore requiring the nicest attention.

The first needles should be passed within half an inch of the upper part of the opening; and the others should be continued to within an equal distance of the bottom, at the distance of three quarters of an inch from each other; for as the retraction of parts divided in this manner is more to be dreaded than any other occurrence, it ought in a particular manner to be guarded against. The ligatures being all inserted, the parts should now be supported by an assistant; and a proper knot being tied upon each of them, the whole extent of the wound should be covered with a pledget of lint spread with any adhesive ointment, for the purpose of preventing the air from finding access. After this the parts should be supported with a roller: the patient should be put to bed, and treated in the manner we have directed above, with bloodletting,

and a low regimen, in proportion to the violence of the symptoms which supervene.

In performing this operation, I have said that the ligatures should be continued to within half an inch of the bottom of the wound ; which is contrary to the usual practice. In general an opening is left beneath, with a view to discharge any matter that may form in the course of the cure ; but there is no sufficient reason for doing so. Instead of proving useful, it obviously does harm, by giving free access to the air, which in every wound of the abdomen should be particularly guarded against. The opening cannot be preserved without the assistance of a tent, by which much irritation and pain is induced ; nor does it ever answer the purpose of discharging the matter, if not accidentally situated near to the under part of the abdomen. I am clearly of opinion, therefore, that the whole extent of the wound should be treated in the same manner ; and if matter should afterwards form, that it will be better to trust to its being absorbed, than to place any dependence on this precarious method of cure.

Any practitioner who prefers the quilled suture, may easily convert the one that I have described into it, by introducing each of the ligatures double. After all the ligatures are passed, a small roll of plaster, or a piece of large bougie, should be passed through the different loops, which ought all to be on one side of the wound ; and a similar roll being placed on the opposite side between each of the ligatures, they must now be tied upon it with running or bow knots, of a due degree of tightness ; care being taken during this part of the operation, to have the sides of the wound properly supported by an assistant.

When the parts are properly and equally drawn together, we seldom find it necessary to remove the ligatures till the parts are united, which they commonly are in six or seven days if kept in close contact, and

if no unufual caufe has occurred to prevent it. But when the ligatures give much pain, and the patient complains of much tenfion over the abdomen, the knots fhould always be untied and kept perfectly loofe, till by bloodletting, fomentations, and gentle laxatives, thefe fymptoms are removed, when the parts may be again drawn together and fecured as before.

I have hitherto been fuppoſing that the protruded part confiſts of a portion of the alimentary canal only, this being the part which in wounds of the abdomen is moſt frequently pushed out; but, it is proper to remark, that the other viſcera are alſo liable to be protruded, particularly the ſtomach and omentum. This, however, does not vary the method of treatment, which ought to be nearly the ſame, whichever of the viſcera are pushed out. The parts ſhould in every inſtance be replaced as quickly as poſſible, and retained in the manner I have mentioned.

We are now to conſider the treatment of wounds in the abdomen accompanied with injuries done to one or other of the viſcera. And in the firſt place, I ſhall ſpeak of wounds of the alimentary canal, as being both moſt frequent and moſt apt to induce important conſequences.

§ 4. *Of Wounds of the Alimentary Canal.*

IN a former part of this ſection, I have obſerved, that wounds of the intefines may be diſcovered by the diſcharge of blood from the mouth and by the anus, as well as by the diſcharge of fæces from the wound in the teguments: we likewiſe judge of this point by the diſcharge of fetid air from the wound, and from the depth and direction in which the inſtrument appeared to run.

By theſe circumſtances being kept in view, and the ſymptoms which wounds of the intefines commonly produce, being duly conſidered, ſuch as nauſea, ſickneſs, violent gripes, or pains through the abdomen,

cold sweats, and faintings, we may in general decide with certainty whether the gut is injured or not. But unless the wounded part is brought into view, little or no advantage is gained by the discovery; for, while it remains undiscovered, our method of treatment must be nearly what ought to be advised for wounds which merely penetrate the cavity of the abdomen. Authors indeed direct us to search for the wounded part of the gut; but as the danger arising from thus exposing the contents of the abdomen, would probably be more than that of allowing the wounded part to remain, this attempt ought never to be made; especially as we know that wounds of the intestines have healed without the injured part being discovered.

When we find, however, that a wound is inflicted on a portion of protruded gut, it ought not to be replaced till the opening is secured with ligatures.

Different methods are proposed for this. Le Dran thinks that it may be done with most safety by what he terms the looped suture; while the generality of practitioners prefer the Glover's suture. The looped suture is performed in the following manner: one end of the wound is to be held by an assistant, while the surgeon does the same with the other; and the needles, which should be round, straight, and small, carrying each of them a thread a foot long, must be equal to the number of stitches intended to be made. As many of the ligatures are now to be passed through both lips of the wound as appear to be necessary, taking care to keep them nearly a quarter of an inch from each other. The threads being all passed, and the needles removed, all those on one side of the cut must be tied together with a knot at their ends, and those on the opposite side must afterwards be secured in the same manner. They are now to be joined together, and twisted two or three times round, so as to form a kind of a cord: by this means the divided parts of the intestine are puckered together, so that

the stitches, which before were distant about a quarter of an inch, are now brought close to each other. The future being thus finished, an assistant must hold the two ends of the twisted threads, whilst the surgeon replaces the intestine in the manner that has been already described. The threads are to be secured to the bandage employed for covering the dressings; and after remaining till the wound in the gut may be supposed to be healed, they are then to be untwisted; and all the ends of one side being cut off close to the external wound, they must now be drawn slowly and separately away.

The principal objection to this method of stitching these wounds is, that in some degree it must contract the diameter of the gut, by which dangerous obstructions might afterwards be produced. Instead of it, therefore, the Glover's future, as it is termed, is commonly practised. In making this future, a small, fine round needle should be used, armed with a thread of waxed silk. The surgeon laying the lips of the wound exactly together, must perforate both at the same time; and carrying the needle to the same side at which it entered, he must now make a second stitch at a small distance, namely, at the eighth part of an inch from the first; and in the same manner must continue, by a proper number of stitches, to draw the whole extent of the wound together. This being done, a sufficient length of the thread is to be left out at the external wound, for the purpose of drawing it away when we suppose the wound in the gut may be united.

Even this method of treatment, however, must tend to lessen the diameter of the gut, a difficulty which may be avoided, and the operation be performed with the same degree of security, by entering the needle always from the inside of the gut, and pushing it outward. The operation should commence near to one end of the wound: the needle being pushed through one side of the gut, the ligature should be drawn for-

ward, and retained by a knot formed on the end remaining in the inside. The needle must now be carried straight across, and entered in a similar manner, so as to pierce the opposite side of the wound also from within; but the following and every succeeding stitch will not be opposite to each other. When the operation is rightly performed, the needle will be carried from one side of the wound, in a diagonal line, to the other, and will enter the gut at the distance of two tenths of an inch from the point from which it came on the opposite side. In this manner the sides of the wound may be drawn closely and exactly together, without lessening the diameter of the gut in any degree; and the end of the ligature may at last be secured and cut off close to the other extremity of the wound, if the gut is to be put freely into the abdomen; or it may be left of a sufficient length to hang out at the wound in the teguments, if it is the meaning of the operator to retain the wounded part of the intestine in contact with the external opening. This indeed is usually done, that we may have it in our power, as it is said, to draw away the ligature on the wound of the gut being cured. It is probable, however, whatever future may be employed, if more than one or two stitches have been passed, that it will be difficult, or even impossible, to get the ligature away, without hurting the intestines. I would never advise, therefore, with a view to this, that the ligature should be left out at the wound; less danger will arise from cutting it entirely away, and allowing the stitches to remain: a considerable part of it will fall into the cavity of the gut; and in such circumstances, the danger of the patient from other causes is so great, that any additional risk that can occur from the remaining part of it, must be so trifling, as not to deserve notice. But in extensive wounds of the intestines, and whenever there is much cause to fear that the operation will not succeed, with a view to prevent the fæces from being emptied into the abdomen, it may be proper, by means

of the thread used for the ligature, to retain the injured part in contact with the wound in the peritonæum. But of this we shall presently speak more particularly.

This is the method of treatment which I would advise when the gut is not cut entirely across; and, however small a wound of the intestines may be, it ought always to be secured with a ligature: for although it is alleged by some, that we should rather trust to nature for the cure of a small opening in a gut than to insert a ligature; to me it appears that the opinion is by no means well founded; insomuch that I would not leave even the smallest opening that could admit either fæces or chyle to pass without stitching it up. Much danger may ensue from omitting it, and the hazard of the patient cannot be increased by the practice being adopted.

When again, any part of the alimentary canal is cut completely across, a difference of practice is required. When both ends of the divided gut protrude at the wound, it should be our endeavour to bring them into contact in such a manner as to admit of their uniting; and it may be done in different ways. It has been done by stitching the two ends of the gut to the peritonæum and abdominal muscles, exactly opposite and contiguous to each other; and although in this manner the fæces must be discharged for some time by the wound, yet different instances have occurred of the two ends of the gut adhering together, and being completely united in the course of a short time: of this several cases have fallen within my own observation.

In such circumstances, we are commonly advised to plug up the opening in the end of the upper extremity of the gut, not only with a view to keep the patient clean and comfortable, by preventing the fæces from being at all times pushed out, but to prevent, as we are told, the gut from contracting, and its diameter from being reduced. I am convinced from experience, however, that this precaution is unnecessary;

and I know that it proves hurtful. Instead of introducing tents or dossils, the outward fore should be dressed as lightly as possible; and if care is taken to keep the patient clean, nature alone will do the rest.

This is, perhaps, the best method of managing this variety of wound; but the same intention may be answered by inserting the upper extremity of the divided gut into the end of the other, and stitching them together. In this situation it would be difficult to draw the divided parts together with a needle and ligature, without hurting the opposite sides of the gut, in any other way than by keeping it extended by means of some round body inserted into it. For this purpose it has been proposed to make use of a tube of thin paste-board or paper; but as this might be laid hold of, and kept firm by the ligature, a small roll of tallow is preferable, as the tallow will afterwards melt, and pass easily off with the fæces. A piece of it, nearly equal to the diameter of the gut, should be inserted into the end of the upper part of it; and being afterwards passed into the other, so as to carry the one, to the extent of an inch or thereby, into the other, the two portions of gut should be now stitched together with a small round needle armed with a fine thread. The stitches should be carried completely round the gut; and, in order to give them as great a chance as possible of succeeding, they might even go twice round; first at the edge of the under portion of gut, and afterwards about an inch beneath, near to where the upper part of it terminates.

In the insertion of one extremity of the gut into the other, I have desired, for an obvious reason, that the end of the upper portion should be put into the other; but it requires some attention to make the distinction. The peristaltic motion is commonly more remarkable in the upper division than in the under; but the most certain method of judging, is to observe at which of the ends the fæces or chyle are discharged: an inversion of the usual motion of the bowels might indeed

produce a deception ; but as this is not a common occurrence, we are not to suppose that at this particular time it is likely to happen.

In wounds of these parts, a portion of divided gut sometimes hangs out at the wound, while the other end of it has slipped into the abdomen. In such circumstances, authors in general advise the end of the gut to be stitched to the peritonæum and other parts contiguous to the wound. If it proves to be the upper part of the gut, the patient, it is said, may live under the inconvenience of an artificial anus, and if not near to the upper part of the small intestines, that a sufficient quantity of chyle may be carried into the blood for his support and nourishment. But in the event of its proving to be the under part of the gut, although death would certainly ensue, were we to rest satisfied with this, it has scarcely been supposed that we ought to proceed further.

I clearly, however, think, that this will never prove satisfactory to the feelings of any practitioner possessed of that degree of fortitude which our art requires, and who has that regard for the safety of his patient which every surgeon ought to possess. And although I have advised, in wounds of the intestines, when no part of them protrudes, where we cannot therefore know whether the wound is large, or only a small puncture, and where the injured part may be so situated that it could not be reached without opening the greatest part of the abdomen, and turning out perhaps the whole alimentary canal, that we had better allow the patient to have the chance of recovering without any attempt to make a discovery, and which he may do if the wound is small, than to propose a measure, which of itself might be productive of more hazard than the injury for which it was meant to be a remedy. Yet, when we are certain of the gut being completely divided by one end of it hanging out of the wound, as this will give much cause to imagine that the other is at no great distance, I think it ought by

all means to be searched for, by enlarging the external wound, so as to admit of the fingers of the operator being inserted into the cavity of the abdomen. Even where the upper part of the gut is protruded, it is worth while to submit to this inquiry, merely in order to have some chance of avoiding the loathsome inconvenience of an artificial opening for the fæces; and, where the upper part of the gut has slipped in, the patient can have no chance for further existence if it is not discovered. In such circumstances, therefore, we should not hesitate on the measures to be pursued.

In wounds of the abdomen, the intestines, besides being protruded and wounded, are sometimes mortified; and they are sometimes mortified without being wounded. But whether mortification be combined with a wound or not, the method of treatment should be nearly the same.

Where only a tendency to gangrene takes place, from the parts being much inflamed, they should be returned immediately into the abdomen, for the reasons that I have given already. But whenever they are entirely mortified, the black dead spot will soon fall out, and the remainder being thus reduced nearly to the state of a sore from any other cause, the same method of cure will become applicable.

Authors, in general, have treated of wounds of the small and great intestines separately; but no necessity appears for this; they are nearly of the same nature, and require the same method of treatment. The least injury done to the bowels is always hazardous, and in every instance our prognosis should be doubtful. But it is said, that wounds are more particularly dangerous in the small than in the large intestines; from their being more apt to induce violent degrees of inflammation: I have not observed, however, that this is confirmed by experience.

§ 5. *Of Wounds in the Stomach.*

IN wounds of the abdomen, we conclude that the stomach is injured, from the part at which the instrument entered, and from the depth and direction in which it appeared to run; from the patient being seized with vomiting of blood; from his complaining of a great and unusual degree of sickness; of languor and singultus; and from the food and drink being discharged at the wound soon after they are swallowed.

All wounds in the upper part of the left hypochondrium which pass to any considerable depth, as likewise those of the epigastrium, can scarcely avoid the stomach; but wounds of any part of the abdomen may reach it when they run in an oblique direction; and, it ought to be noticed, as I have elsewhere observed, that wounds may penetrate the stomach when it is full, which would not touch it when empty.

Wounds of the stomach must always be considered as dangerous, and a doubtful prognosis only should be given; for although many instances are recorded of their being cured, yet they are not so frequent as to warrant us in the course of practice to expect them.

The same plan of treatment which I have advised in wounds of the intestines* applies with equal propriety to wounds of the stomach. When the wounded portion protrudes, it should be stitched up, and replaced as quickly as possible. But even where it does not protrude, it ought to be searched for; and when the anterior part of the stomach only has suffered, it will not be difficult to discover. We should not, however, be deterred from the inquiry by the seat of the wound; for we may be able to reach it wherever it may be, excepting in the posterior part of the stomach.

* Section VI. of this Chapter.

It is to be observed, that wounds of the stomach are more readily discovered than wounds of the intestines; for these last are more concealed by convolutions of themselves, as well as by other viscera.

In wounds of the stomach and bowels, the patient should be put upon as strict a regimen as his strength will bear: not only with a view to prevent inflammation, which, as I have formerly observed, is the most dangerous symptom that can occur, but to prevent the injured parts from being distended, by which they might be materially hurt. Instead of regular meals, a spoonful or two only should be allowed at once; and no more should be given even in this way than is merely necessary to support life. In wounds of the stomach and upper part of the intestines, we might venture in a great measure, and at least for several days together, to trust to nourishing glysters: but this should be carefully avoided in wounds of the great guts; as the injected liquor might more readily be forced in this way into the cavity of the abdomen than if taken by the mouth.

§ 6. *Of Wounds of the Omentum and Mesentery.*

I HAVE already described the situation of these parts; but we have no means of judging whether they have suffered in wounds of the abdomen or not, if they are not protruded.

When it is found that a protruded portion of omentum is injured, we ought to see whether any part of it is nearly separated from the rest or not: for whatever part of it is in this state should be immediately removed; or when it has become cold, with much reason to dread that it will mortify, it will be proper to remove it also. But when no appearance of this takes place, we should advise it to be immediately returned into the abdomen.

In chapter IX. when treating of hernia, it will be necessary again to enter upon the consideration of

this ; at present, therefore, we shall refer to that part of our subject.

In wounds of the mesentery, what we have most to be afraid of, is the discharge of blood or chyle into the cavity of the abdomen ; for as the lacteals, together with a great number of arteries and veins, run in the duplicature of this membrane, it can scarcely be injured without some of them suffering. Whenever any portion therefore of the mesentery protrudes, it ought to be examined with accuracy : and when any of its arteries are divided, they should be immediately tied with ligatures ; the ends of which being left out at the wound, will admit of their being taken away as soon as they are entirely separated.

§ 7. *Of Wounds of the Liver and Gall Bladder.*

FROM the anatomical description that I have given of the contents of the abdomen, it appears that the liver will be apt to be hurt by every wound that penetrates either the right hypochondrium or epigastrium.

The liver does not appear to be possessed of much sensibility : many instances have occurred where superficial wounds of the liver have healed with the same ease, and have not induced more alarming symptoms than usually arise from wounds of the same extent in any other part of the body. But wounds of the liver which pass to any considerable depth, are always to be considered as dangerous, from the great quantity of blood which is sent to it, as well as from the interruption which they may give to the formation of bile, one of the most important secretions in the body : and they are apt to prove particularly hazardous, from their allowing the bile, which soon becomes putrid, to be poured into the cavity of the abdomen.

We judge of the liver being hurt, from the situation and depth of a wound ; from the quantity of

blood that is discharged being more considerable than could probably be afforded by any blood vessels of the integuments or muscles; from bile being discharged along with the blood; from bile tinged with blood being carried into the bowels, and discharged both by the stomach and anus; from the abdomen being apt to swell and become tense; and from pain being felt on the top of the shoulder, a frequent symptom in different affections of the liver.

All that we can do in wounds of the liver, is to guard as much as possible against excessive hæmorrhagies, and to discharge any collections of blood or bile that may form in the abdomen when they become considerable. We endeavour to prevent or put a stop to the hæmorrhagy by bloodletting, gentle laxatives, keeping the patient cool, and at perfect rest both in body and mind. And we discharge collections of blood, bile, or matter, by making an opening in the most depending part of the abdomen, or wherever they may happen to form.

Wounds of the gall bladder are by experience found to prove more dangerous than wounds of the liver; for they are still more difficult to heal, at the same time that they are more certainly productive of extravasation of bile into the abdomen. Instances indeed have happened, of the bile being so completely obstructed in its passage from the gall bladder to the duodenum, that the bladder has swelled so as to produce much external tumefaction: and, in some cases, these swellings, after bursting or being opened, have continued to discharge bile for a considerable time; and at last have been known to heal without producing any extravasation into the abdomen, or other alarming symptoms. This, however, proceeds from the previous distension of the bladder having produced adhesions between it and the neighbouring parts; by which, when an opening is made into it, the bile is prevented from spreading. But few instances have occurred of wounds in the gall bladder having this fa-

vourable termination. To procure as free a vent for the bile as possible, and to discharge it by an opening, such as I have mentioned, when it collects in the abdomen, is perhaps all that art ought to attempt.

§ 8. *Of Wounds of the Spleen, Pancreas, and Receptaculum Chyli.*

WHEN the spleen is laid bare, we easily discover whether it is injured or not; but as this organ does not afford any particular secretion by the appearance of which we might be determined, and as wounds of it do not excite any remarkable set of symptoms, it is difficult to judge merely from the depth or direction of a wound, whether it is hurt or not. It is observed, indeed, that blood discharged immediately from the spleen is of a peculiar deep red colour; but this test is not entirely to be trusted; nor are we to conclude from the quantity of blood being considerable, which a wound in the region of the spleen may discharge, that the spleen itself is certainly injured; for it lies so near to large blood vessels belonging to other viscera, particularly to the emulgent arteries and veins, that no certain judgment can be formed from this circumstance.

The same observations which we have made upon wounds of the liver, will apply with equal propriety to wounds of the spleen; only we may suppose, that the danger attending the latter will not be so considerable, as they will not put a stop to any material secretion.

As the pancreas lies deeply covered with the other viscera, any injury done to it can seldom be discovered: but as a division of the duct of this gland will prevent the secretion which it affords from being carried to the bowels, this may, by interrupting or impeding digestion, do much injury to the constitution; and as the liquor will be effused into the cavity of the abdomen, it may thus be productive of collections,

the removal of which may ultimately require the assistance of surgery.

Wounds of the receptaculum chyli will be distinguished from their situation, and from the discharge being a thin milky liquor. They must necessarily be attended with much danger, as they will deprive the patient of the greatest part, or even of all the nourishment which he ought to derive from his food. They can never in any way become the object of surgery, but by producing collections in the abdomen which may require to be discharged.

§ 9. *Of Wounds of the Kidneys and Ureters.*

IN a subsequent part of this work,* I shall have occasion to mention the situation of the kidneys; an accurate knowledge of which is an object of much importance in judging whether penetrating wounds in these parts may have injured them or not; but, in general, this may be ascertained by the symptoms which take place.

The external coverings of the kidney may be hurt without any symptom of importance being induced; but neither the pelvis of the kidney, nor the ureters, can be penetrated without producing some or perhaps all of the following symptoms: the patient complains of violent pain, not merely in the part itself, but over the whole loins; in the groin, yard, and even in the testicles; he is liable to severe sickness and vomiting; the urine is passed with pain and difficulty, and along with it more or less blood is usually discharged; and although the greatest part of the wound may heal, a fistulous opening commonly remains during life.

When the kidney is pierced by a wound entering from the belly, the urine is apt to be extravasated into the cavity of the abdomen: but when wounded from the back, or even from the side, the urine will

* Vide Chapter XV. Section II.

either pass directly out at the opening, or it will spread through the contiguous cellular substance; for the kidney being situated behind the peritonæum, the urine will not in this case find access to the belly. The risk, therefore, with which wounds of this organ may be attended, will depend in a great measure on this. When the urine passes into the abdomen, the danger will be very great; but when this does not happen, if the patient survives the hæmorrhagy which at first takes place, he may have a tolerable chance to escape with the inconvenience of a fistulous opening, at which the urine will continue to be discharged. Instances indeed have occurred, even of this being at last cured; but they are so rare that they are scarcely to be looked for. All that art can in such circumstances with propriety attempt, is to prevent the urine from lodging; and, if the sides of the opening become callous, to render them raw from time to time, either with the scalpel or lunar caustic, by which they may at last be made to unite.

§ 10. *Of Wounds of the Bladder.*

THE bladder, when empty, lies altogether within the bones of the pelvis; but when filled with urine, it rises much higher, insomuch, that when the urine is long obstructed, the belly not unfrequently rises above the umbilicus. In judging, therefore, whether injuries done to these parts have penetrated the bladder or not, we must know whether it was empty or full. But for the most part this point is easily determined; as in general the urine comes away by the wound, and even that which passes by the urethra is at first always tinged with blood.

The danger arising from wounds of the bladder is in some degree in proportion to their situation. As the upper part of the bladder lies within the cavity of the abdomen, punctures that penetrate into it are apt to produce an extravasation of urine into the belly, by

which the most dangerous symptoms are commonly induced: while the under part of the bladder, not being covered with the peritonæum, is often wounded, without any symptom of importance taking place, as we daily observe in the operation of lithotomy, as it is now practised in the lateral method.

The pain that attends wounds in the bladder is often relieved by fomenting the under part of the abdomen and peritonæum, with flannel pressed out of warm water; while by taking blood in proportion to the strength of the patient, advising gentle laxatives, and a low diet, we endeavour to prevent inflammation, the most dangerous symptom attending wounds of this organ. And when inflammation has already taken place, we try to remove it by farther evacuations of blood; by doses of opiates proportioned to the degree of pain; and by the femicubium. Indeed, warmth applied in this manner seems to have a more certain effect in removing the pain and tension of the abdomen which these wounds are apt to induce, than almost any other remedy.

When, again, the upper part of the bladder is injured, together with the risk which occurs from inflammation, we have the additional hazard, that I have already taken notice of, arising from extravasation of urine.

As the danger with which this is attended is always very considerable, especially when the urine passes into the abdomen, it might give the patient some further chance of recovering, to treat wounds of this kind in the bladder upon the same principles, and in the same manner, that I have advised for wounds of the intestines; that is, by stitching up the wounded part either with the Glover's suture, or in the manner I have proposed in a preceding part of this section, as may be seen in § 4. The Glover's suture might answer equally well with the other; and here it might be used with more freedom than in the intestines, as the

bladder can more readily admit of being somewhat diminished in its capacity. As yet I have not put this proposal in practice, but I mean to advise it in the first instance that may occur.

To prevent the inconvenience and danger arising from the extravasation of urine into the abdomen, it has been proposed to draw the opening in the bladder forward to the external wound, and to stitch it to the peritonæum and contiguous parts. This may be easily done when the anterior part of the bladder is wounded; but when the opening lies behind, to draw it forward and retain it at the wound would be productive of much pain, and might ultimately be attended with more danger than it was meant to prevent. In such circumstances, I would rather trust to the wound being neatly stitched up, when the parts should be immediately replaced, and the patient treated in the manner I have advised for similar injuries done to the intestines.

§ 11. *Of Wounds of the Uterus and its Appendages.*

THE uterus is a strong muscular bag peculiar to the female sex, of a triangular figure, and situated between the bladder and rectum. In an unimpregnated state, it lies altogether within the bones of the pelvis: but during pregnancy, it rises so high in the abdomen as to touch the umbilicus and even the stomach; while at the same time, the inferior point of it, termed the os tinæ, terminates in the vagina, a smooth membranous sheath which runs contiguous to, and terminates beneath, the urethra.

The uterus is firmly attached by different ligaments to the contiguous parts: by the ligamenta lata on each side, which appear to be doublings of the peritonæum; and by the ligamenta rotunda, which arise from the upper corners of the fundus uteri, and passing down through the openings in the external oblique muscle, are lost in the upper part of the thigh. By

the tubæ fallopianæ, which arise near to the ligamenta rotunda, the uterus communicates with the ovaria, two small round bodies placed within an inch and a half of its fundus.

From the uterus stretching, and occupying different parts in the different periods of gestation, it is evident that wounds, which in one state might injure it, in others will pass considerably above it: so that in judging from the situation and direction of a wound in these parts, this circumstance ought not to be overlooked: in extensive wounds, we may know at once, by examination with the fingers, whether the uterus is injured or not: but in others, where this is not admissible, we must judge entirely from the symptoms which take place.

In an unimpregnated state, a wound of the uterus is not productive of symptoms very different from those arising from wounds of the contiguous parts. But during pregnancy, wounds of this organ either induce symptoms of an approaching abortion; or the quantity of blood discharged outwardly by the wound, or extravasated into the cavity of the abdomen, will be considerable. At least this in general is the case, when the injury is important; for, during pregnancy, the quantity of blood sent to the uterus is considerable; and we know from experience, that hæmorrhagies which occur from it in this state, seldom stop till after delivery; by which the uterus is allowed to contract, so as to compress and support the injured vessels.

In all injuries, therefore, of this kind, where symptoms of approaching abortion occur, nothing should be done to prevent it; and where symptoms of this kind do not take place, and whenever there is cause to suspect that the patient may suffer from loss of blood, if the delivery cannot be accomplished in the usual way, the child should be taken out by the cæsarion operation. In a subsequent part of this work I shall have occasion to describe the method of perform-

ing this operation ; but in cases such as we are now considering, the easiest, and perhaps the best, method of doing it, is to enlarge both the external opening and the wound in the uterus to a size that will admit of the child being taken out. In other circumstances, wounds of the uterus must be managed nearly in the same manner with other penetrating wounds of the abdomen.

Besides the several viscera in the abdomen and pelvis, which we have thus been considering, many large blood vessels and nerves pass through these parts, which are also liable to be wounded : but as no remedies with which we are acquainted can afford any relief in divisions of the nerves ; and as the large blood vessels here lie too deep for any surgical assistance, they very universally end fatally. A patient may indeed linger long under the paralytic symptoms which succeed to injuries done to these nerves ; but a division of the large blood vessels of the abdomen in every instance proves quickly fatal.

I have thus finished the consideration of wounds of the thorax and abdomen ; and it will be observed, that I have entered minutely into it. To this I was induced, not merely by the importance of the subject, which I consider, however, as one of the most material that practitioners meet with, but with a view to excite the attention of beginners to an intimate acquaintance with the most useful part of anatomy, that of the thoracic and abdominal viscera.

In the preceding sections I have treated separately of all those wounds, which, from the situation, or any other peculiarity of the injured parts, may require any variety in the method of treatment. The extremities indeed are liable to wounds which require a mode of management that I have not yet spoken of, namely, those wounds which are complicated with fractures of the contiguous bones : these, however, will more properly fall to be considered when we come to treat of compound fractures. The only other varieties of

wound which we have now to speak of, are poisoned or envenomed wounds, and gunshot wounds.

SECTION XIII.

Poisoned Wounds.

WOUNDS may be poisoned in various ways : the bites of several animals, particularly those of the viper, afford examples of poisoned wounds ; and the stings of the tarantula, of wasps and bees, are of the same nature. It is evident, too, that poison is conveyed to wounds by the bites of mad or enraged animals, particularly by the bites of mad dogs : and they may be poisoned by the matter or secretion of various kinds of sores, as well as by the juices of different vegetables.

The stings of wasps and bees, and other insects of this climate, although productive of much pain, seldom terminate in any symptom of importance : the application of vinegar or spirit of wine to the part affected immediately after the injury, will often prevent the pain, tension, and inflammation, which otherwise would supervene : and when once these symptoms take place, they will for the most part be more effectually relieved by washing with cold water, or immersing the parts in water, than by any other remedy. For the sting of a scorpion, we are advised to kill the animal, and apply it to the injured part, or to cover the part with a dead toad or some other animal supposed to be of a poisonous nature. There is much cause, however, to imagine that this practice is founded in prejudice ; and we are told, that of late the same remedies have been found to prove useful in the stings of insects in warm climates, that we have just men-

tioned for the stings of bees and other insects of this country.

As the bite of a viper proves sometimes fatal, it deserves at all times particular attention. It is true, indeed, that it often heals easily without any symptom of importance being induced by it; for the poison of this animal being contained in a small bag at the root of each tooth, which it can discharge or retain at pleasure, it would appear that it does not throw it out if it be not excited to irritation. But as we can never judge with certainty whether the wound be poisoned or not, we ought in every case to be upon our guard. To prevent the poison from entering the system is the object we should have in view. This, however, can only be done when the assistance of practitioners is procured immediately: for although there is reason to suppose that some other poisons, even when applied to recent wounds, do not immediately enter the circulation; yet we know from various circumstances, that this is by no means the case with the poison of the viper, which commonly begins to operate upon the system in the space of a few hours. The patient complains of a violent burning pain in the injured part, which soon begins to swell. Tension and inflammation take place, not merely over the affected limb, but often over the whole body. The patient becomes faint and languid, the pulse low and feeble; he complains of giddiness, nausea, and vomiting; of a fixed pain in the region of the heart; the whole surface of the body becomes yellow like the skin of a jaundiced patient; the urine appears of a deep yellow, and is evidently strongly impregnated with bile; cold sweats take place, along with convulsive twitchings in different parts of the body; and if relief is not quickly obtained, death soon closes the scene.

With a view to prevent the accession of these symptoms, the injured part should either be cut out immediately or destroyed with the actual or potential caustery. The sooner this is done, the more effectual it

will probably prove ; but it should always be advised as long as no bad symptom has appeared. In former times suction was much employed for the removal of poison in wounds ; in some cases by instruments kept for the purpose, but most frequently by the mouth ; and it was found, where the skin of the mouth was entire, that it might be done with safety. This might frequently prove successful ; but where the life of a patient is so nearly concerned, that remedy only should be advised which will with certainty prevent the poison from entering the blood. We should not therefore hesitate to advise the injured part to be immediately cut out ; and with a view to render the practice as effectual as possible, we should endeavour to excite a plentiful suppuration over the surface of the fore. This may be done by the application of stimulating ointments, when the patient does not complain of pain and tension ; and by the use of emollient poultices, when much inflammation takes place.

But when it appears that the poison has already entered the system, this local treatment of the fore is not to be trusted. In such circumstances, the application of warm oil, not merely to the fore, but over the whole body, has been much recommended ; and it is said that some advantage has been derived from the internal exhibition of oil : two spoonfuls of fine olive oil, given every hour, is said to have allayed the most violent symptoms which the bite of a viper ever excites. From some late observations, however, the efficacy of this remedy is much to be doubted ; and it would appear that a plentiful sweat, kept up for a considerable time, is the most certain method yet discovered, not merely of mitigating the symptoms, but of removing them altogether. By whatever means a sweat is induced, it is found to prove useful : but experience shows, that small doses of the volatile alkali, frequently repeated, is for this purpose more to be trusted than any other remedy. A particular preparation of this kind, *eau de luce*, has been much re-

commended ; twenty drops of it to be given every hour. But there is reason to suppose, that any other form of the volatile alkali will prove equally effectual.

All the varieties of theriac, as well as many other remedies, are recommended for the bites of vipers ; nay, different remedies are advised for the bite of every variety of this animal. But as we do not find that any of them are to be trusted, it is not necessary to enumerate them.

The most formidable wound of a poisoned nature which we meet with in this country, is the bite of a mad animal : for although instances daily happen of these wounds healing without exciting any symptom of importance, yet whenever they terminate in hydrophobia, the utmost danger is to be dreaded. Indeed the instances of patients recovering from this dreadful symptom are so rare, that we despair in every case of any remedy proving useful : a variety of nostrums have been held forth to the public, by which we are told that hydrophobia may not only be prevented, but even cured when it has actually taken place. I have not heard, however, of any well attested fact of this having happened.

As a preventative of hydrophobia, nothing with which we are acquainted can be depended on, but an immediate removal of the injured part, either with the scalpel, or the actual or potential cautery ; which, when accompanied with a plentiful suppuration upon the sore, has, in different instances, appeared to answer the purpose : that is, patients who have been treated in this manner have escaped, while others bit at the same time by the same animal have suffered.

The sooner that the injured part is removed, the more effectual the operation will prove : but we had better advise it even at the distance of several days, than deprive the patient entirely of the chance which it affords ; especially as there is reason to imagine that this poison does not enter the system so quickly as a variety of others are observed to do ; at least this must

be the case, if we can judge from the time at which it begins to operate. For we know, that in most instances none of the symptoms induced by the bites of mad animals, appear till several weeks after the accident; and it has been known that a person has remained perfectly well after the bite for the space of six months, and at last has been suddenly seized with hydrophobia. Whenever we are certain, therefore, that a person has been bit by an enraged animal, we should advise the part to be cut out at whatever period this may be, provided no symptom has appeared of the poison having entered the system, at the same time that the fore should be kept open for a considerable time by the application of some irritating ointment.

While we place most confidence in this treatment, the advantages to be derived from other remedies should not be neglected. Sea bathing has in all ages been much famed as a preventative of these symptoms: we have few well attested cases, however, of any benefit being procured from it. By many practitioners, mercury is much depended upon, particularly frictions with mercurial ointment, and applying it as a dressing to the fores; and as this may be employed along with any other plan of treatment that may be adopted, it may be right in every case to advise it.

It will often happen, however, that neither these nor any other means we can employ will prove useful; and as the province of surgery affords no remedy for the symptoms which accompany hydrophobia, as soon as they take place, the unhappy sufferer should immediately receive all the assistance which physicians of experience and observation can give.

When wounds are poisoned by the matter of discharges, as sometimes happens to surgeons in the treatment of fores, particularly in those of the venereal and cancerous kinds, the best practice would be to remove the virus immediately, in the manner I have just men-

tioned in cafes of poisoned bites, by cutting out the part affected, or burning it with a hot iron. With respect to the veneréal poison, a timid patient may indeed hesitate in the use of such a formidable remedy, when he knows that we are possessed of an antidote which seldom fails : many, however, would endure the momentary pain of a burn or a cut, in preference to the slow operation of a mercurial course. And in cafes of fores coming into contact with the matter of a cancer, we should not hesitate in adopting the practice immediately ; for hitherto we are not possessed of any remedy upon which dependence can be placed for the cure of this disease.

This would likewise be the most eligible practice in wounds infected with any of the vegetable poisons. We are told, however, that in those parts of the world where alone it can be necessary, antidotes are universally known for every poison of this kind ; and that the Indians, when they are wounded, can discover immediately whether the instruments with which they are hurt have been poisoned or not.

With respect to metallic poisons, they do not at present fall within our consideration ; for however deleterious they prove when taken into the stomach, they do not appear to prove otherwise hurtful when applied to wounds, than by irritating or corroding the parts with which they come in contact. We are told, indeed, that instances have occurred of these poisons entering the system even when applied to wounds ; and this is mentioned as a reason for our not using the different preparations of lead with such freedom as is now universally done. But although remedies of this class are now daily employed, I have not heard of a single well marked case of their proving noxious : nay, it is to be doubted, whether even the salt or sugar of lead, as it is termed, proves hurtful, even when taken in considerable quantities into the stomach. We know that in small doses it may be used with safety ; and I have much reason to think

that it may be taken even in large quantities, with more freedom than is commonly imagined, from its having happened in different instances with patients of my own, who by mistake have swallowed and retained large cupfuls of a strong solution of cerussa acetata, without any bad symptom being induced.

SECTION XIV.

Of Gunshot Wounds.

AS wounds made by fire arms are supposed to be very different from others, they are usually treated of in separate chapters. I think it right to adhere to a custom which has long prevailed; but at the same time I must observe, that this difference consists chiefly in the symptoms being for the most part more severe and violent in gunshot wounds than in others. Till of late, most of the symptoms induced by gunshot wounds were supposed to originate from poison carried in with the ball; and it was also imagined, that the ball cauterized or burned the parts as it passed along. We now know, however, that these opinions are both ill founded; that the injured parts do not suffer either by poison, or from the immediate application of heat; and that all the phenomena peculiar to gunshot wounds, proceed from the violent contusion produced by the passage of the ball. Of this we are rendered certain, from there being no poison contained either in gunpowder, or any of the articles of which balls are usually made; and from observing that symptoms of a similar nature are often induced by contused wounds produced by very different causes.

We may, therefore, with much propriety, say, that gunshot wounds are altogether of the contused kind;

an idea consonant to the method of cure, and which will tend to do away that mystery which hitherto has tended to overshadow this branch of practice. It has been a prevailing opinion, that there is something so singular in the nature of gunshot wounds, as to render it improper for any practitioners to take the charge of them, but such as have had opportunities of attending fleets and armies, and of serving, as it were, an apprenticeship to this branch of practice. There is no good foundation, however, for this opinion; and I have no hesitation in saying, that gunshot wounds should be managed upon the same principles, and in the same manner, with every variety of wound attended with an equal degree of contusion.

In gunshot wounds, the symptoms we have most reason to dread are, inflammation, gangrene, and a suppuration so abundant as to exhaust the strength of the patient. These are therefore to be chiefly kept in view, and our practice will be more or less successful in proportion as they are mild or severe. In some cases the contusion is so violent and extensive, that the patient suffers from the injured parts being immediately attacked with gangrene. But, for the most part, inflammation is the symptom from which the greatest danger arises; for, if not kept moderate from the first, it seldom fails to terminate either in gangrene or in extensive collections of matter.

To prevent or remove inflammation should therefore be considered as our first object in the treatment of gunshot wounds; and as nothing tends with such certainty to accomplish this as local bloodletting, any veins or arteries divided by the ball, should be allowed to discharge freely before they are tied: excepting indeed where some of the larger arteries have suffered, I believe it would be a good general rule for practitioners, in gunshot wounds, not to check any hæmorrhagy that may take place. In this they would be warranted, not merely by the well known powerful influence of local bloodletting in preventing inflam-

mation in general, but by many well attested facts, all tending to show that it proves particularly useful in gunshot wounds. Among other proofs of this, it may be mentioned, what almost every army surgeon has observed, that some of the most remarkable cures of gunshot wounds have happened where patients, from necessity, have been left for a considerable time upon the field of battle; by which much more blood is commonly lost than is usual with such as, from their rank, are more early taken care of. In all gunshot wounds, therefore, we should at once determine upon taking as much blood as the strength of the patient will permit; and where the parts are so much contused, that the vessels which have been divided do not afford a sufficient quantity, a circumstance by no means unfrequent, instead of taking it from the arm or any distant part of the body, it should be drawn off by the application of leeches to the injured parts; or when these are wanting, by cupping and scarifying the contiguous sound parts. In general, if this practice is carried a sufficient length at first, inflammation will not take place; but when this has not been done, and when the parts afterwards swell and inflame, the operation should be repeated once and again according to circumstances.

Our next object is to remove any extraneous body that may be lodged in the wound, as far as this can with propriety be done. When a ball has not penetrated deep, and especially when the wound is left entirely open by a portion of skin and teguments being completely removed, there is little difficulty in clearing away whatever might do harm. But when a wound runs to a considerable depth, and especially if a counter opening has not been made by the ball passing out at the opposite side, any search that is made for extraneous bodies should be done with much care and circumspection. When treating of Punctured Wounds in Section III. of this chapter, the consideration of this was entered upon. I shall now refer to

the observations, which at that time were suggested ; and at present shall only remark, that when extraneous bodies lodged in gunshot wounds can be taken away without injuring the contiguous parts, it ought always to be done ; but when much pain is likely to be excited, or a high degree of inflammation endangered by the attempt, we ought to desist. In such circumstances, it will be better to trust to the extraneous bodies being afterwards discharged along with the matter of the fore ; to nature pushing them out ; or to the parts in which they are lodged being accustomed to their residence. From much experience we know, that in almost every instance bullets should be allowed to remain in whatever part they are lodged rather than that much force should be employed to extract them. A ball lodged in the substance of a bone, is perhaps the only exception to this general rule : a ball cannot indeed be extracted from a bone but with much difficulty ; and therefore it is in general allowed to remain. I have known several instances of this ; but in all of them much pain and danger to the patient, as well as trouble and perplexity to the practitioner, ensued. The unyielding nature of bone, occasions, upon the lodgment of a foreign body in its substance, great pain, tension, and swelling over all the contiguous parts. To prevent these, the extraction of the ball, when it can be done without hazard of the patient's life, should be attempted, as soon after the accident as possible, and before the parts become swelled and pained.

Different forceps have been invented for extracting bullets from wounds, and some have proposed to do it with screws : scarcely any of these instruments, however, have answered the purpose for which they are meant ; and excepting where a bullet can be easily laid hold of with common forceps, no instrument should ever be employed : for, besides tearing and irritating the injured parts, they are apt to catch the contiguous muscles, or other soft parts, by which much

mischief is commonly done. There must always be a risk of this when the wound runs deep ; but it ought to be more particularly avoided in wounds of the thorax and abdomen, where laying hold of any of the contiguous parts would necessarily produce much danger. When a ball is not deeply lodged, but lies near to the mouth of a wound, so that the surgeon can see it, forceps may with safety be employed ; but whenever it lies deeper than this, if it is judged proper to extract it, a counter opening, as it is termed, should be made upon it, so as to admit of its being taken out with the fingers. It will commonly happen, indeed, that balls may be extracted with much more ease both to the patient and surgeon, by judicious openings of this kind, than by the use of forceps or any other instrument. The pain and terror which the making of these openings are supposed to excite, are the principal objections to which they are liable ; but it should be remembered, that in such circumstances, it is not the present ease and conveniency of the patient that so particularly merit attention, as his future advantage and safety. Nor will the pain induced by cutting directly upon a bullet be so considerable, as the tearing it out from a deep wound with forceps.

Where the course of a ball is of considerable length, this will always be the easiest method of taking it out, when the practice is not forbidden by the contiguity of large blood vessels and nerves : but when the wound is only of short extent, instead of cutting upon the ball, by making a small opening into it, it answers better to lay the sinus open through its whole length ; by which the ball is not only more easily taken out, but the cure is afterwards more readily accomplished. Indeed, this practice should be generally adopted, even when the ball is not lodged. When the two openings made by the entrance and exit of a ball are not very distant from each other, and when with safety they can be laid into one, it should always be done as soon as possible after the accident ; by which the vessels

which have been injured will be more freely unloaded than they possibly could be in any other manner ; every kind of extraneous matter that the ball may have carried in, will be brought into view ; and the sides of the sinus being allowed to collapse, the size of the fore will thus be diminished.

This being done, the parts affected should be covered with pledgets of an ointment formed of wax and oil, and an emollient poultice be laid over the whole ; a practice which proves much more successful, as well as more agreeable, than the application of warm stimulating dressings ; which, till of late, were universally used in all cases of gunshot wounds. The pain and irritability which almost uniformly attend this kind of injury, point out the propriety of the most soothing applications. For the most part those that I have mentioned answer the purpose ; but in some cases the preparations of lead answer better ; particularly Goulard's cerate, or the common wax ointment impregnated with a small proportion of saccharum saturni. An opiate should now be administered ; and the part affected being placed in the easiest and most convenient posture, the patient should be laid to rest.

The formation of matter in every fore attended with contusion, is an object of the first importance ; for till this takes place, there is often reason to suspect that gangrene may supervene. With a view to hasten it, the warm poultices should be frequently renewed ; and they should be continued till the tension and swelling which usually attend wounds of this kind is removed, and till the fore has acquired a healthy granulating appearance, when it will fall to be treated in the manner I have already advised for fores proceeding from any other cause.

Gunshot wounds are commonly described as being covered from the first with deep sloughs or escars ; and various remedies are advised for removing them. Every appearance, however, of this with which they are attended, proceeds entirely from contusion ; and

if the injury be not large and extensive, the slough covering the wound is not often perceptible; or it is so thin and inconsiderable, that it dissolves and comes away with the matter of the first or second dressing. In such cases therefore, it requires no particular attention. And even when it runs to a greater depth, it commonly separates, so as to be easily removed as soon as a free formation of matter has taken place: for every slough of this kind is a real mortified spot; and I have elsewhere endeavoured to show that nothing tends to separate mortified parts so readily from those that are sound, as a free suppuration being induced upon them.

In the early stages of gunshot wounds, emollient poultices prove more useful than perhaps any other remedy: but it is necessary to remark, that they should not be continued after the effects that I have mentioned are produced: for when employed too long, they not only tend to excite too much relaxation, and to render the parts soft and spongy, but are apt to induce too copious a formation of matter; from which the patient is often in greater danger than from any other circumstances attending his situation: for although it is a point of the first importance, in every gunshot wound, to encourage the formation of pus to a certain extent; yet we find universally, that in great quantities it proves very prejudicial, and when once excited, that it is with much difficulty checked. I think it also right to observe, that this superabundance of matter is very apt to proceed from a different cause, namely, from the inflammation being allowed to run too high, by which extensive effusions and consequent abscesses take place, among the contiguous muscles. This cannot in any way be so effectually prevented as by copious bloodletting immediately after the injury. It is chiefly with the view indeed of preventing this distressful occurrence, that I have advised the practice of early bloodletting in all gunshot wounds; and with

those who have had opportunities of perceiving the inconveniencies that arise from those extensive suppurations that ensue from this being omitted, no other argument will be required to show that in every instance it should be adopted.

In whatever manner a too copious flow of matter has been induced, the practice to be followed must be the same. Every collection that appears must be discharged by a depending opening; the limb should be laid in that posture which most readily admits of its running off; the patient should be supported by a nourishing diet; and the bark should be plentifully given. It is in this state indeed of gunshot wounds that bark acts with most advantage; when the inflammatory symptoms are mostly gone, and when the patient is suffering from too copious a discharge. In this situation it often proves highly serviceable; but in order to act with advantage, it should be given in large quantities. Elixir of vitriol proves in such cases a powerful addition to bark.

When, notwithstanding a liberal use of these medicines, and a proper attention to the other circumstances of the case, the discharge still continues copious, we will commonly find that it is kept up by detached pieces of bone, or by pieces of cloth, or other extraneous bodies, having been carried in with the bullet. In such circumstances, nothing will tend to lessen the quantity of matter till the extraneous body is removed; for while it remains, it will irritate and inflame the contiguous parts, and effusion and suppuration will ensue. The fore ought therefore to be again examined; and any loose body or detached pieces of bone that are discovered should be removed. When the irritation is kept up by pieces of cloth, as they are too soft to be discovered by the probe, they are apt to pass unnoticed. Hence, where there is cause to suspect that any article of this kind is lodged in wounds, it must be taken out in some other manner: and when

the parts are so situated that a cord or seton can be passed along the passage made by the ball, nothing will prove more successful. I have met with different instances of pieces of cloth being brought out with the daily drawing of a cord, which were not suspected to be lodged; and in consequence of which the sores were soon cured, after various attempts to heal them had been made in vain.

I have already advised opium as an useful medicine in the early stages of gunshot wounds: by tending more effectually than any other remedy to abate irritation, it proves often serviceable in lessening the discharge of these sores, even when they have been of long duration, and when various other medicines have been employed without advantage. It should therefore be used with freedom whenever the discharge appears to be kept up by pain or irritation.

Although extensive hæmorrhagies do not always succeed immediately to gunshot wounds, yet they sometimes take place afterwards. This seems to proceed from the divided arteries being left open, when the mortified sloughs, which contusions usually produce, fall off. About this time, therefore, practitioners should be much on their guard against such an occurrence, especially when the injury is extensive, or seated near to any of the large blood vessels. The hæmorrhagy is often preceded by great heat in the injured parts, and with a throbbing pulsatory pain. At this period it may in some cases be prevented by plentiful bloodletting, especially by the application of leeches to the contiguous parts; but when once the hæmorrhagy appears, if the vessels are large, nothing but ligatures will answer the purpose. As the discharge is often so sudden and violent as to induce much hazard before the assistance of practitioners can be procured, patients in such circumstances should be furnished with a tourniquet, with directions to the ser-

vant in attendance to apply it on the first appearance of blood.

Hitherto I have not mentioned the scarifying of gunshot wounds ;— a practice recommended by almost every writer upon this subject, and till of late very univerversally believed to be right. By scarifying the sores, it was supposed that the sloughs with which they are sometimes covered would sooner separate, and the cure be thereby hastened : later experience, however, shows that this reasoning is fallacious ; and instead of proving useful, that scarifications here very commonly do harm : they create additional pain and inflammation, at the same time that they evidently extend the surface of the sore, while no advantage appears to arise from them. They should therefore be laid altogether aside. Even the dilatation of gunshot wounds, so much recommended of late, should be employed with caution. When the passage of a ball is not extensive, and the parts through which it has gone, can with safety be laid open, it would be right in every case to do it with freedom from one end of the sinus to the other : no harm could accrue from it ; and I have found from experience, that in these circumstances, it tends to forward the cure ; but I have never been able to discover what advantages are to be derived from the mere dilatation of the external opening of a gunshot wound : the views of those who propose it are to give a more free discharge to the matter than it would otherwise have, but in deep narrow wounds, formed by pistol or musket balls, as an increase being given to the diameter of one part of the sinus will have no effect whatever upon the rest of it ; and as it must evidently do harm, by enlarging the wound, while no benefit can probably accrue from it ; I do not hesitate to say that the practice should be laid aside. Where a wound is either so situated that it would be dangerous to lay it open from one end to the other, or of too great extent for this practice to be adopted, the

passing a cord, as I have already advised, along the sinus, often answers our purpose. This, however, should never be attempted till the first or inflammatory stage of the wound is over: for while any degree of pain or tension remains, the irritation which the cord excites is very apt to do harm.

But it sometimes happens even that a cord cannot be employed, owing to the situation and direction of the wound. In such cases, after the pain, tension, and other symptoms of inflammation are removed, and a free suppuration is induced, the sore must be treated in the manner that I have advised when speaking of punctured wounds: a proper application of pressure along the course of the sinus will, in such circumstances, often effect a cure when it cannot be obtained in any other manner.

By some it may be supposed, that something might here be said of the method of managing mortification when excited by gunshot wounds; but it appears to be unnecessary, as this symptom has already been fully considered as a consequence of inflammation.* I think it right, however, to remark, that in gunshot wounds, nothing in general proves so effectual in preventing mortification as plentiful bloodletting. It will not indeed prevent those parts from mortifying which have been severely contused: but it is not this that in such cases we have most reason to dread; for gangrene which occurs from contusion, is commonly circumscribed, and is not apt to spread. It is that variety of gangrene which succeeds to the inflammatory stage of gunshot wounds, of which we have most cause to be afraid. But when bloodletting is freely practised, gangrene seldom takes place, and the same remedy likewise answers best in preventing it from spreading.

As bark proves frequently useful in mortification, it is almost universally given in gangrene arising from

* Vide Chap. I.

gunshot wounds. I am, however, convinced, that the practice is often founded in error, and that much mischief is done by it. When gangrene takes place in debilitated habits of body, bark may be given with safety; and in such circumstances it proves often the most effectual remedy. But mortification from gunshot wounds happens most frequently in strong plethoric patients, where tonics of every kind do harm, and where bloodletting and other evacuations prove commonly useful. In the subsequent stages even of this variety of gangrene, if it continues to spread after all the symptoms of plethora and inflammation are gone, bark may be employed with propriety; and in such circumstances it should be given with freedom; but it should never be advised while the inflammatory tension and pain continue.

In offering these observations upon gunshot wounds, I have hitherto been supposing that the injury is circumscribed, or at least not so extensive as to preclude hopes of saving the injured limb; and it is proper to remark, that with due care and attention, wounds of this kind may be often cured, and limbs saved, where the first appearances were very alarming. But when a limb is injured in such a manner that there is no reasonable hope of saving it, it would be improper to persist long either in these or any other means of cure that have yet been proposed. By doing so, the patient would suffer much unnecessary pain and trouble, while his strength might be so much impaired, as to give him no chance of recovering afterwards from the removal of the limb. But the attempt to save limbs which have suffered much by gunshot wounds, gives rise to a question of importance, that merits particular discussion.

In the various battles which occurred in the last German war, the number of wounded men was often surprisngly great; of course the amputation of limbs became frequently necessary. By many it was imag-

ined that the practice was carried much further than it ought to have been ; and it was even alleged, that limbs were often wantonly removed, which with much ease and safety might have been saved. Amongst others who were of this opinion, Mr. Bilguer, surgeon to the armies of his Prussian Majesty, wrote a treatise, in which he endeavours to prove, that amputation of limbs is rarely necessary, as almost every injury, for which it is usually advised, will admit, he thinks, of a cure, by more gentle means.

As nothing but real necessity can ever justify the removal of a limb, the public were much indebted to Mr. Bilguer for his attempt : there is much reason, however, to believe, that the zeal with which he appears to be animated, has made him carry his restrictions too far ; and that numbers would suffer much unnecessary pain, trouble, and hazard, were they to be generally adopted.

Mr. Bilguer thinks, that scarcely any case of gunshot wound can be so bad as to require amputation. Even where the softer parts are much lacerated, and the bones and joints much injured, we ought always, he thinks, to attempt to save the limb : and he asserts, that by this practice more lives will be saved than can ever be done by the usual method of proceeding to immediate amputation. After all the attention, however, that I have been able to give to a subject of such importance, in the course of my own practice, and after much information obtained from others of experience and observation, I am of opinion, that much harm would ensue by admitting this as an universal rule. I would advise in every case where the fleshy parts of a limb only are merely divided, to make some trials for saving it ; and they will often succeed. Where all the muscular parts of a limb are much lacerated and contused, it would no doubt be in vain to attempt to cure it ; on the contrary, it should be removed at once. But when any considerable por-

tion of the fleshy parts of a limb remains unhurt, although the others may be injured in the severest manner, if none of the large joints have suffered, we should never despair of being able to save the limb. The contused parts may indeed mortify and throw off, and thus an extensive fore will ensue; but from daily experience, we know that the largest fores will heal; and if in this we should be disappointed, we still have it in our power to advise amputation, while both the patient and surgeon have the satisfaction to think that nothing has been omitted from which any benefit could probably have ensued. And on the subject of Amputation, I shall afterwards have occasion to shew, that the operation proves usually more successful when a fore has been of some duration, than when employed immediately after the accident.

But when any of the large joints are much injured by the ends of the bones which compose them being shattered or splintered, immediate amputation should always be advised: for the inflammation which succeeds to these wounds comes on quickly; and when inflammation takes place, the operation can never be employed, till it is altogether removed. The height to which inflammation is in such cases apt to proceed, is a powerful argument in favour of early amputation: for when large joints are materially hurt, the parts soon become highly inflamed, notwithstanding of all that can be done to prevent it; so that no time should be lost in putting the operation in practice. It must indeed be allowed, that out of a great number of patients, some few might in such circumstances save their limbs, even where the joints have suffered in the worst manner: but we cannot allow with Mr. Bilguer, that this is a sufficient reason for the practice which he recommends being generally admitted. It is not the success which may attend a few cases by which practitioners should be directed, but that which ensues from a general course of practice. And this I

think may be considered as certain, that in the circumstances we are now considering, more lives would be lost by attempting to save the injured limbs, than by removing them soon after the wounds have been received ; at the same time that the practice would be attended with much less trouble and pain to the patient : for the fore produced by the amputation of a limb is trifling indeed, when compared with extensive lacerated wounds of the large joints. In the present improved method of operating, a stump often heals in the course of two or three weeks ; whereas wounds in the joints, even when they terminate most favourably, often continue obstinate, and produce much perplexity and distress for several months.

When in gunshot wounds any of the large bones are fractured, through any considerable part of their extent, and when this is accompanied with much laceration of the corresponding soft parts, immediate amputation of the limb will be the best practice, and ought to be advised. But where a gunshot wound not very extensive is merely accompanied with a simple fracture of a contiguous bone, or even where the bone is fractured in different parts, if the injury does not extend to the joint, we ought perhaps in every instance to endeavour to save the limb. By removing the detached pieces of bone, and treating the fore with attention, we have often the satisfaction to obtain a cure, and to restore patients to the use of their limbs, who otherwise might have remained lame for life, or who might have been deprived of them entirely.

It is proper, however, to remark, that although the attempt should always be made, where a patient is to remain in a fixed situation, and where the regular attendance of practitioners can be procured ; yet after engagements, whether at sea or land, where those that are wounded must be frequently moved about, and where a deficiency of surgeons and nurses very commonly prevails, I believe it would be a good general

rule to proceed to immediate amputation, in every case of gunshot wound accompanied with fractures of any of the contiguous large bones. By doing so, a few limbs might sometimes be removed, which with much care and attention might be preserved; but I am convinced, that more lives would be saved by it than by attempting, in such circumstances, to pursue any other method of treatment. We shall have occasion, however, to enter more fully upon the consideration of this subject, in speaking of Amputation.

CHAPTER IV.

OF BURNS.

BURNS assume different appearances, according to their degrees of violence, and manner in which they are produced. Thus, burns which merely irritate the surface of the skin, differ materially from those which corrode or destroy it; while those again have a different aspect from such as affect the muscles, tendons, ligaments, and other deep seated parts; and we know that such as are produced by boiling water, and other liquids, differ materially from those that are produced by the direct contact of hot metallic bodies, or of burning combustible materials.

Burns which do not destroy the cuticle, and which irritate the skin only, act nearly in the same manner with cantharides and other vesicantia. The irritation with which they are accompanied, excites an increased action in the exhaling vessels of the parts affected, by which vesications are formed in extent and number proportioned to the violence of the burn; but when the skin or subjacent parts are destroyed, no vesicles take place. In this case, a black mortified slough is first observed; and when this separates and is thrown off, an ulcer is left of a depth corresponding to the degree of heat by which it was produced.

In every case of burn, the pain is severe; but for the most part it is more considerable where the skin is merely much fretted or irritated, than where the degree of heat has been such as to destroy the skin entirely.

In deep extensive burns, mortification sometimes takes place suddenly, but the symptoms that we have

most cause to dread are pain and inflammation. The pain and irritation which burns excite, are in some instances so violent, that all our efforts are apt to fail in preventing them from inducing the very highest degree of inflammation; and when the surface of a burnt part is large, the effects of this inflammation are not confined to the injured spot: they are apt to excite fever; and in many cases such a degree of torpor is induced, as at last ends in death.

In the treatment of every variety of burn, our first object should be to procure ease. Where the skin is not destroyed, but seems to suffer merely from irritation, an abatement of pain may be procured by the application of remedies of very different and even of very opposite natures: by dipping the part affected in very cold water, and keeping it for some time immersed in it, the pain will often be rendered very supportable; while on the other hand, immediate ease is often experienced from plunging the injured part suddenly into hot water: emollients are often employed, and in some cases with immediate relief; but, in general, astringent applications answer better. One of the best applications for this variety of burn is strong brandy, or any other ardent spirit: it excites a momentary additional pain; but this soon subsides, and is succeeded by an agreeable soothing sensation. This remedy proves most effectual when the parts can be kept immersed in spirits; but when this cannot be done, they should be frequently moistened with pieces of soft linen completely soaked in it. Of late strong vinegar has been much employed for burns; *acetum lythargyrites*, solutions of *saccharum saturni*, and Goulard's saturnine water, make useful applications for the same purpose; and as a proof that it is the astringency of the remedy from which the effects result, the same benefit is derived from a strong solution of alum or even from common ink.

It is the common opinion, that remedies of this kind prove chiefly useful by preventing those vesica-

tions or serous exudations with which superficial burns are usually attended : but I do not find that the observation is well founded ; for I have always remarked, that they procure an abatement of the pain sooner where these vesications have already appeared, than when they are employed so early as to prevent them from rising, which they frequently do when applied immediately on a burn being inflicted.

Whatever remedy we employ, it ought to be continued as long as the pain remains ; and in extensive burns, where the irritation is great, along with external applications, opium should be given in doses adequate to the degree of pain. Even the stupor with which patients with large burns are apt to be attacked, is more readily removed by opium than any other remedy. As this symptom is probably induced by some degree of effusion upon the brain, and appears to be the effect of that severe irritation which always accompanies burns, we may readily conceive that opiates should here act as the most useful remedies ; and, accordingly I have found, in various instances, that they have done so.

With respect to the management of vesications in burns ; by some we are advised to open them immediately, while others assert that they should never be meddled with. In judging from my own observation, I would say, that they should never be opened till the pain is gone : for during this period, the pain becomes always more severe on the air getting access to the cavities of the vesications ; but when the irritation produced by the burn subsides, they may be opened with safety ; and at this period it ought always to be done ; for when the serum is allowed to rest long upon the skin beneath, it is apt to render it tender, and even to induce some degree of ulceration, which in this manner we prevent. Even at this time the vesicles should be opened with small punctures, instead of large incisions, so that as little air may be admitted as possible. And after the serum is discharg-

ed, the best application that can be made is a thin liniment of wax and oil, or Goulard's form of a fat-urnine ointment. Oil by itself is too thin, as it runs quickly off; and ointments of the usual consistence give more pain than liniments, as their stiffness prevents them from being applied or removed so easily.

In this manner all such burns as we are now considering may in general be cured, excepting where they are so extensive as to excite much inflammation and fever. In such circumstances, bloodletting, and other remedies adapted to the particular symptoms, must be advised; and when the injured part is found to ulcerate, which often happens in severe burns, those remedies must be employed which the nature of the fore may render necessary, and for which I must refer to the different sections of Chap. V. where every variety of ulcer will fall to be considered.

When, again, burns are from the first attended with loss of substance, as usually happens when they are produced by hot metallic bodies, cooling emollient applications prove most effectual: the part being kept constantly moist with a liniment composed of equal parts of lime water and linseed oil often gives immediate ease; and the easiest way of applying it is, to daub the parts frequently over with a soft pencil well soaked in it. The application and removal even of the softest coverings excites much pain; and I have always found in this kind of burn, that no harm ensues, during the first two or three days, from the injured parts being exposed to the air. It often, indeed, gives relief when no advantage is derived from any application. But as soon as the pain and irritation arising from the burn are removed, the parts should be covered and treated in the same manner as ulcers arising from any other cause. The liniment that I have mentioned of lime water and linseed oil, is perhaps the best that has yet been employed in this kind of burn. In some cases, however, I have found that more immediate ease has been procured from the ap-

plication of a saturnine ointment; and bathing the parts in a weak solution of saccharum saturni in some instances gives relief.

In burns arising from the explosion of gunpowder, some of the grains of the powder are apt to be forced into the skin. At first they produce much irritation; and if not soon removed, they commonly leave marks, which afterwards continue fixed and permanent. They should therefore be picked out with the point of a needle, or any other small instrument, as soon as possible after the accident; and with a view to prevent inflammation, as well as to dissolve and carry off any particles of the powder which might remain, the parts affected should be kept covered for two or three days with emollient poultices. In other respects, injuries of this kind are to be treated in a similar manner with burns produced in any other way.

When parts which lie contiguous are burnt, they are apt to adhere to each other, if means be not fallen upon to prevent them. This is more particularly the case with the fingers and toes, and with the nostrils and palpebræ. The surest method of preventing it, is to keep pledgets covered with any proper dressing inserted between them during the course of the cure.

In the treatment of ulcers arising from burns, the parts are apt to become soft and fungous, and to rise above their natural level. On this being perceived, any emollient applications that have been previously used should be laid aside; such as are moderately astringent should be employed instead of them; and gentle compression with a roller proves particularly useful. Bathing the parts with a common saturnine wash, or with lime water, or a solution of alum, frequently succeeds; and one of the best ointments in this situation is calamine cerate: by persisting in these means, any fungous excrescences that arise, will, for the most part, be soon removed; but when this does not happen, they must be taken down by the use of burnt alum in fine powder, blue vitriol, or lunar caustic.

CHAPTER V.

On the Theory and Treatment of ULCERS.



SECTION I.

General Observations on Ulcers.

VARIOUS definitions have been given of the term ulcer; but what I understand by it is, a solution of continuity in any of the softer parts of the body, discharging either pus, sanies, or any other matter.

Ulcers have been distinguished by different appellations, according to the particular circumstances with which they are attended; and if these had been taken from characteristics sufficiently distinct, and of any real importance in the cure, they would certainly have been material, and ought to be retained. But as it is evident, that many of them are taken from circumstances either not sufficiently obvious, or from such as are merely accidental, and that do not afford any real distinction; to adhere to these would be improper, in so far as it would continue to lead to complex and difficult practice, when more simple treatment would answer better.

With the view of avoiding this difficulty, the following arrangement of ulcers is proposed; and it will be found to comprehend every variety of sore that practitioners meet with.

Ulcers may be divided into two general classes. In the first, I mean to comprehend all those that are merely local, and that do not depend upon any constitutional disease; and, in the second, all those that proceed from any general affection of the system.

The varieties of local ulcers are,

1. The simple purulent ulcer.
2. The simple vitiated ulcer.
3. The fungous ulcer.
4. The finous ulcer.
5. The callous ulcer.
6. The carious ulcer.
7. The cancerous ulcer; and,
8. The cutaneous ulcer.

And in the second class of ulcers are included the venereal, the scorbutic, and scrofulous ulcers.

In the following sections, I shall endeavour to point out the different appearances of these varieties of ulcers, together with the method of cure best adapted to each of them; but before proceeding to do so, I shall offer a few general observations upon ulcers, and chiefly on the causes, prognosis, and method of cure.

The causes which, in different circumstances, may give rise to ulcers, are exceedingly various; but in general they will be found to proceed from one or other of those that follow.

1. From such as may be termed occasional or exciting causes; such as, inflammation, from whatever cause it may arise, when it terminates either in gangrene or the formation of matter; wounds; bruises ending in suppuration; and burns.

2. From such as may be considered as predisposing causes; of which kind, are all diseases of the system attended with determinations to, or affections of, particular parts: such as fevers of every kind that terminate in what are called critical abscesses; also lues venerea; scrofula; and scurvy.

3. They may proceed from a combination of the two foregoing causes. Thus, a slight scratch, or excoriation, which in a sound person would heal easily, in a habit tainted with disease will frequently produce a very disagreeable and tedious ulcer.

The causes of ulcers being various, the prognosis to be given must also be so.

1. It must depend upon the nature of the different exciting causes.

2. Upon the situation of the fores ; and,

3. On the time of life and habit of body of the patient.

With respect to the first of these, it is evident, that the occasional cause must have considerable effect on the nature and duration of ulcers. Thus, an ulcer produced by a simple wound, inflicted with a clean cutting instrument, will, *cæteris paribus*, heal more easily, than a sore that ensues from a severe bruise, or from a wound produced by a foul or ragged instrument.

In Chap. III. we had occasion to see, that punctured wounds are of more difficult cure than such as are freely laid open ; and ulcers produced by punctured wounds, are in like manner of difficult treatment ; but the causes of this having been pointed out when speaking of punctured wounds, it is not necessary at present to consider the subject further.

The cure of ulcers may be influenced by their situation, in two different ways.

1. With respect to the nature and organization of the parts on which they are seated ; and,

2. From their being situated on the trunk of the body, or on the upper or lower extremities.

Thus, it was long ago remarked, and the remark has since been confirmed by observation, that ulcers in fleshy parts heal more easily, than when tendons, aponeuroses of muscles, glands, periosteum, or bones, are injured.

The pain occasioned by sores in soft muscular parts is not so considerable, the discharge is generally better conditioned, and the cure commonly advances more quickly ; and, whether ulcers are seated in the cellular membrane, in the tendons, periosteum, or bones,

the cure commonly proceeds more easily in the trunk of the body than in the extremities.

The depending situation of the latter seems to be the chief cause of this ; for the fluids having, in the extremities, to proceed in a direction contrary to their own gravity ; whenever the solids lose their tone, or suffer in their arrangement, swellings of the œdematous kind very naturally occur. And, when serous swellings arise in the neighbourhood of ulcers, they tend not only to increase the quantity, but to vitiate the quality of the discharge ; and thus the cure is protracted, till the parts, by rest and proper management, have again recovered their natural tone.

Hence, a material part of the cure in ulcers of the legs is obtained from the limbs being kept in a horizontal posture : and on the same principle we account for the effects of the laced stocking in the cure of ulcers, where it seems to act entirely by preventing this kind of swelling : of this, however, we shall speak more particularly hereafter.

The situation of ulcers with respect to the contiguity of large blood vessels and nerves, from the danger of these at last becoming affected, should, likewise, influence our prognosis ; and, ulcers seated upon, or very contiguous to, any of the large joints, or upon either of the cavities of the chest or abdomen, will always be considered as more hazardous than ulcers in other parts of the body.

I had also occasion to observe, that the prognosis in ulcers should be much influenced by the age and habit of the patient.

Thus, in young healthy people, the secretions are commonly better conditioned, than in the old and unhealthy, in whom the secreting organs seldom perform rightly their different functions ; and as the varieties of matter discharged from ulcers are to be considered almost entirely as secretions from the general mass of blood, their being of a good or a bad quali-

ty, must depend greatly on a healthy state of the solids, so that we need not wonder at their being so much influenced by the general health of the patient.

The cure of ulcers depending, therefore, upon such a number of circumstances, a just prognosis, it is evident, can only be obtained from a due attention to all of them.

The first circumstance to be ascertained in the management of ulcers, is the propriety of attempting to cure them or not: that it is proper to endeavour to heal every recent sore, is universally allowed; but when ulcers have been of long duration, or when they appear to have had any effect in carrying off, or in preventing, any disease to which the system has been liable, it has always been considered as dangerous to remove them; and, accordingly, almost every author who has written upon the subject, has expressly determined against it, as being an uncertain and dangerous practice.

Ulcers that afford a copious discharge, and have been of long duration, it would no doubt be imprudent suddenly to heal up, as the system might probably suffer from the retention of a large quantity of fluids, which it had been accustomed to throw off by means of these drains. Many cases, indeed, have ended fatally, from ulcers in this situation drying up suddenly, either of their own accord, or by the imprudent use of astringents.

On the other hand, however, the distress arising from an extensive sore, disagreeably situated, and which may not perhaps terminate but with the life of the patient, is an inconvenience to which few are willing to submit, and makes it an object of importance, the discovery of such a plan of treatment as may render it safe for patients in this situation to have them removed.

With due caution, the cure of every ulcer may, I think, be attempted; the only requisite precaution, in

habitual sores, being the introduction of an adequate drain in the form of what we usually term an issue.

An issue being introduced, and brought to discharge nearly equal to what the ulcer was accustomed to afford, the latter may be cured with safety; and if it has not been of long duration, the size of the issue may be gradually lessened, and at last perhaps removed entirely.

But where an ulcer has been of long continuance, or seems to have been instrumental in preventing any other disease, the issue should, without hesitation, be continued of the same size for life: but even this may be done with little inconvenience when compared with the trouble attending a large ulcer.

This practice might, from reasoning alone, be considered as safe. For, if a drain equally copious is first introduced, and afterwards kept open, the healing of the ulcer for which it was inserted, however old it may have been, could never probably do harm; but from experience I can say, that nothing proves more effectual in the cure of old ulcers, than issues; and I have not known an instance of any patient being injured by the oldest sores being cured, where the precaution was taken of having an issue previously inserted.

The objections made to this practice, are,

1. That an artificial issue gives nearly the same trouble as a natural ulcer. And,

2. That nature having been long accustomed to the discharge of a particular kind of morbid matter afforded by the ulcer, we ought not, by innovations, to run any risk of diverting her stated and usual operations.

The first of these arguments is easily answered; for it cannot be admitted, that a simple issue, for which we can choose the most convenient situation, will ever prove so troublesome as ulcers usually do. Of this, indeed, we daily meet with proofs; few complaints

proving more perplexing to patients than ulcers in general do, while we seldom hear of any real distress from issues.

The other objection alleged against the healing of old ulcers, is the supposed danger to the constitution, from the retention of a particular kind of morbid matter, which by their means many have imagined it may have been accustomed to throw off.

By those who support this objection it is also said, that although the matter of an issue may be equal in quantity to that of an ulcer, still the difference to the constitution may be material, from the matter which they afford being different; for while the discharge of issues is commonly a mild bland pus, the matter of many ulcers is thin, sharp and acrid.

At first view, this argument appears to be of importance, and it has probably, with many, been the chief cause of the practice in question being rejected. On due consideration, however, it will not appear to be of much weight; for it can be easily shown, that it is more by the quantity than the quality of the matter discharged by ulcers and issues, that they prove useful or otherwise to the constitution.

Thus, it is observed, that the stoppage of even a pea issue, that has discharged nothing but the mildest and most simple pus, proves equally dangerous, as the stoppage of an ulcer discharging nothing but matter of the most acrid kind; which would not be the case, if the common opinion upon this point was well founded.

And, that the quantity discharged by ulcers should have an important effect on the system, will not appear surprising, when we reflect on the large proportion of fluids requisite for the supply of an issue, of even a moderate size, with pus. For, besides the quantity that appears and is discharged at the different dressings, a large exhalation and absorption likewise, of the more thin serous parts, is constantly and

at all times going on ; which circumstance alone accounts for the debilitating effects frequently produced by issues, which in point of size are very inconsiderable.*

Were we, indeed, certain, that such acrid and putrescent matters, as are frequently discharged by ulcers, previously existed in the blood, and that such sores served merely as drains for these ; this would, no doubt, prove a very weighty argument : but as it is probable, nay, I may say, certain, that it is by the ulcer only that such kinds of matter are formed, and that none of them previously existed in the blood, we are induced therefore to consider this argument as of little importance.

Very little consideration, indeed, will make it appear, that no such varieties of matter as are frequently observed to flow from ulcers, ever existed in the blood. No analysis of the blood has ever been able to discover them : nor can it be conceived, how fluids so acrid, and so different from the blood of a healthy person, can circulate in the delicate and irritable vessels of the human frame, without producing immediate danger. Now, it is well known, that the discharge from some ulcers, especially from those generally termed phagedenic, is often so acrid, as not only to excoriate the surrounding parts, but even sometimes to render it dangerous for a surgeon to apply the necessary dressings.

The discharge which in some instances of ophthalmia takes place from the eyes, has been known to be so acrid, as to corrode the neighbouring parts ; and the serous evacuation of blisters, although commonly inoffensive, is sometimes possessed of so much acrimony, as to produce deep ulcerations in the parts to which they have been applied.

* Upon this subject Sir John Pringle remarks : " As near as I could guess, an ounce of serum, upon standing some days, did not furnish more of this matter, viz. pus, than what might be produced by the daily running of a pea issue, or of a seton." Vide Exper. xiv. appendix to Diseases of the Army.

In some cases of scurvy, indeed, a considerable degree of putrescency, even of the blood itself, no doubt, frequently takes place : but it is not in the ulcers which occur in scurvy, that such corrosive humours, as we are now describing, are ever observed ; the phagedenic ulcer of authors being materially different from the true putrid ulcer, as described by Lind and other writers on scurvy.

Besides, though it were proved that these varieties of matter actually existed in the blood, even in a completely formed state, how is it possible, that by means of ulcers, or any other drains, the morbid fluids chiefly should be evacuated, and those only left behind that are mild and innoxious ? a circumstance which, however improbable it may appear, must be asserted by those who support the opinion in question.

The obvious insufficiency of this theory should induce us to reject it, though we could not propose a more satisfactory opinion in its place. But, as the various appearances and alterations which take place in the discharge of ulcers, seem evidently in a great measure to depend on some peculiarity of the solids, we are therefore more easily induced to conclude, that other suppositions do not merit much attention.

The general seat of ulcers is in the cellular membrane. Now, it is well known, that naturally there is secreted into the cells of this membrane, as there is into every cavity of the body, a thin transparent serum, the principal intention of which is to keep these parts moist, and to facilitate the action of such muscles as are connected with them. It is this chiefly, with a greater proportion of the coagulated part of the blood, which, with a due degree of heat, as I have elsewhere shown, forms that matter which we call pus ;* and which we suppose, and indeed find, to be, the natural discharge of ulcers in a sound healthy state of the body ; and it is some change induced up-

* Vide Chap. I. Sect. 1, 2, and 3.

on the nature of this fluid, which occasions the varieties in the discharge from ulcers, and from the same ulcer at different periods. These changes, though they may frequently be, in some degree, influenced by different circumstances, as will hereafter be observed, must yet, in a great measure, depend upon some particular affection of the vessels that separate such fluids from the blood: for by means of an external topical application, we can often change the appearance entirely of the matter of an ulcer in the course of a few hours; which in this manner could not be done, were the change produced upon it to depend on an alteration to be effected on the general mass of blood.

Very considerable differences we may suppose will take place in the discharge of ulcers from the difference of the causes by which they are produced: thus, a burn is very likely to produce a different effect from a cut; a bruise, from a puncture; and some difference may likewise occur from the state of health in which the patient may be at the time.

In what manner these different causes operate in producing such various effects upon the solids or secreting vessels of ulcers, is not, perhaps, to be easily explained, nor can we determine precisely what the particular changes they induce upon such parts really are. But, as almost all the causes of ulcers, with which we are acquainted, tend to excite irritation, it is probable that they all act by producing some inflammatory affection on the extremities of such vessels as empty into the sores; and therefore that the nature of the discharge which an ulcer yields, will depend much upon the degree of inflammation that in this manner is excited.

I have already endeavoured to show, that one certain effect of inflammation is to propel a greater quantity of the red globules of the blood into the smaller sets of vessels, than naturally they are intended to

transmit.* This, when it takes place in vessels opening into ulcers, and especially when the inflammation is severe, will render the matter very different, both in colour, smell, and acrimony, from genuine pus, which I have already endeavoured to prove is produced from pure serum only.

Upon this principle, many of the varieties of matter met with in sores, may be explained: but other circumstances likewise occur which may have some influence in their production. The degree of heat, in which the part is kept, and the remora of the fluids for a longer or shorter period in the cavities of sores, must have no small influence on the consistence of the discharge.

From one or other of these circumstances, or from different modifications of all of them, the various appearances of matter which wounds and ulcers afford, are clearly explained, without having recourse to that inexplicable doctrine of their pre-existing in the system. But although it were otherwise, and that we could not so easily account for the differences which daily take place, in the discharge of sores; yet that they depend in a great measure on some peculiar action or conformation of the vessels in the part affected, seems to be still more probable than any other opinion that has yet been advanced; and is just as certain as various circumstances under our daily observation, for which we cannot account, but of whose reality no kind of doubt can be entertained.

Thus, in what manner the nerves, which in their structure are all so similar, act in the production of hearing, vision, taste, and all the different senses, is, perhaps, impossible ever to determine; as is also the action of the liver, secretory organs of the mouth, ear, &c. in producing fluids of such different natures from the same mass of blood, and which did not seem to exist in it before: only that the facts are so, nobody

* Vide Chapter I.

will doubt: and till the contrary is evidently shewn, we have the same reason to believe, that the different appearances of ulcers with respect to the variety of matter which they afford, are at least more frequently owing to some of the local causes that I have mentioned, than to any indisposition of the general mass of blood.

I have said, more frequently only, from there being some particular cases of scurvy and other putrid diseases, as I have already remarked, in which the blood is so much dissolved, as to run off by ulcers and other drains in the form of a bloody ichor: such cases, however, are not frequent, except in high degrees of the true scurvy, which are not often met with; and, were they even more frequent than we find them to be, they could never account for all the varieties of matter which we meet with in ulcers.

The principal objection, therefore, that has been made to the healing of old ulcers, seems, on being examined, to be no better founded in theory, than it is, as I have formerly remarked, on real experience. For, although we find it strongly inculcated by authors, never to attempt the cure of these sores, yet all of them have probably been either biased by that favourite opinion of morbid matter in the system; or, a few having led the way and laid down principles, the rest have indiscriminately copied from them, without paying any regard to experience.

Nay, I think it may be shown, that long continued ulcers, instead of proving useful, are not unfrequently attended with much risk and danger. Thus, it is common for ulcers on the shin and other parts immediately above the bones, to penetrate so deep as to affect the periosteum, and sometimes even the substance of the bones themselves; a circumstance we never meet with in an issue, at the same time that every advantage is obtained from it as a drain.

The constitution must likewise suffer more from the long continuance of an ulcer, than it probably can do

from the substitution of an issue : for it must be admitted, that a considerable part of the matter secreted by ulcers, must be again taken into the system by the lymphatics ; and when it happens to be of an acrid nature, as in sores of long duration is often the case, not only the general mass of blood, but even the solids themselves, must thereby in time be injured.

Accordingly, obstructions are daily met with in the external glands situated in the course of the lymphatics, leading from these ulcers ; and as the glands seated internally are, from the same cause, liable to the same affections, it will not be denied, but that, from this circumstance alone, considerable danger may accrue from ulcers of long duration.

Thus, it appears from every consideration, both of convenience and safety, that the cure of every ulcer should be attempted ; and, with the previous caution of inserting an adequate drain, it may always be done without any kind of risk.

This much I have judged it necessary to say in general, of the safety in curing old ulcers, and I have insisted on it the more, from the opinion generally received upon this point appearing not to be adopted from experience, but founded on hypothetical reasoning alone.

When the healing of an ulcer, then, is to be attempted, the method to be pursued for effecting it next requires our attention. By almost every author who has written upon this subject, four different states, as they are termed, are enumerated, as being necessary for an ulcer to pass through in its progress towards a cure, namely those of digestion, detersion, incarnation, and cicatrification ; and various remedies have been recommended as proper for the different states, and for these only : and, upon this part of the subject, it may be observed, authors have spoken with as much certainty and precision, as if every circumstance in the treatment of ulcers could be regulated at discretion.

Thus, all the different kinds of turpentine, unguentum *Ægyptiacum*, powders and tinctures of myrrh, euphorbium, and aloes, are pointed out as digestives: as detergents, basilicon, linimentum arcaei, mercurius precipitatus ruber, and other escharotics: with a view to promote incarnation, or the growth of new granulations, powders of mastich, thus, and olibanum; and as cicatrifiers to accomplish the cure, various simples, as well as compound applications, are recommended, particularly the astringent boles, earths, lime water, &c.

Such a number of divisions, however, in the several states or stages of ulcers, with the consequent indications of cure, and remedies supposed to be necessary for the accomplishment of these, has had the effect of rendering the treatment more complex than we find from more late observation it ought in any instance to be: the indications in the following sections, will appear to be comprehensive and simple; and I can say from experience, that the method of cure that I have ventured to propose, will be found more certain in its operation than the more complicated mode of treatment which hitherto has in general prevailed.

We now proceed to consider the different varieties of ulcer; and in adverting to the several distinctions, it will be observed, that it is obvious circumstances only, and such as at the same time indicate and require some peculiarity in the method of treatment, that I have allowed to have any influence in characterizing a species.

Thus, ulcers of the first class, will all of them, in their appearances, be found different from one another; and all of them will likewise require something peculiar in the method of cure: and again, those of the second class will appear to be equally well distinguished, and by similar circumstances, not only from each other, but from those also of the preceding class. The first to be taken notice of is the simple purulent ulcer.

SECTION II.

Observations on the simple purulent Ulcer.

 § 1. *Of the Symptoms, Causes, and Prognosis, of the simple purulent Ulcer.*

THE simple purulent ulcer is entirely local, attended with no great degree of pain or inflammation, and the discharge which it affords is mild and purulent. The granulations which form in it are firm, and of a red healthy appearance, and the cure, when properly conducted, proceeds regularly, with little or no interruption, till a cicatrix is obtained.

The simple purulent ulcer may be produced by various causes, but it will be understood, that they must all be such as act locally, and without affecting the system.

In this view, we are to consider wounds of every kind that do not immediately unite without the formation of matter; and this whether they may have been attended with loss of substance or not. Under this head we rank all chirurgical operations attended with incision into any part of the body.

Among other causes of this ulcer, may be mentioned burns, in whatever manner they are produced, whether by fire, hot metallic bodies, or scalding liquids: also bruises; and every external accident that terminates in suppuration, and a subsequent discharge of matter.

I do not, however, mean to assert, that a simple purulent ulcer is always a necessary effect of the application of these causes; for the very reverse of this is in some instances the case. Thus, burns frequently produce very troublesome vitiated ulcers; and the same kind of sore is apt to occur from contused wounds,

and occasionally from the other causes that I have mentioned. I only mean to say, that one or other of these may in general be traced as the primary or original cause of these ulcers, whatever appearances they may exhibit before they become simply purulent.

With respect to the prognosis in this species of ulcer, it should almost in every instance be favourable: in some degree it should depend on the loss of substance that has taken place, and partly on the situation of the sore, age, and habit of body of the patient. These circumstances being considered, together with what has been mentioned in the last section when speaking of ulcers in general, the prognosis to be given need never be long in doubt.

Before proceeding to consider the means to be employed in the cure of a simple ulcer, it will not be improper to offer a few general observations on the manner in which nature seems to act in the cure of sores, and on the effects of such assistance as may be given by art for the same purpose.

§ 2. *Remarks on the Growth of new Parts in Sores.*

THERE is evidently in every ulcer, in its progress towards a cure, a growth of new parts that tends to diminish the vacancy which the ulcer has produced. This substance, from the granulated form which it assumes, has been generally termed granulations; and it appears in larger or smaller quantity, according as the patient is young or old, healthy or otherwise; inasmuch that, in the young and plethoric, this increase of parts is often in such a degree as to rise above the level of the neighbouring teguments, and to require the use of escharotics to repress it.

When the loss of substance is thus as far as possible supplied, the remaining part of the cure consists in the formation of a cicatrix. This is effected, either by nature alone producing an exsiccation, as it were, of the surface of the new granulations, and in this man-

ner forming a kind of cuticle or scarf skin; or, it is obtained by art from the use of drying astringent applications.

By the formation of new parts, or granulations, I do not mean to insinuate, that real muscular or other organized parts are ever regenerated; but merely to express that production, which, if the constitution is sound, takes place to a certain degree in the cure of every ulcer.

The real nature of this production is not, perhaps, easily to be determined: but, from the texture and appearances which it exhibits, it is obviously very vascular; from which it is probable, that it consists in an elongation or extension of the small blood vessels that have been divided, with a considerable proportion of inorganic cellular substance; which, again, is most probably formed by a matter secreted from the mouths of these vessels, to which it chiefly serves as a support or means of connection.

We must not imagine, however, that any very extensive loss of substance is ever entirely filled up in this manner: for although, in particular circumstances, nature has been known to supply very great accidental deficiencies; yet, in general, her operations of this kind are very limited. In youth, indeed, before the different parts have arrived at their full growth, and while the several vessels are yet daily extending, considerable losses are, often, almost completely repaired: but we ought not, even at this period of life, to attribute, as is commonly done, the cure of sores entirely to the growth of new parts; a process perfectly different seems here to have an evident influence, namely, the decay of the contiguous sound parts, a circumstance that merits particular consideration.

§ 3. *Of the Decay of the contiguous sound Parts in the cure of Ulcers.*

ALTHOUGH, in the cure of ulcers, whether they are attended with loss of substance or not, a growth of new parts, to a certain degree, generally takes place; yet deficiencies of this kind are evidently more diminished by the decay or decrease of the divided parts that remain, than by any other cause. Indeed, the effect of this with respect to a cure, is ultimately the same as if all such deficiencies were actually supplied with a new substance: for, if the cavity of an ulcer is diminished, or even entirely annihilated, by the subsiding or wasting away of the parts with which it is surrounded, the formation of others thus becomes unnecessary: and, accordingly ulcers are often cured, especially in old people, without any evident growth of parts taking place.

This part of nature's process in the cure of ulcers, is to a certain degree obvious even in the smallest sores, but the larger the ulcer, the more evident it becomes: we observe it most remarkably in the cure of that extensive ulcer produced by the amputation of the thigh and other extremities. In such cases, indeed, no considerable formation of new parts ever takes place, while the cure advances, just in proportion as the skin is allowed to contract by the wasting away or decrease of the parts which it surrounds: nor is this decay or diminution of bulk confined to one set of parts only: it extends equally to all, the bones perhaps only excepted.

Thus, after the cure of a stump, every vessel, even the largest, is almost entirely obliterated for a considerable extent: at least nothing is found to remain of them but the thin membranes that composed their coats, now shrunk into small inconsiderable cords: the fibres of the different muscles are, in the same

manner, much diminished; and the cellular substance seems frequently to be almost entirely annihilated. I have happened to have many opportunities of dissecting the stumps of patients after death, and the appearances were uniformly what I have here represented.

There is yet another case of ulcer, in which the cure seems still more evidently to be accomplished in this manner. In a large incised wound, with little or no loss of substance, its edges, in the course of a short time, become swelled and tumefied; they are thereby kept at a considerable distance from each other, and the whole exhibits the appearance of a large foul ulcer. In this situation it would remain for a considerable time, were it either neglected, or treated with acrid irritating dressings: as soon, however, as by warm emollient poultices, and other applications, a free discharge of pus is obtained, the inflammation becomes less; the swelling of the surrounding parts subsides, and the sore gradually contracts, so that its edges, which before were much separated, now approach to each other.

The same phenomenon may be perceived in the cure of every ulcer attended with much inflammation; where the chief part of the treatment consists in removing the pain, irritation, and swelling, which, in such cases, always take place.

Every small bile is found to exhibit the same appearances: on a bile being laid open, an ulcer is always left, and the cure depends chiefly on the removal of the inflammation and swelling of the surrounding parts.

These, however, it may be said, are only instances of preternatural swellings, perhaps originally excited by the presence of some acrid irritating cause; upon the removal of which, they may be expected to subside, and the ulcers which they produce to contract and heal. The same circumstance, however, has been shewn to take place even with respect to the substance of sound parts; particularly, as I have already

remarked, after the amputation of a limb; the blood vessels, nerves, and muscles, in all such cases, being constantly found to suffer a very considerable decay.

This is likewise known to happen in deep transverse wounds that penetrate through the different muscles, even to the depth of the bone; for a cure in these cases is seldom to be obtained by the first intention, especially when any loss of substance has been produced. In the cure of ulcers which remain after these wounds, an evident decay of the divided parts always takes place; and what proves it clearly is, that the vacancy occasioned by a wound of this description, is never so large and conspicuous immediately after the cure, while the patient yet remains lean and emaciated, as it afterwards becomes, when, in the course of time, by the recovery of health and appetite, all the parts of the body, and, among others, those which have been divided, come in a great measure to regain their former bulk; and when, accordingly, any vacancy occasioned by the wounds appears to be more considerable.

When, indeed, a wound penetrates only the cellular membrane, or does not entirely divide the muscles, the cavity which it produced at first, in the course of time, becomes gradually less, and at last often disappears entirely. This, however, is in consequence of the parts below extending in their diameters; which, in the case of a wound with loss of substance penetrating to the bone, never can happen.

This opinion, with respect to the cure of wounds, depending in a great measure upon the decay of the surrounding parts, was first suggested by a very ingenious French practitioner, Mr. Fabre: and, like every new doctrine, it has by some been denied to have any effect; whilst, by others, more extensive effects have been supposed to result from it, than, on examination, it will be found to produce.

Thus, Mr. Fabre, and Mr. Louis, another surgeon of eminence in Paris, assert, that wounds of every kind

which do not heal by the first intention, are cured entirely by an *affaissement*, as they term it, or a wasting away of the extremities of such parts as have been divided; and they absolutely affirm, that there never occurs any lasting production of new parts in the healing of fores.*

This assertion, however, is in direct opposition to daily observation; and seems to be merely the effect of a lively imagination applied to the support of a favourite doctrine: for, although it must be allowed, that the cure of ulcers, especially in old people, is in a considerable degree accomplished by the wasting or decay of the contiguous sound parts, yet all practitioners must admit, that in a great proportion of cases, the formation of that vascular substance commonly termed granulations takes place to a considerable extent; inasmuch that, in various instances, especially during youth, we can scarcely suppress it but with the daily application of escharotics.

As a further confirmation of this, some remarkable instances might be enumerated from authors, of deep and extensive losses in wounds, being almost entirely regenerated: this appears, however, to be unnecessary, as every candid practitioner will admit that it is so.

But while the opinion cannot be admitted in such an extensive latitude, as some might incline; yet from the various reasons which I have given, it will appear in a certain degree to be well founded; and from all that has been said with respect to it, this inference, I think, may be drawn, that although ulcers are in most instances supplied with a new production, yet to a certain extent the cure depends upon the contraction of the surrounding skin, in consequence of the parts beneath becoming less bulky than they were before.

This, when any preternatural tumefaction has been induced, as is usually the case in scrofulous fores, as

* Vide *Memoires de l'Academie de Chirurgie*, tom. 4

well as in some others, is effected by the discussion of the swelling alone ; but in others, attended with real loss of substance, the extremities of the contiguous sound parts are in the progress of the cure also much diminished.

§ 4. *Of the Effects of Compression in the Cure of Ulcers.*

By these observations on the theory of the cure, a point of much practical importance in the management of ulcers comes to be explained ; I mean the use of the laced stocking ; a remedy long ago recommended by Wiseman and others, for preventing those œdematous swellings to which patients with ulcers in the legs are almost always liable.

For the removal and prevention of these swellings, the laced stocking is no doubt to be considered as the most effectual remedy ; but it proves, I am persuaded, much more frequently useful, by serving to promote that diminution of the adjoining parts, which I have seen to be so necessary in the cure of ulcers : as in this respect it acts merely by the degree of compression which it gives, it must evidently prove equally beneficial in whatever part of the body sores may be seated ; and accordingly, I have found, that ulcers in the arm, and wherever a constant moderate pressure can be applied, have received more benefit from this than from almost any other remedy.

Pressure for this purpose is most conveniently made, both in the legs and elsewhere, by a broad roller applied spirally, from the under extremity of the limb to a little above the diseased part. In ulcers of the legs, the roller should commence at the toes, and be carried to the knee joint, or at least to two inches above the diseased parts : and, even in ulcers of the thighs, the bandage should commence at the toes, otherwise it is apt to produce œdematous swellings of the parts beneath : with a roller, compression can be made

more directly on a particular spot, than with the laced stocking; it is more conveniently applied, and it generally gives less uneasiness to the patient. It is likewise more easily obtained: for the difficulty of fitting a laced stocking, with that exactness which it requires, is so great, that we can seldom get it done; whereas a roller may at all times be easily procured.

Rollers, for this purpose, should be about two inches and a half broad; and on experience we find, that they answer better of cotton, or thin flannel, than of linen or silk. They not only keep the parts warmer, which, in every ulcer, proves useful; but the softness and elasticity of the flannel and cotton prevents them from fretting and galling the parts to which they are applied; an inconvenience we daily meet with in using bandages of linen.

In the application of this bandage, it will be understood, that it should be done in such a manner as particularly to support the skin, and thus to draw the edges of the sore as nearly as possible together. For as no regeneration of new skin ever takes place, it comes to be an object of the first importance, both in the treatment of wounds and ulcers, to prevent as much as possible the retraction of the divided skin, for all such parts as it cannot be made to cover, have afterwards for their protection a thin scarf skin only, which, both in point of strength and appearance, is much inferior to the *cutis vera*.

From due attention to this, much assistance may be obtained in the cure of wounds and ulcers; for, in most situations, every wound not attended with much loss of substance, may be made to heal by the reunion of the divided parts; a practice which in every wound that can occur we are to consider as the most eligible method of cure: when it can be done immediately on a wound being inflicted, it should always be advised; but when it has either at first been neglected, or considered as impracticable, it may frequently be accomplished afterwards in a later period of the disease.

For, in large wounds, when a free suppuration has come on, and the inflammation which originally took place has partly subsided, the sides of the wounds, or ulcers as they then are, may by proper compression be either entirely united, or brought so far to approach each other, as greatly to diminish the vacancy; a circumstance which tends much to shorten the cure, and to render it in every respect more easy.

In the application of pressure for this purpose, it will be understood, that it is not to be employed while much inflammation remains; but as soon as this symptom is nearly removed, it may always with safety be put in practice.

The application of moderate pressure proves so generally useful, that after the inflammatory stage of ulcers is over, it ought in, perhaps, every instance to be employed: cures may no doubt be accomplished by other means; but I will venture to say, that in the most troublesome of all sores, namely, habitual ulcers of the legs, more lasting cures will in general be obtained by a proper application of pressure, than by any other means with which we are acquainted.

§ 5. *Of the Advantages to be obtained from Art, in the Production of Granulations in Sores.*

THE chief advantage which in the production of granulations accrues from art in the cure of sores, is the removal of such causes as tend to retard the natural exertions of the system; and although the different obstructions which nature meets with in her progress are exceedingly various, yet they may all be reduced to two general heads, namely, to such as may be considered entirely as internal, and those again which operate merely as external or local causes.

Under the first of these heads are included all diseases of the constitution, for we find by experience, that a healthy state of the system only, is capable of producing sound granulations.

Hence the cure of ulcers in lues venerea, scrofula, and scurvy, can never be permanently effected if the general disease of the constitution be not first corrected or removed.

We also find, that the growth of new parts is impeded by the system being either too much emaciated, or in such a height of tone and vigour, as to be particularly liable to diseases of the inflammatory kind; and I may here observe, that to obviate the effects of either of these states of the constitution, is no inconsiderable part of the method of cure in ulcers of every description.

The local obstructions, again, which occur to the formation of new parts in ulcers, are of various kinds; but they may all be reduced to two general heads; namely, to such as act solely in a mechanical manner by exciting irritation; and those that are evidently of a corrosive nature.

From daily observation, we find, that granulations in fores, are, *cæteris paribus*, most quickly formed when the part is kept free from pain; and the cause is obvious: for irritation, in whatever way it is produced, must excite, in the extremities of the divided vessels, a preternatural degree of spasm or stricture; a state entirely opposite to what we have shown to be the most favourable for the production of new parts; for as this very probably depends, as we have already had occasion to see, on an elongation of the divided vessels, the more completely that these are relaxed, the more readily will such an extension advance.

And we accordingly find, that whatever tends to keep up much inflammation in fores, has a certain effect in putting a total stop to the production of new parts.

Hence the necessity of removing from wounds and ulcers, every extraneous body, or whatever tends to produce irritation; and from this also we account for the great advantage of dressing seldom, and of using mild applications, instead of continuing the ancient

practice of dressing frequently, and often with very complex irritating applications.

The other set of local causes that tend to obstruct the formation of new parts, are chiefly all those vitiated discharges, which, by neglect or improper management, are so apt to occur in every ulcer; for, almost every variety of matter, that differs much in colour or consistence, from good pus, is found to be more or less acrid: infomuch, that in some instances it not only prevents granulations from rising, but corrodes and destroys the contiguous parts.

In all such ulcers, our chief object is to correct this acrid matter, which we most readily do by whatever is capable of converting it into what is termed laudable pus; the means best adapted for which will in the ensuing sections be particularly described.

These obstacles to the growth of new parts being removed, nature will always, as far as possible, carry on their formation; and when, in due time, the vacancies produced by fores are supplied, the only part of the cure that remains to be completed, is the formation of a cicatrix. This, too, is commonly an effort of nature; but it may frequently be promoted by art.

Whilst any deficiencies in fores remain to be filled up, and whilst the parts are for this purpose still shooting and extending, the mildest applications, as I have observed already, are the most proper; but, when the loss of substance has either been repaired entirely, or to such a degree as the strength and other circumstances of the patient will permit, those applications, which, in the extending state of the vessels would have been prejudicial, now become proper and necessary.

Thus, mild styptic powders and washes, by contracting or corrugating the extremities of such vessels as have been divided, and producing an exsiccation of that inorganic cellular substance in which these vessels are enveloped, tend to induce over the surface of fores

that thin covering we term cicatrix ; which, although at first always tender and delicate, yet in course of time it commonly acquires greater strength, by receiving a farther addition of thickness from the same cellular substance by which it was at first in a great measure produced.

Having premised these general observations upon the manner in which the cure of sores seems to be accomplished, and which apply in a great measure to every variety of ulcer, we now proceed to the more particular treatment of the simple purulent ulcer.

§ 6. *Remarks on the Indications of Cure, and on the Remedies employed for the Cure of the simple purulent Ulcer.*

IN the cure of this variety of ulcer, as little inflammation, and no preternatural swelling are supposed to take place, but merely a vacancy, either from a real loss of substance, or from a retraction of parts simply divided, the discharge at the same time being mild and purulent, the only indications that occur, are,

- 1st, To diminish, as much as possible, any vacancy that the ulcer may have occasioned ; and,
- 2d, To promote the formation of a cicatrix.

For the more effectual accomplishment of the first of these, the concurrence of two circumstances is required ; namely, the formation, to a certain extent, of new granulations ; and the diminution or decay of such parts as lie immediately contiguous to the ulcer.

I have formerly shown, that either a considerable degree of inflammation, or the presence of acrid matter, are alike detrimental to the production of new parts ; so that this part of the cure should consist chiefly or entirely, in such a mode of treatment as tends most effectually to the prevention of both.

In the first place, we should avoid the use of the several warm gums, balsams, and spirituous tinctures,

recommended by all the old writers, and still too generally continued by many of the moderns.

For although, in some varieties of ulcer, remedies of this class may be used with safety, and in certain circumstances with advantage, yet, in the simple purulent ulcer, they very commonly do harm, and ought to be laid aside; as ought also every application that can irritate or excite pain: for whatever has this effect, must increase the inflammation; and, consequently, for the reasons that I have formerly given, must necessarily retard the cure. Even the common basilicon and linimentum Arcæi of the shops, are, for the same reasons, improper; for every ointment with any large proportion of resin or turpentine, always excites irritation.

The only advantages that we are here to expect from ointments, is their allowing the dressings to be renewed with less pain than they otherwise could be: and hence a composition of the blandest materials, is, for such purposes, preferable to every other, such as the unguentum simplex of our Dispensatories; or ointment prepared with white wax, spermaceti, and fresh olive oil, without any other addition.

In sores of this description, ointments impregnated with the preparations of lead, sometimes prove useful; and as Goulard's cerate is a very neat preparation of this kind, I think it right to insert the prescription which he gives for it.

Take four ounces of refined wax, and one pound of oil; and keep them over a slow fire till the wax is melted, taking care to stir them gently. Having previously mixed four ounces of what he terms extractum saturni, with six pounds of water, add it by little and little to the wax and oil, now cooled in a vessel of a proper size.* Let them be well incorporated together with a wooden spatula, always taking

* For the preparation of the extractum saturni, see Chapter I. Section II.

care to let the quantity of water first put in, be thoroughly absorbed before more is added : this cerate may be made stronger or weaker, by adding more or less of the extract. This, as well as every ointment, should be prepared in small quantities, as it is of much importance in the treatment of sores to employ such dressings only as are perfectly fresh and free from rancidity.

Pledgets of lint, spread thin with either of these ointments, seldom excite pain, nor do they ever produce any kind of inconvenience ; for, although oily applications to sores have been condemned by some, from an apprehension of their turning rancid ; yet I can say, from experience, that under proper management they never become so. Nor is it easy to suppose, that any such preparation, as those I have mentioned, when composed of fresh materials, can ever become putrid between the dressings of sores, which very rarely ought to be more distant than twenty-four hours from each other.

The frequent dressings of sores is now very generally, and very properly, condemned ; but as practitioners are apt to run into opposite extremes, we find by some that once in six or eight days is judged sufficient. It rarely, if ever, happens, however, that this can be proper. It affords no advantage to the sore : and I can assert, from frequent evidence of both methods, that the cure proceeds more easily when the dressings are changed daily, than when not renewed so frequently : it tends also to render the patient much more comfortable, and to preserve the air of his apartment in a more pure state than it otherwise possibly can be. I am therefore clearly of opinion, that although the dressings of sores ought not to be frequently renewed, that the contrary extreme would prove still more hurtful ; especially in hospitals, where the air is seldom so pure as it ought to be. The circumstance by which we should be chiefly directed in the dressing of sores, is the quantity of matter which they

afford : no application should be removed till it can be done with ease ; but whenever there is much matter in the cavity of an ulcer, the dressings should be renewed daily.

The chief objection that has been suggested to the frequent dressing of sores, is the effect which much exposure to air is known to produce upon them ; but when new dressings are prepared, and immediately applied on the others being removed, no inconvenience of this kind can occur. This I may, however, remark, is a point of such importance as to merit very serious attention ; for the too free admission of air to sores, always interrupts the cure, not only by acting as a powerful cause of irritation, but by tending to vitiate the nature of the discharge.

Another objection has been made to the use of unctuous applications in sores, namely, that they are apt to render the parts soft and flabby, and that they thus tend to prevent the new granulations from being so firm as they ought to be.

This I know, indeed, is the effect of a long continued use of warm emollients, especially of fomentations and poultices : but ointments, such as those that I have mentioned, very thinly spread, never act in this manner, and they always prove more agreeable than dry lint ; which, unless the sores to which it is applied are plentifully covered with matter, is apt to excite much irritation, and in some degree tends to produce the same effect as gentle escharotics ; a circumstance that seems to have been well known to the writers of the last century, who frequently recommend dry lint for suppressing the undue growth of parts, when in the cure of sores it takes place in too great a degree.

I have long objected to the indiscriminate use of dry charpee or lint in sores. This will appear from the preceding paragraph, which was published many years ago, and I have not had reason to alter my opinion. The effect of custom, however, is so powerful, that it may be long before the use of dry lint is so universal-

ly laid aside as it ought to be : but, after much experience, I am clearly of opinion, that a general use of it as a dressing, tends greatly to retard the cure of ulcers ; and whoever will have the resolution to deviate from established practice, and will employ any mild ointment instead of it, will receive much satisfaction from doing so. When speaking of mild dressings, I wish to have it understood, that it is in the simple purulent state of ulcers only, in which they chiefly prove useful. After all that has yet appeared to the contrary, not only in the writings of ancient authors, but even in those of some modern practitioners, I am perfectly convinced, that, in this state of an ulcer, a cure will be more easily and more quickly obtained by mild dressings, than by any other : but in the sloughy foul state of some sores, dressings of this kind, it must be owned, have little or no effect ; and in such circumstances some of the warm irritating ointments, to be afterwards pointed out, are the only means from which relief can be obtained.

The next circumstance of importance is the method to be pursued for preserving the matter of ulcers in a purulent state ; and as purulent matter is the mildest and least acrid discharge that ulcers ever afford, nothing should be omitted that can tend to preserve it in this state.

In the variety of ulcer that we are now considering, the principal attention which this requires, is the preservation of a due degree of heat in the part affected. This, in every part of the body, is necessary ; but more particularly in the arms and legs than elsewhere, for the natural heat of the extremities is less than it is in the trunk where the action of the heart has more influence.

In chapter I. when treating of inflammation, I have endeavoured to show, how necessary a due degree of heat is for the formation of pus in cases of abscess. It is equally so in the treatment of ulcers, and therefore merits particular attention : the want of this in-

deed is not an unfrequent cause of the most simple ulcers degenerating into those of the most inveterate kind.

Whilst any degree of inflammation remains in ulcers, the best method of applying heat, is by the frequent renewal of warm emollient cataplasms: but, as soon as the inflammatory symptoms are nearly gone, remedies of this kind should be laid aside; for they tend to relax the parts so powerfully, that a long continued use of them is apt to induce, as I have already observed, too much laxity or want of tone wherever they are applied: and the same purpose may be then answered equally well, by applying over the dressings, compresses of cotton, flannel, or any other covering that most effectually retains heat.

The benefit resulting from due attention to this mode of management, I have frequently experienced; and although not of so much importance in the treatment of simple ulcers, as in those of a worse kind, yet even in the slightest it should never be omitted.

In almost every ulcer, poultices prove useful in one stage or other of the cure: and although in those attended with much inflammation, they may no doubt prove serviceable as emollients; yet the degree of heat which they afford, by tending to promote a good suppuration, is, I am persuaded, the chief advantage which they ever produce.

But poultices, when used with this intention, if not frequently renewed, rather do harm than good; and, in order to obtain all the advantages that may be derived from them, they should be renewed at least every three hours. But this subject having been fully considered in the first chapter, it is not necessary to enter upon it again; for, the same observations apply with equal force and propriety here.

The circumstances that I have noticed, namely, the prevention of irritation by mild dressings, and the preservation of a proper degree of heat in the part affected, are the most certain means both of promoting

the growth of new parts, and for obtaining and keeping up a discharge of good matter. They should both therefore be kept in view in the cure of ulcers: either till there is no farther deficiency to fill up, or till the farther production of new parts is no longer to be expected.

The next most important part of this indication in the cure of ulcers, is to be obtained, as I have already observed, from gentle compression: and this, it may be remarked, should be employed at the same time, and be used along with the several applications we have just been considering; for as soon as the inflammatory state of an ulcer is over, and a discharge of good matter induced, slight compression, by means of a roller, may be immediately applied and continued during the remainder of the cure. It should be applied in such a way as not only to produce gentle pressure upon the parts immediately surrounding the ulcer, but also to serve as a support to the skin and other teguments, so as to prevent their retraction, which otherwise, in large ulcers, is very apt to happen.

When, by due perseverance in the various means of cure that I have thus pointed out, any loss of substance in ulcers is at last as far as possible supplied, the next indication of cure comes then to require attention, and that is, the formation of a cicatrix.

For the most part, we observe, that sores cicatrize soon after the process of incarnation, if we may so term it, is at an end; but this does not always happen, for in some instances, even where every deficiency appears to be supplied, still a cure is difficult to accomplish: the surface of the sore remains raw, and at the same time discharges considerable quantities of matter. In such cases, it becomes necessary to lay aside the ointment employed for the preceding part of the cure, and to use applications of a more styptic or astringent nature.

In this view, unguentum album prepared with cerufs, and cerate prepared with lapis calaminaris, are commonly used; but they answer best when the sores are at the same time bathed with lime water, a solution of saccharum saturni, or any other astringent wash: by bathing the sores with one or other of these, two or three times daily, and dressing with one of these ointments, a cure may frequently be obtained when we would not succeed with emollients: ardent spirits, too, often answer the purpose, of putting a stop to the discharge of sores in this state, and of drying or corrugating the soft cellular substance upon their surface into a firm cicatrix.

In some instances, again, a cicatrix does not form from the new granulations being so considerable as to rise above the surface of the contiguous parts. In such cases, we depend upon a proper application of escharotics: of these the best for common use is blue vitriol and calcined alum; and when they do not succeed, nothing weaker than lunar caustic will succeed.

In slight cases, indeed, a cure is often accomplished by the use of dry lint alone; a pretty tight bandage being at the same time applied over all.

This, I must however observe, is a stage of ulcer which frequently proves more perplexing than any other part of the cure: for it often happens, even in the most healthy people, and when the preceding part of the cure has gone very properly on, that a cicatrix cannot be induced, and the granulations newly formed continue raw, and do not show any tendency to heal: in this situation, when the means that I have mentioned do not answer, compresses moistened in French brandy, being applied under the roller, will often accomplish a cure; or spirits used in this manner, may be alternated with tincture of myrrh, or with a solution of blue vitriol in water; a practice which in different instances I have found to succeed, when the means usually employed have failed.

I have thus enumerated such local applications as prove most useful in the cure of these ulcers ; but in the course of the cure, other circumstances sometimes occur, which likewise merit attention.

In every ulcer, even in those of the most simple kind, rest of body is particularly requisite ; inasmuch, that, when it is not advised, no remedy with which we are acquainted can be depended on for a cure ; and in ulcers of the legs, it is even necessary to keep the diseased limb at rest, and as much as possible in a horizontal position. Rest and a horizontal posture have indeed been considered by almost all practitioners, both ancient and modern, as necessary for the cure of ulcers in the legs ; but in some late publications, it is asserted, that rest is so far from being necessary, that a cure is just as easily performed whilst patients are going abroad as when under strict confinement.

In some very slight ulcerations, this may sometimes be the case ; and, with the assistance of a tight bandage or laced stocking, applied so as completely to support the parts, even sores of a worse kind may be cured, and the patients at the same time allowed to move about. But, in general, so far at least as my experience goes, the regulations upon this point, enjoining strict confinement in ulcers of the extremities, as handed down to us by ancient writers, appear to be well founded ; for according as they are more strictly followed or not, the cure commonly advances quickly or otherwise.

It often happens, indeed, as I have observed above, that ulcers even of a bad kind, are cured without any assistance from confinement or a horizontal posture of the limb. This I have frequently met with ; and at this time I have different cases under my care, of ulcers going on towards a cure, whilst the patients are daily going abroad. But their being allowed to take this liberty, has always arisen from necessity ; as there is nothing of which I am more convinced, than that ulcers of the legs will cure sooner, more easily, and to

more real advantage, whilst the limb is preserved in a horizontal posture, than when the patient continues to take exercise. But when the circumstances of patients prevent us from receiving the advantages to be derived from confinement, we are reduced to the necessity of attempting the cure by other means; and, in such circumstances, nothing answers so well as pressure applied with a roller in the manner that I have uniformly mentioned in this as well as in the former editions of this work.

As confinement, during the cure of ulcers on the legs, proves always inconvenient, various means have been proposed for rendering it unnecessary; and it has not only been said, that cures may be performed without any assistance from confinement or a horizontal posture, but by some it is alleged, that these points of attention are even prejudicial.*

I have already remarked, that ulcers of the legs may be healed while patients are daily going abroad; and especially if a due degree of compression is continued. But, notwithstanding all the arguments adduced in favour of the practice, I have not yet heard of any which ought to set aside the opinion that I have endeavoured to inculcate, namely, that a horizontal posture is highly proper for the cure of every ulcer of the lower extremities. The means proposed by Mr. Underwood, I have tried on various occasions; they have sometimes proved successful; but, whatever may have been the case with others, they have never, in the course of my experience, effected cures so easily and speedily, or which have proved so permanent, as the means that I have pointed out, of employing mild dressings to simple sores, together with a horizontal posture in every ulcer of the leg.

* This has been asserted by other writers; but it has been more fully enlarged upon of late, in a very ingenious Treatise upon Ulcers of the Legs, by Mr. Underwood of London.

In almost every ulcer, directions have been given by practitioners, for the regimen of the patient ; and, in general, a low spare diet is prescribed. Such regulations, however, very commonly do harm ; for they seldom fail to relax the habit of body, and to hurt the nature of the discharge. Full living ought certainly to be avoided, for whatever excites fever, proves in the management of ulcers always hurtful ; but while this should be duly guarded against, it is equally proper to avoid the pernicious consequences of living too low. The discharge of purulent matter is so apt to produce debility, that, in large ulcers, this circumstance alone proves always hurtful if the constitution is not at the same time enabled to support it by a proper allowance of food. We always find indeed, that the cure of ulcers goes on more easily when the patient is kept in his usual habit of body, than when his system is much reduced by a low regimen : nay, I have had many opportunities of observing, that ulcers even of the worst kinds, may be soon made to heal by the use of a nourishing diet alone, after having obstinately resisted all the usual remedies under a low regimen.

For the same reasons that a low regimen is improper, the use of purgatives, and whatever tends to excite debility, should be avoided. Nor have I ever perceived, that in this variety of ulcer, internal medicines prove useful. I know that medicines of various kinds are frequently given, particularly bark, nitre, and cooling purgative salts. But in the simple purulent ulcer, which we are now considering, I have never perceived that any advantage has been derived from medicines : the affection is merely local, and local remedies ought to be depended upon for the cure. When, indeed, the matter of a sore is in too great quantity, and especially when it is thin and acrid, bark, steel, and other tonics, may be given with advantage : but when the local applications that I have mentioned do

not correct this, it will commonly be found to originate from some general disease of the constitution; a different species of ulcer will be therefore produced, and other remedies will consequently be required.

SECTION III.

Observations on the simple vitiated Ulcer.

§ 1. *Of the Symptoms, Causes, and Prognosis, of the simple vitiated Ulcer.*

I CONSIDER every ulcer as vitiated, in which the discharge is materially different from that of the purulent ulcer described in the last section.

The most frequent appearances of the matter of ulcers in this vitiated state, are,

1. A thin green coloured discharge, termed sanies.
2. A somewhat red, and generally very acrid matter, termed ichor. And,
3. A more viscid glutinous kind of matter, called fordes.

This last is frequently of a brown appearance, somewhat resembling the grounds of coffee, or grumous blood mixed with water. They are all of them much more fetid than purulent matter, and none of them are altogether free from acrimony; but that which we generally term ichor, is the most acrid of any, being frequently so sharp and corrosive, as to destroy the contiguous parts.

From the acrimony of this kind of matter, the ulcers do not fill up with new granulations: they rather become more extensive: and, instead of a red healthy complexion, they are either of a dark brown, or

of a black sloughy appearance. The pain in all of them is considerable; generally more or less in proportion to the acrid state of the matter.

This variety of ulcer may be induced by wounds, burns, bruises, and every other cause that can produce the simple purulent ulcer; for even that variety of ulcer, however mild it may have been, if either neglected, or improperly treated, is apt to degenerate into the vitiated ulcer which we are now considering.

It is here also proper to observe, that this alteration in ulcers, from the simple to those of a more inveterate kind, happens more frequently in particular parts than in others: thus, from the tendons and aponeurotic expansions of muscles not affording the serum required for the formation of purulent matter, ulcers seated in these parts commonly prove more troublesome and inveterate than those that are seated in the cellular membrane, where the secretion of a fluid proper for this purpose generally takes place.

In vitiated ulcers, that are merely local, and not connected with any disease of the system, when not of long duration, and more especially in healthy patients, we may always give a favourable prognosis. But, when the reverse of this takes place; when the patient is old; the ulcer extensive, inveterate, and of long standing; the prognosis should always be doubtful, at least, in such circumstances the cure will always be tedious and for the most part uncertain.

§ 2. *Of the Cure of the simple vitiated Ulcer.*

I HAVE already remarked, that the matter of ulcers becoming vitiated, proceeds, in general, from some particular affection of the solids or secreting organs in the parts diseased, whereby fluids are separated from the blood which cannot be converted into good pus. The cause of this I have also endeavoured to explain; and, from the arguments I have advanced, it appears, I think, to consist in different degrees of inflamma-

tion, or of increased action in the vessels of the parts diseased, occasioned by one or other of the exciting causes which give rise to ulcers.

Besides the arguments already adduced in support of this opinion, it seems to be further confirmed by the nature of the remedies found to prove most effectual in the cure, which are chiefly such as prove most powerful in easing pain and abating irritation.

Thus, warm fomentations and poultices frequently prove useful, not only by the relief which they afford from pain, but in altering the nature of the discharge, and converting it into purulent matter: this I have known happen from the first or second application of a poultice, although, as I have formerly observed, poultices should never be long persevered in after the inflammation for which they are applied is removed, as they are apt to render the ulcerated parts too soft and spongy.

In severe degrees of pain, however, remedies of this kind do not always prove successful. And while much pain continues, the matter will not become better, nor will the sores assume a healing appearance: it therefore becomes an object of the first importance, in this variety of ulcer, to remove the inflammation, by the presence of which the cure is for the most part chiefly impeded..

When warm emollients fail, we employ opiates, local bloodletting, and escharotics.

In this view, we frequently derive advantage from the internal exhibition of opium; and I have also known pledgets of soft lint dipped in laudanum, and applied to the surface of an ulcer, remove the pain, and induce a favourable appearance over the whole. This purpose is also frequently obtained from the application of leeches to the edges of a sore, which, in some instances, I have known give relief when every other remedy has failed. When the leeches can be made to fix upon the sore itself, they commonly an-

swer best ; but when this cannot be done, they should be applied as near as possible to the pained parts.

In this vitiated state of ulcers, when the symptoms do not soon yield to emollients, we frequently succeed by the use of caustic and escharotics. These, when first applied, excite more pain than emollients ; but this soon subsides, and leaves a pleasant soothing sensation over the whole parts. When this kind of dressing succeeds, the quantity of matter soon becomes less ; from being thin, acrid, and offensive, it becomes bland and purulent ; and fresh granulations of a healthy appearance sprout up over the whole surface of the ulcer, which soon begins to contract. I am now, therefore, in the daily practice of using remedies of this class, which I constantly employ as soon as emollients appear not to answer the purpose.

In some ulcers, a mixture of red precipitate, or any other escharotic, with basilicon or wax ointment, answers all the purposes to which I allude ; but when they do not succeed in this form, they commonly answer when applied in dry powder over the surface of the sore : occasionally, however, we meet with cases in which even this does not answer, and in these the application of lunar caustic often succeeds. The caustic should be applied not merely to the edges of the ulcer, but over the whole surface, and renewed every third or fourth dressing, till the matter becomes thick and purulent, and the granulations assume a healthy appearance. Immediately after touching an ulcer with caustic, the parts should be covered with dry lint, as ointments of every kind tend to blunt the action of caustic. For the intermediate dressings, nothing answers better than a mixture of basilicon and red precipitate, in the proportion of a drachm or four scruples of the latter to an ounce of the ointment.

For general use, as an escharotic, in ulcers, red precipitate, or hydrargyrus nitratus, as it is now commonly termed, is perhaps the best we can employ ;

verdigris finely levigated, is also used occasionally for the same purpose, likewise corrosive sublimate, and even arsenic ; but all of these excite more pain than precipitate, while they do not in any circumstance appear to be preferable.

For the purpose of changing the nature of the discharge in this vitiated state of ulcers, and converting it into a state of purulency, a variety of other applications have at different times been recommended. At one period the gastric juice of sheep and other animals was much extolled as a dressing for this kind of sore, and of late the power of rhubarb has been recommended ; but after having amply tried them both, I have not found that either of them answer any good purpose.

While with local applications we endeavour to bring ulcers into a healing state, the habit of body should not be neglected. When the patient is much reduced, his strength should be supported by a full allowance of food, while any tendency to plethora and inflammation should be kept down by a low regimen.

When this vitiated state of ulcers occurs in weak or emaciated patients, Peruvian bark proves commonly useful. In order, however, to answer any material purpose, it should be given in larger doses than we commonly employ. In the quantity of four or five drachms daily, it not only gives tone to the system, but for the most part has an obvious influence in correcting the nature of the discharge.

But, in plethoric habits, and especially where there has previously been much tendency to inflammation, the bark should be used with caution : in these circumstances, indeed, it should seldom be given to any extent, till the tendency to inflammation has in a good measure disappeared.

With due perseverance in the remedies and plan of management which I have thus pointed out, if the system is not otherwise unhealthy, the discharge will

at last become purulent, and this being accomplished, the most material part of the cure will in a great measure be obtained ; for the parts being no longer corroded and kept down by constant immersion in acrid matter, they commonly soon put on a healthy appearance ; and new granulations being now at liberty to form, any loss of substance produced by the ulcer, is soon, as far as possible, supplied.

Ulcers being thus brought to a healing condition, are to be treated during the remainder of the cure in the manner that I have mentioned in the last section, that is, with mild dressings, with due attention to the preservation of a proper degree of heat in the parts affected, together with the application of gentle pressure with a roller, from the time of the inflammatory symptoms being removed.

It frequently happens, however, in this as in every ulcer of long duration, that although the parts, with proper management, may be brought to put on a healthy appearance ; and although the discharge may be converted into the best kind of pus ; yet still the sore cannot be made to cicatrize, but continues to discharge as plentifully as ever.

In such circumstances, issues often answer a good purpose ; and where ulcers have been of long duration, as the cure will seldom prove permanent if an adequate drain be not introduced, we ought in every instance to advise it.

For, besides the danger arising from the practice of healing old ulcers before new drains are inserted, any cicatrix we obtain generally soon bursts open, as the necessary effect of that redundancy of fluids induced by the retention of those which the constitution had been accustomed to throw off, for a supply of pus to the ulcers.

In every ulcer, therefore, of long duration, the first part of the cure should consist in the introduction of an issue of such a size as may afford a quantity of matter in some degree proportioned to the discharge.

And although the situation of such drains has commonly been chosen as near to the ulcer as possible; yet, provided the same quantity of matter is discharged, the situation of the issue need not be an object of attention; and therefore, that which is most convenient for the patient may be fixed upon.

Since the first editions of this work were published, the advantages to be obtained from issues in the cure of habitual ulcers, have in various instances been experienced. In some, cures were obtained by issues, when every other means of relief had previously failed; and in others, the sores broke out again upon allowing the issues to dry up, and were again cured by having recourse to the same means.

Various instances might likewise be given from authors, not only of the difficulty of curing habitual ulcers if an issue be not previously inserted, but of very pernicious consequences being induced by it. But as the experience of every practitioner must have furnished instances of this, I do not think it necessary to refer to books for authorities.

In sores which have not been of long continuance, however extensive they may be, it would be highly improper to put the patient to the trouble of an issue for their cure. In recent ulcers, the system has not been so long accustomed to the discharge as to induce any risk from a stop being put to it; but in ulcers of long continuance, I must again say, that a cure can never be attempted with safety, unless an issue of an adequate size is previously inserted.

As issues of every kind are attended with some inconvenience, they seldom prove agreeable to patients; and from this consideration, practitioners are frequently induced to dispense with them: the least consideration, however, must render it evident, that no motive of this kind should meet with attention.

It is chiefly in the vitiated ulcer, that the internal use of nitre has been recommended; but, although I have given it, in this as well as in other varieties of

fores, in very considerable quantities, and with every necessary attention, I cannot say that I ever observed any obvious benefit result from it. Sores, indeed, have been cured, in which nitre was used; but unless the roller and other local applications were employed at the same time, this remedy, in any of the trials that I have made of it, never accomplished a cure.

SECTION IV.

Observations on the fungous Ulcer.

§ 1. *Symptoms and Causes of the fungous Ulcer.*

BY the term fungus, I here mean to express every preternatural rising of the surface of a sore. For the most part, this kind of excrescence is soft and spongy, but in some instances it is of a more firm texture than healthy granulations.

These excrescences are not commonly painful, although, in some instances, it is otherwise; and the discharge which they afford, varies according to the variety of ulcer with which they happen to be connected.

Thus, when a hyperfarcosis, the term commonly given to fleshy excrescences in sores, occurs merely from neglect, in a simple purulent ulcer, the discharge frequently continues good; while, in ulcers discharging vitiated matter, the discharge usually continues to be of the same nature.

With respect to the causes of this formation in sores, I have already observed when speaking of the simple purulent ulcer, that in healthy young people, the new granulations are apt to push forward too much, so as to rise above the surface of the neighbouring parts. This, by pursuing the directions which

were then given, we have it often in our power to prevent; but when these are neglected, as is often the case with poor people, a degree of fungus is apt to rise, which it frequently proves very difficult to remove.

Another variety of fungus is produced in wounds, by the new granulations being allowed to rise and advance before they are sufficiently found at bottom. In this manner, whether from matter lurking beneath, or from extraneous bodies lodging in the diseased parts, the granulations still continue to advance; but, instead of cicatrizing when on a level with the contiguous parts, they go on rising beyond them, till the disease we are now considering is of some duration.

When in this manner a fungus has commenced, it continues to increase, till the cause is discovered by which it was produced, and on this being removed, if the constitution is otherwise sound, the fungus for the most part subsides quickly.

§ 2. *Of the Cure of the fungous Ulcer.*

THE cure of these excrescences must in a great measure depend upon the cause by which they are induced: when produced merely by an overgrowth of parts, and where no disease or carious bones are found to lurk at the bottom of the sore; when the tumor is extensive, and does not rise to any great height, we should immediately have recourse to escharotics.

Of these a great variety has been used; even the actual cautery has been proposed, and by others, we are advised to remove at once all fungous parts with a scalpel.

Either of these would in every case prove effectual, and more expeditious than perhaps any other that can be mentioned: but they have such an appearance of severity, as to deter almost every one from submitting to them; especially as it is well known that all such excrescences as we are now considering, can just as

certainly, though perhaps not so quickly, be removed by more gentle remedies.

Excrescences of a soft texture may frequently be removed by calcined alum alone: covering the fungous parts with the powder every second or third day, will often prove effectual; but when the protuberant parts have acquired much firmness of texture, alum alone does not answer: in this case, one of the most effectual applications that I have ever employed, is a powder composed of equal parts of calcined alum and red precipitate finely levigated: scarcely any fungus, however firm it may be, resists the power of this escharotic. For several years past, I have been in the practice of using it frequently, and it seldom fails to answer the purpose. Next to this is lunar caustic, which acts more quickly, and does not produce more pain than caustic of the weakest kind; it seldom fails to produce the proper effect, which is not the case with the others; and it is not so apt to run and spread over the contiguous parts, which is frequently a very troublesome circumstance attending the other.

The caustic should be melted in water; and a small brush or pencil being dipt in it, in this manner it should be applied to such parts as are to be destroyed: and this being done either daily, or every second day, the fungus will be removed in a longer or shorter time, according to the size and firmness of the tumor. A strong solution of verdigris in water, of crude sal ammoniac, or blue vitriol, will also occasionally succeed in removing these excrescences.

Cases, however, sometimes occur, in which some variety of practice becomes necessary: I have made trial of various articles; but none ever proves so generally useful as lunar caustic, or the mixture I have mentioned, of calcined alum and red precipitate. I have sometimes used strong solutions of silver and crude mercury, in spirit of nitre; and the effects of these, as may readily be imagined, are always power-

ful: they are nearly the same, indeed, being only somewhat more powerful than those we commonly experience from lunar caustic, this kind of caustic being merely a solution of silver in the nitrous acid, evaporated to dryness.

One ounce of pure quicksilver will dissolve in an ounce and half of strong spirit of nitre; and this forms, perhaps, as strong a caustic as can be prepared. For other purposes, where milder preparations are necessary, the strength of the remedy may be reduced by using a smaller proportion of mercury and a weak nitrous spirit: but for the removal of a hard callous excrescence, the strongest solution should be employed; it gives no more pain than the weakest, and it always proves more effectual: but in using it, either for warts, or those fungous excrescences we are now considering, it ought never to be applied to any extensive surface at once. When the fungus is not large, the solution may be applied over the whole of it; but, in extensive sores, it answers better to apply it to a small portion at once; and if different parts of an excrescence are touched daily, the whole will in general be soon removed. After the application of any kind of caustic, the parts should be covered with dry lint; and not, as is commonly done, with any kind of ointment, which always destroys the activity of caustic.

We have hitherto been supposing, that the surface of the fungus is of considerable extent, and not much raised above the contiguous parts: but whenever the base is narrow, and the height of the excrescence considerable, the most expeditious and easiest method always is, to take it off with a ligature.

When the excrescence is narrow at the base, and in any degree pendulous, a ligature can be applied and easily kept on; but when the tumor is broader below than above, it requires some attention to prevent it from slipping off. It may always, however, be done in the following manner.

A strong needle, with an eye near to its point, and fixed in a handle, being pushed through the tumor at its base, two waxed ligatures must be introduced at its eye, when the needle must be again drawn back, so as to leave the threads with their ends hanging out at each side of the excrescence. A firm ligature is now to be formed round one half of the tumor, by the two extremities of one of the threads; and in like manner the other half is to be included by the other two, and each of the ligatures being from time to time properly tightened, both halves of the tumor will for the most part soon fall off. The hint of this practice was taken from the description of a curved needle recommended by Mr. Cheselden, for the extirpation of diseased tonsils, which, in certain cases, without some such contrivance, could never be done with safety.

The fungus being, in this manner, removed, the fore is to be treated in the manner that I have advised for simple purulent ulcers.

The other variety of fungus proceeds, as I have observed already, from matter or other extraneous bodies lodging in fores, by which the granulations which form above them, instead of being firm and healthy, are of a soft spongy texture, and of a pale unhealthy aspect.

The cure of this consists entirely in giving vent to any matter that may be lodged, or removing any portion of bone, or other extraneous body from the fore. This being done, the excrescence begins soon to decay, and healthy granulations forming from the bottom of the fore, a cure is afterwards obtained with common dressings alone: escharotics have no influence in the cure, for while any extraneous bodies remain concealed in fores, the granulations sprout up almost as quickly as they are destroyed, and on these being removed, all the newly formed parts disappear so quickly, that it is not necessary to apply caustic for the purpose.

These are the only varieties of fungus, which, in local ulcers, ever prove troublesome; excepting, perhaps, that which occurs as a symptom in carious ulcers, and of which an account will be given in its proper section.

SECTION V.

Observations on the sinuous Ulcer.

§ 1. *Of the Symptoms and Causes of the sinuous Ulcer.*

WHERE only a small portion of an ulcer is exposed to view, the matter which it affords, collecting either in the cellular substance immediately below the skin, or among the contiguous muscles, and discharging itself by one or more openings, gives rise to what we term a sinuous ulcer.

These sinuses serving as reservoirs, both for the matter that forms in the body of the sore, and for that which proceeds from their own cavities, makes the discharge, when the matter of the sinuses is pressed into them, appear to be more considerable than their extent of surface would give cause to suspect.

A sinus, as thus described, is the most simple state of the disease: but, by long continuance, or by the use of astringent applications, it is liable to become hard and callous through its whole course; and, in this situation, from its supposed resemblance to a pipe, it is termed a fistula; of which nature is the fistula in ano, a well known troublesome disease.

The most frequent cause of the formation of sinuses in ulcers, is the want of a free vent to the discharge;

which, naturally falling to the most depending part of a fore, if it does not there get easily off, it is apt to insinuate into the soft yielding substance of the cellular membrane, in which it proceeds, till it somewhere or other makes an opening for itself, either upon the surface of the body, or into some of the neighbouring cavities.

Tight bandages, when applied directly upon ulcers, and not made to act likewise upon the neighbouring sound parts for some way both above and below the sores, are not unfrequently attended with this effect: they should always therefore be applied with much care and attention.

In all recent sinuses, and even in those of long duration, when the parts are so far accessible as to admit of being properly treated, and when the constitution in other respects is healthy, we may very commonly give a favourable prognosis. But when of long continuance, and especially if the sinuses open into any of the joints, or when the parts are of difficult access, the cure, in such cases, becomes both difficult and doubtful.

§ 2. *Of the Cure of the sinuous Ulcer.*

IN cases of recent sinus, we are directed by all the ancient writers on surgery, and likewise by many of the moderns, to make use of what they term vulnerary or healing injections. And, in the more advanced states of the disease, when, by long continuance, the sides of the sinuses have become callous, escharotic injections and powders are recommended: but none of these are to be trusted; and the too frequent use of them has often rendered hard and callous such sinuses as before were of the most simple nature.

Others, again, have advised to lay the different sinuses open from one end to the other, and, by cutting out all the hardened parts, to convert the whole

into one common ulcer, and to proceed afterwards with the cure in the ordinary way.

In this manner we might no doubt frequently succeed; but, besides the great pain, and very unseemly cicatrix, which this operation never fails to produce, it cannot, in every case, with safety be put in practice.

Thus, when sinuses run to a very great height up the rectum, we cannot make the attempt; and when, as is frequently the case, they penetrate deep, and run below either large blood vessels, tendons, or nerves, this mode of treatment becomes altogether inadmissible.

But although the practice were not in any degree hazardous, it ought in almost every instance to be laid aside; since we can, by a more simple and less painful operation, be always as certain of proving successful, as by a simple incision, or by an entire destruction of the parts.

The intention of cure in all cases of sinus, is to produce a coalescence of their sides, so as to destroy any vacuity that may have taken place.

The easiest and perhaps best means of accomplishing this, is, first to make a depending orifice for a free exit to the matter, and then, by gentle irritation, to induce, on the internal surface of the sinus, a slight degree of inflammation, which, by experience, is known to be the state most favourable for producing adhesion between the divided parts of an animal body; so that a firm union of the sides of the sinus may in due time be obtained.

Now, both these intentions are fully answered by the introduction of a seton, from the orifice in the ulcer along the course of the sinus, to its other extremity; where an opening, large enough to receive it, ought to be made in the manner already pointed out in cases of abscess.

The cord of cotton or silk should at first be sufficiently large for the size of the sinus; to be diminished gradually, as the cure advances, by taking away

a thread or two from its thickness every second or third day. At last, when the discharge is much lessened by the vacuity occasioned by the sinus being filled up, the seton should be totally withdrawn; and a bandage being applied with some tightness over the part, and continued for a sufficient length of time, a complete cure will thus for the most part be effected.

The first step to be taken, then, in all cases of sinus, is to discover the direction in which they run; which commonly we can easily do, either by the introduction of a probe, or observing where the matter points on being allowed to collect, and from whence it comes, on the part being pressed. And into every sinus opening into the ulcer, a seton should be introduced.

This method of curing sinuses, by the use of setons, is free from all manner of danger, and is admissible in a great proportion of cases: even when sinuses run deep among muscles and blood vessels; and when it would be unsafe, therefore, to use either the scalpel or acrid injections; a seton, introduced by means of the director, in the manner I have mentioned, may be always employed with safety and advantage.

Neither is the practice confined to cases of recent sinus: it answers nearly equally well in those of long duration: hence, there is reason to think, that it would answer in fistula in ano, were it not rendered inadmissible from the situation of the parts affected. In similar affections in perineo, I have known it used with much advantage: and in this situation, indeed, it is particularly proper; as the cicatrix produced by the opening of a long sinus in the usual way, with a scalpel, proves in these parts frequently more troublesome and painful to the patient, than even the original disease which it was meant to cure.

The sinuses being at last filled up, the ulcers with which they were connected, must be cured in the ordinary way, by the means pointed out in the different sections of this chapter.

SECTION VI.

Observations on the callous Ulcer.§ 1. *Of the Symptoms and Causes of the callous Ulcer.*

AN ulcer is said to be callous, when instead of contracting, its edges keep at a stand, turn ragged, and at last, by acquiring a preternatural thickness, rise considerably above the level of the contiguous parts: and, as it is generally from neglect, or improper treatment, that ulcers become callous, the discharge which they afford is commonly a thin vitiated matter.

It is chiefly in this ulcer that varicose veins are met with, especially in ulcers of the leg. This seems to be owing, not only to the difficulty which the blood in this situation meets with in its return to the heart; but, in a great measure to the stricture which the callosities produce on the course of the veins.

This variety of ulcer has by many been termed varicose; from their supposing them to proceed from, and to be as it were fed by, matter furnished from these swelled veins, which frequently have the appearance of opening into them.

This error, however, must have arisen from want of attention to the cause of these swellings in the veins; together with the mistaken notion which hitherto has prevailed of the formation of pus, which formerly was supposed to circulate with, and to be deposited from, the blood; but which I have endeavoured in Chap. I. to demonstrate to be an opinion void of foundation.

Ulcers seldom become callous from any other cause than neglect and improper treatment. When injudiciously treated, either by irritating or relaxing applica-

tions, or when entirely neglected, so that fungous excrescences are either allowed to arise, or dressings and other extraneous bodies permitted to remain too long in their cavities; such substances come at last to act as impediments to the further contraction of the ulcers. And, the small vessels of their edges being thus prevented from proceeding further in a right direction, are forced to push upwards, and sometimes even backwards, till, by the effect of pressure produced by the usual bandages, they naturally come to acquire a morbid hardness or callosity; which, as long as it may be allowed to remain, very effectually prevents the further progress of the cure, however judiciously the fores may in other respects be treated,

§ 2. *Of the Cure of the callous Ulcer.*

IN our treatment of callous ulcers, the first step towards a cure should be the removal of their edges; for till this is accomplished, however well the disease may be otherwise managed, the process of cicatrization will not take place.

In recent cases, warm emollient cataplasms, when continued for a due length of time, by softening the callosities, will frequently, without any other application, answer every intention of cure. But it is only in the earliest periods of the disease that these prove effectual: for when of long duration, and the edges of the sore have acquired much preternatural hardness, no emollients, or any other discutients, ever produce any obvious benefit.

The only remedies upon which we can place dependence, are the scalpel and caustic: and as the last, when properly managed, is equally certain with the other, it should, as the easiest, for the most part be employed; and, for reasons that I have given in a former section, the lunar caustic should be preferred. The solution of silver or of mercury, of which a description was given in the section on fungous ulcers,

may be used with equal propriety here: either this, or the lunar caustic, should be applied every two days to the callous edges of the fores, by which they will be soon destroyed. In this manner, and by continuing the poultices as long as the fores remain foul, they soon assume the state of simple purulent ulcers, when by common treatment a cure is for the most part easily obtained.

In the list of symptoms, varicose veins were mentioned as one. These, we might imagine, on the cause being removed by which they were produced, would likewise disappear. This, however, is seldom the case; for when blood vessels by distention have been deprived of their tone, they do not soon recover it. In the treatment, therefore, of the callous ulcer, it is not enough to remove the cause which originally produced these swellings in the veins: some support must be given to the weakened parts, in order to enable them with more certainty to recover the strength which they have lost.

Nothing has ever answered this purpose so well as the laced stocking, or spiral bandage, which I have already mentioned so frequently in the cure of ulcers. In order to prove useful, however, it must be continued for a great length of time. With this attention, it seldom fails to answer, and to render unnecessary that painful operation, so frequently advised, of extirpating, as in cases of aneurism, the diseased or swelled parts.

The effect of pressure in the cure of fores, I have already taken different opportunities to mention; but it proves in a particular manner useful in ulcers with callous edges. In fores of this description, the hardness or callosity of their edges, is not the only impediment to a cure: the contiguous parts are always much tumefied; and this tumefaction must be entirely removed, before any permanent cure can be obtained.

This swelling of the contiguous parts originates most probably from obstruction in the smaller vessels of the

edges of the fores, in consequence of pressure produced by the callosities which surround them: and accordingly it sometimes subsides entirely by the application of emollient poultices alone. But when this does not happen, pressure obtained by a proper and continued use of a flannel roller, will very commonly prove successful.

SECTION VII.

Observations on the carious Ulcer.

§ 1. *Of the Symptoms and Diagnosis of the carious Ulcer.*

EVERY sore seated upon, or communicating with, a carious bone, may be termed a carious ulcer.

Caries appears to be the same disease in bones with sphacelus or gangrene of the soft parts; as I think, is obvious, both from the symptoms, causes, and method of cure.

The bones not being so plentifully supplied with blood vessels as the softer parts of the body, the anastomosing of different vessels does not occur so frequently in them; so that, when any considerable artery of a bone is destroyed, the parts which it supplied naturally suffer more than any of the softer organs would do from an injury of a similar nature.

And, as all the blood vessels of bones are known to pass to them through their surrounding membrane the periosteum, upon which they generally run for a considerable way before they penetrate deeper, it is not uncommon for a bone to become carious which has not otherwise been injured than by having a small portion of its membrane destroyed.

I do not, however, mean to say, that a caries must necessarily succeed to the destruction of part of the periosteum; for the contrary often happens: and unless the injury has been so considerable, as at the same time either to affect the structure of the bone itself, or to occasion, as I have already observed, the destruction of some principal artery, a caries will never occur from the periosteum being abraded; but whenever an accident has produced either of these effects, the other will almost constantly take place.

From the first appearance of a bone after being laid bare, if it has not been much injured, we can never at once determine whether caries will succeed or not. In mere abrasions of the periosteum, I would, from a number of observations, conclude, that there is at least an equal chance that it will not: a short time, however, will commonly resolve the uncertainty.

For if, at the end of the fourth or fifth day, a bone that has been denuded still retains its natural appearance, we may in general, with certainty, conclude, that caries will not succeed; and may accordingly proceed with the cure, as if the wound was of the most simple nature, which we could never with propriety do, whilst any uncertainty continued of the state of the bone; and hence the importance of being soon able to determine whether a bone laid bare is to be attacked with caries or not.

For, if a cure should be attempted in a case where caries is to follow, and if the fore should be made to cicatrize, all the new parts would be again to destroy; much unnecessary pain would be given to the patient, and a permanent cure much longer delayed than if proper measures had been taken at first.

When a denuded bone is to become carious, it usually shows itself in a short time. By the end of the fourth or fifth day, the bone begins to lose its natural healthy appearance: it turns first of a pale white, and then gets a slight tinge of yellow; and whenever this

begins to appear, there can be no further doubt of what will ensue.

It sometimes remains, however, in this state, for a considerable time, and by degrees gets a more deep tallow like appearance; in which state it commonly continues for a longer or shorter time, according to the degree of violence with which the injury has been inflicted: afterwards it goes through the different stages of brown and dark, till it has acquired a black of the deepest dye, a period at which we may suppose this portion of bone to have arrived at the highest degree of mortification.

The discharge is never of the consistence of good pus: it is generally considerably thinner; and from the first appearance of a caries, it acquires a very disagreeable fetor, which always turns more considerable as the different stages of caries advance; and at last becomes dark, or even black, at the same time that it is frequently very acrid.

As the several degrees of blackness or mortification go on, small foramina or holes form over its whole surface, which, by degrees, increase both in size and number, till even the most solid bones acquire a kind of spongy appearance. In this situation, the mortified portion generally becomes loose, and, when pressed upon, a considerable quantity of greasy kind of matter, with an intolerable fetor, can commonly be forced out from the different openings; which so taints the whole discharge from the ulcer, and gives it such a very peculiar smell, as renders it scarcely possible for any practitioner who has once known what it is, ever to be deceived with respect to the existence of caries. Indeed, this alone affords almost as certain a distinction in cases of latent caries, as any that can be given.

In ulcers attended with a carious bone, the new granulations never have a healthy appearance; they are soft, and more flabby than natural; and, instead of being red and florid, they have commonly a dark brown complexion.

The granulations, however, commonly advance quickly enough; and they would frequently proceed too far, if not prevented by art; a piece of attention always necessary, till the diseased parts of the bone are either cast off by the efforts of nature, or are cut out by art, so as to admit of the fore being firmly healed from the bottom. And, when neglected for any considerable time, these soft productions frequently increase so remarkably, as to form very large and troublesome excrescences.

I have hitherto been supposing, that only a portion of the substance of a bone is diseased; in which case a cure is sometimes obtained by a single lamina only casting off. But the same phenomena take place when a caries has been so considerable, as to affect the whole circumference of a bone. Only, in this case, the caries generally advances more quickly; and, in the course of the cure, it is often necessary that the whole substance of the bone, in the diseased part of it, should be removed.

Such are the appearances of caries, produced by external accidents, laying a bone fairly open to view: but caries likewise occurs in a more latent manner, particularly in ulcers of long duration.

Ulcers of long continuance above the tibia, and other bones not thickly covered with soft parts, by the matter insinuating to the periosteum, and there producing inflammation and suppuration of that membrane, by which the bone itself is apt to be eroded, very often give rise to caries; and this, as long as it continues, prevents effectually the cure of the ulcers, notwithstanding the use of every remedy that can be employed. For when, in such circumstances, a cicatrix is induced, the cure never proves permanent; for the disease, in the course of a short time, always breaks out again.

In cases such as we are considering, when the ulcer is neither deep nor extensive, and the bone still remains covered, a caries is not always easily discovered; so

that practitioners are frequently, for some time, at a loss how to proceed: with due attention, however, and especially with the aid of experience in similar circumstances, the state of the bone may, in general, be easily discovered.

When by the introduction of a probe at any opening that may be formed, if a roughness is discovered on the surface of the bone, the case at once becomes obvious.

Such information, however, is not always to be obtained; for frequently there is no evident opening in the surface of the fore; so that no instrument can get admission; and at other times, even when an opening sufficiently large is met with, and when a caries certainly exists, the diseased part cannot be reached with the probe on account of the obliquity or winding direction of the sinus which leads to it.

Although, in such cases, however, the bone itself cannot be immediately reached; if sufficient attention is given to the appearance of the fore, and to the nature of the discharge, we need not often remain long in doubt.

When the bone is carious, any new parts which may have formed in the ulcer, are commonly, as I have remarked already, soft and flabby; and, instead of forming a regular surface, the new granulations sprout up unequally, and instead of a healthy red appearance, they have a dark brown complexion.

These circumstances, when they take place, together with the discharge of a thin, dark, greasy matter from the ulcer, accompanied with the peculiar offensive fetor, which caries always affords, point out the real state of a bone, with almost as much precision as if the bone itself was clearly exposed to view.

§ 2. *Of the Causes and Prognosis of the carious Ulcer.*

ALL those accidents which can occasion denudation, loss of substance, or erosion of a bone, have

commonly been enumerated as the causes of caries. But it is a circumstance well known to practitioners, that the common teguments and periosteum are frequently destroyed, without any degree of caries taking place; and that even a considerable loss of substance in a bone may occur, without being followed by this appearance.

The causes, therefore, of caries, may be said to be, whatever can, by erosion or otherwise, destroy the circulation in the whole or in any part of a bone.

In this view, may be mentioned, wounds affecting either the periosteum or bones, violent contusions, and inflammation of the periosteum, from whatever cause it may proceed, when it ends either in abscess or gangrene; the acrid matter of ulcers penetrating to and destroying the periosteum; and the application of acrid spirits and powders, to bones merely laid bare; a practice recommended very universally by almost all the ancient writers on this part of surgery. Blood effused upon a bone by the rupture of an artery or a vein, is very apt to produce caries; and I may also mention as a frequent cause of caries, the pressure produced upon bones by large deep seated tumors, which evidently act by destroying the circulation in the periosteum and bone beneath.

I have observed above, that loss of substance in a bone does not always produce caries. Thus, very considerable portions of the cranium, are frequently taken out when fractured, without any caries of the remaining part of the bone taking place; and, that this likewise happens occasionally in other parts of the body, I have had various opportunities of observing.

That such occurrences, however, do not so frequently take place in other bones as in those of the cranium, cannot be denied; and the reason probably is, that by a greater proportion of blood vessels going to the bones of the skull than to any of the long bones, any violence which might otherwise be suffi-

cient for putting a stop to the circulation in the injured part, may by this mechanism be prevented; and if no stoppage is given to the circulation, no caries will ensue, for it is to this alone, as I have already endeavoured to shew, that in a great proportion of cases caries is to be attributed.

In every instance of caries, the prognosis must depend upon a variety of circumstances: the principal of which are,

The situation of the diseased parts; the nature and organization of the affected bone; the nature and degree of the inflicting cause; the extent of the disease; the age and habit of the patient.

Thus, it will readily be allowed, that caries in any of the bones of the skull, ribs, or vertebræ, by those parts being connected with organs so immediately necessary for life, must be attended with more risk, than a caries of the same extent, in any of the bones of the extremities.

For a similar reason, caries seated near to any of the joints, from the danger of these becoming affected, is always attended with more risk than when the disease is confined to the middle of a bone.

The consistence or texture of a bone, too, has no small influence in every case of caries; exfoliations being much more tedious, in the hard and compact bones, than in those that are soft and vascular. Thus, although caries is attended with more risk in the skull than elsewhere, if it admits of a cure at all it never in this situation proves nearly so tedious as in the humerus, femur, or tibia.

The nature of the cause by which caries is produced, should likewise have some influence on the prognosis. Thus, a wound with a sharp cutting instrument, that may have destroyed not only some of the periosteum, but even part of the bone itself, does not generally produce such a deep or extensive caries, as commonly succeeds to severe contusions of bones with perhaps no immediate loss of substance.

The extent of the diseased part, is also a circumstance of much importance in the cure of caries. This is, no doubt, the case in every ulcer, but it is more particularly so in all cases of caries; for we constantly find that much more time, in proportion, is required for the separation of a large piece of spoiled bone, than what in general is sufficient for the removal of a smaller portion.

And, lastly, the patient being young or old, healthy or otherwise, are circumstances which necessarily have much influence on the progress of the cure. This happens indeed in every ulcer, but in a more remarkable degree where caries takes place than in others, owing to ulcers of this description being commonly so tedious, that few constitutions are able to support the discharge, if they have not previously been robust and healthy.

These are the leading circumstances requiring our attention, in the treatment of ulcers attended with carious bones; and it is from a due attention to all of them that a just prognosis is to be formed.

§ 3. *Of the Cure of the carious Ulcer.*

CARIES being a disease of the same nature in the bones, with mortification in the soft parts, no cure it is evident can with propriety be attempted, till the removal of the diseased parts is accomplished.

For if an union of the soft parts should be obtained, the dead portion of the bone beneath not having any connection with the contiguous sound parts, by thus acting as a cause of irritation, would soon produce an abscess or collection of matter, and in this manner would force open the parts newly united.

In a healthy state of the constitution, the separation of mortified parts from such as remain sound, is, in general, accomplished by a natural exertion of the system.

The course which nature follows in effecting this, seems, as I have formerly remarked when treating of gangrene, to be through the intervention of a slight degree of inflammation, which forms as it were, a boundary between the sound parts and such as are diseased.

Inflammation thus induced is soon succeeded by a serous exudation from the mouths of the sound vessels: to this suppuration ensues, together with the formation of new granulations over the surface of the sound parts below, by which all the diseased parts are soon completely separated and thrown off.

This happens in the most evident manner in mortification of the softer parts of the body; and it requires very little attention to discover the same phenomena in every case of caries. Only, from there being in the bones, as I have formerly remarked, a more sparing distribution of blood vessels, and consequently not such a disposition to inflammation, the exertions of nature, for the removal of caries, are seldom so obvious or so quickly accomplished.

From these considerations, it is obvious, that our chief indication in the cure of caries, is to excite, and continue as long as may be necessary, such a degree of inflammation in the adjoining sound parts of the bone, as may be requisite for the total separation of those that are diseased.

With a view to this, the diseased part of the bone must be laid freely bare. In some instances, this may be done by a simple incision along the course of the caries, but in others we find it necessary to make a crucial incision, or even to take away part of the teguments altogether. And till the disease of the bone is entirely removed, it is necessary, from time to time, to prevent the formation of new parts, at least in so far as might obstruct the separation of the caries.

In former times, it was the prevailing practice, when a bone was laid bare, whether carious or not, to cover every part of it with powders and tinctures of aloes,

euphorbium, myrrh, and other warm gums. This was probably suggested with a view to correct the fetor and putrefaction that always take place in caries; and from custom only it has by some been continued; for the only effects which these applications can produce, further than that of correcting putrefaction, is to irritate and inflame the soft parts of the sore, without having the least influence on the more material disease of the bone.

For, when the caries is not quite superficial, these substances can never penetrate to, or affect the sound parts of the bone, where alone, by the irritation they would excite, some benefit might accrue from them.

And again, when no caries has appeared, these applications to bones merely denuded of the periosteum, can never, in any respect, be necessary; while they may frequently be the means of inducing disease which otherwise would not have appeared.

Another remedy much recommended by almost every author, in the more advanced stages of caries, is the actual cautery. It ought, however, to be entirely exploded; for, in whatever way we suppose it to be applied, it must certainly do harm.

If applied in such a manner as entirely to destroy the diseased parts of the bone, the sound parts beneath, from the degree of heat that is necessary for this purpose, would commonly be so much injured, as to be soon rendered equally carious with those intended to be removed.

And, on the contrary, when used in a more limited manner, the diseased part of the bone will not be removed, whilst at the same time much risk would be incurred of retarding the natural exertion of the system for the removal of the disease: for even a very moderate heat will affect the destruction of such granulations as nature may for this purpose have already formed; and the just degree of heat, I may here remark, that is necessary for destroying the morbid

parts, without affecting the sound, it is scarcely possible to determine.

When, for any particular reason, the actual cautery may not be judged proper, it has been recommended by many, to employ artificial caustic preparations ; and by others, we are advised, as the shortest process, to strike off at once all the diseased parts of the bone with a chisel and mallet.

But the objections to the use of the cautery, which I have stated above, hold equally strong with respect to these : so that every application of this precarious nature should be entirely laid aside ; especially as we have it in our power to accomplish the same indication in a much more safe and certain manner.

For the purpose of exciting the necessary degree of inflammation, the most effectual method, and which, in slight cases of caries, proves always sufficient, is to make a number of small perforations over all the surface of the diseased bone, to such a depth as to give the patient a slight degree of pain, and no farther.

This operation being renewed every third or fourth day, the diseased portion of bone, in the course of a short time, not only loses cohesion between its own parts, but a gentle inflammation being, by the same means, raised and kept up till a free suppuration is produced, the whole mortified mass is generally, in a short time thereafter, entirely thrown off from the sound parts beneath.

These perforations are very conveniently and effectually made by a pin or perforator, such as is used for fixing the head of the trepan ; which being fixed in the handle of that instrument, it is thereby wrought with much ease and expedition.

Although this operation, in general, answers the purpose in slight cases of caries, when not of great extent, and which do not penetrate deeper than the first or second lamella of a bone ; yet when the caries is extensive, and goes deep into the substance of a bone,

it shortens the process greatly, if, instead of the perforator, a small head of a trepan is employed.

This instrument being applied at proper distances over the surface of the caries, and carried to such a depth as to excite a slight degree of pain, that degree of inflammation which I have shown to be so necessary for the cure, is thus very quickly induced: and at the same time, by converting, as it were, an extensive caries into so many distinct parts, the separation of these from the sound bone below comes to be more easily accomplished, than if the whole surface had still remained in one continued piece.

As soon as any of the parts become loose, their final separation may be always hastened, by daily insinuating below them the end of a common spatula or levator, so as to press their edges gently upwards.

The head of a trepan is frequently employed for taking out a piece entirely when bones become carious through the whole substance of their different lamellæ; but, in the state of the disease which we are now considering, the caries is not supposed to have penetrated to such a depth, and consequently such a practice cannot with propriety be advised.

After the use of either of these instruments, the ulcer is to be dressed in the usual manner. Only, as long as any of the caries remains, the putrescency and fetor of the matter are commonly so considerable, that it becomes necessary to employ some remedies to correct it. For which purpose, a strong decoction of Jesuit's bark and walnut tree leaves is frequently used with advantage: and a solution of camphor in weak brandy is also an application by which this fetor of morbid bones is removed. The carious part of the bone should be daily dressed with pieces of soft lint soaked in either of these, whilst the rest of the fore may be treated in the manner I have advised in Sect. II. for the simple purulent ulcer.

This putrescency of the discharge afforded by carious ulcers, is likewise much corrected by the applica-

tion of lime water : if the sores are frequently moistened with soft cloths dipt in lime water, the matter seldom becomes very offensive ; and as this remedy seems to have some influence in destroying the cohesion of osseous matter, it should in most instances be employed. Since I first employed lime water in ulcers attended with carious bones, I have met with different instances of exfoliations being much promoted by the continued use of it.

As soon as the carious parts are all removed, the whole being then in the state of a simple purulent ulcer, will fall to be treated accordingly : for, although we are particularly directed by authors, never, in any case of caries, or of denuded bone, to make use of ointments, or greasy applications ; yet, as there was never any just reason given for this prohibition, I long ago made trial of ointments in every case of caries ; and, no inconvenience having ensued, I have since that period been in the daily practice of applying them as freely to bones as to other parts.

Of the great variety of books which I have had occasion to consult upon this subject, none have afforded me more satisfaction than a Treatise on Carious Bones, by the late Dr. Monro ; and I am happy to find, that the practice I have ventured to recommend, is supported by the authority of such an eminent practitioner ; who, after speaking of the application of unctuous substances to bones, not only admits of it as safe, but recommends the practice as exceedingly useful ; and says, “ I can now, after a great many trials, assure you, that no medicines so effectually *prevent the corruption* of bones laid bare, and *assist* to cover them so soon with flesh, as ointments.”*

* In the same ingenious Dissertation, may be seen a particular account of the several species of caries ; with a list of authors in different ages, from Hippocrates downwards, who have written upon it, with the several methods of cure proposed by each of them. Vide Monro's Works, 4to. Edin. 1781, p. 283, &c.

Hitherto we have been supposing, that the disease does not penetrate far into the substance of a bone : but when the reverse of this is the case, and a considerable portion, perhaps, of the whole circumference of a bone is diseased ; or when the disease extends even round a whole bone, as in many instances is the case ; the shortest process in this situation is, to take out at once all the diseased parts, either with the head of a trepan frequently applied, or by means of a small spring saw.

Many inventions have been proposed for cutting out portions of carious bones which lie deep : with a view to protect the contiguous parts from the operation of the saw, it has been advised to cover them with thin plates of steel ; and saws of various forms have been invented for dividing the bone.

Almost every part of surgery is already too much loaded with machinery ; but no operation with which we are acquainted, seems to require less aid from new instruments than the removal of a portion of carious bone. In whatever part of the body the disease is seated, the teguments and muscles which cover the caries should be freely divided ; and, when the bones of any of the extremities become carious, if this is done to a proper extent, so as to admit of a piece of firm leather being inserted below the bone, for the purpose of protecting the soft parts on the opposite side of the limb, a common straight saw will answer, in almost every case, better than any other. But when the bone lies deep, a small spring saw of a circular form may be employed for dividing such parts of it as cannot be easily reached by the common saw.

Thus, either by the use of the trepan, or with a saw, any portion of a diseased bone may be removed ; a practice which may frequently be employed to much advantage in the skull, in the bones of the hands and feet, and in those of the legs and arms, when the caries does not run into the necks and heads of the bones, so as to affect the joints : in which event, if

an anchylofes does not enfue, or if nature does not by fome means or other effect a cure, amputation of the limb muft almoft always become neceffary at laft ; a caries of the extremities of large bones being one of the many complaints for which art has not as yet difcovered a remedy.

But, whenever caries is confined to the middle of any of the bones of the extremities, excepting, perhaps, in the thigh, where the thicknefs of parts is confiderable, amputation of the limb fhould never be advifed for it : for, with due perfeverance and attention, if the patient's health is not injured, nature may, in general, be fo far affifted by removing the difeafed parts, that a complete cure will at laft be obtained. And in no cafe whatever fhould we despair, when the carious part can, with fafety be removed : for, however extenfive the difeafe may be, if we can completely remove it, nature will feldom fail on her part to fill up the vacancy ; there being many instances on record, even of whole bones being regenerated.

I have already obferved, that in caries of the larger joints, amputation of the difeafed limb is almoft the only remedy on which we have to depend : it has, however, been propofed, and even attempted, to fave limbs in this fituation, by cutting out the ends of the carious bones. Mr. Park, an ingenious furgeon of Liverpool, has publifhed a treatife upon this fubject, in which he gives the hiftory of a difeafed knee joint, where this operation fucceeded. Although much merit, however, is due to whoever makes any probable attempt for faving limbs which otherwife would be amputated, and although the public is much indebted to Mr. Park for the trouble he has taken to promote the fuccefs of this operation, yet, from various circumftances, there is much reafon to think, that it will never prove to be of general utility : befides other objections which occur to it, the rifk which attends it is evidently greater than what ufually results from the amputation of limbs : the extent of ulcer induced by

it is greater ; the suppuration is of course more plentiful ; and the matter not so freely discharged. I do not here, however, think it necessary to enter more fully into the discussion of this point, as I shall have occasion to speak of it more particularly in the chapter upon amputation.

During the treatment of caries, it must be understood that the same attention is requisite to the habit of body of the patient, to his diet and other articles of regimen, as in other varieties of ulcers.

Thus, if he is of a full inflammatory constitution, all heating and very nourishing articles of food should be abstained from ; while a nourishing diet should be allowed, if the system is low and emaciated, as from the long continuance of caries is most frequently the case. In such cases, too, as tonic remedies are much wanted, Peruvian bark becomes particularly useful, and it should always be given in large quantities.

The bark indeed is almost the only medicine which, in caries we find it necessary to advise ; but when the parts that cover a carious bone become painful, as in some instances is the case, we are then under the necessity of having recourse to opiates ; and, as the pain is in such circumstances commonly induced by the distention of the periosteum, in consequence of the bone becoming enlarged, I have frequently made trial of slight scarifications, or of bleeding with leeches directly on the pained parts ; by which means relief is sometimes obtained, when it cannot be procured by any other means. I may here also remark, in addition to what has been said upon this subject in a former section, that in every variety of ulcer attended with much pain, leeches applied either upon the edges of the fores, or directly on the ulcer itself, are often attended with the best effects, insomuch that I am now in the daily habit of using them, whenever a fore becomes so inflamed and painful as to resist the influence of poultices and the other means usually employed for relief.

In every carious ulcer, as soon as the diseased part of the bone is taken away, the fore which remains is to be treated in the manner that I have already advised for the management of that variety of ulcer, to which, at the time, it may appear to belong.

SECTION VIII.

Observations on the cancerous Ulcer.

§ 1. *Of the Symptoms and Diagnosis of the cancerous Ulcer.*

CANCERS have been generally divided into occult and open. By the first are meant those hard glandular swellings accompanied with frequent shooting pains, which, for the most part, terminate in open cancerous ulcers, the usual appearances of which are these: the edges of the ulcer are hard, ragged, and unequal, very painful, and reversed, being sometimes turned upwards and backwards, and in other instances inwards. The whole surface of the fore is commonly unequal: in some parts fungous excrescences arise, whilst in others deep excavations take place. The discharge for the most part is a thin dark coloured, fetid ichor; and often so acrid as to excoriate, and even to destroy, the neighbouring parts. In the more advanced stages of cancer, from some of the blood vessels of the ulcer being eroded, large quantities of pure blood are often discharged.

Patients labouring under the real cancerous ulcer, universally complain of what they term a burning heat over the whole ulcerated surface; and this we may remark is for the most part the most tormenting symptom attending the disease.

These are the most frequent symptoms of cancer ; but the appearances which this disease assumes are so various, that it is almost impossible in any description to comprehend all of them.

In addition to this, however, I may remark, that we derive some assistance in the diagnosis of these ulcers from their situation, for although cancers occasionally occur in every part of the body, yet we meet with the greatest proportion, either evidently in the substance of one or more glands, or in those parts where glands are known to be most numerous. Thus, six times the number occur in the lips and breasts of women, than in all the rest of the body besides.

§ 2. *Of the Causes of Cancer.*

VARIOUS opinions have been suggested by authors on the cause of cancer, and various remedies have been recommended for the cure. But the little success which still attends our treatment of cancer, shows, that the opinions which have been formed of it, have been more founded in theory alone, than on practice and observation ; for there is no disease to which the human frame is liable, that has baffled the power of art more than this variety of ulcer.

Although an acquaintance with the theory of cancer might throw some light on the method of cure ; yet as all that has hitherto been said upon the subject, is merely speculative, and not supported by experience, any account we could give of it, would neither afford entertainment nor instruction. Before going farther, however, I shall examine with attention the opinion that has hitherto very commonly prevailed, of cancer proceeding from a general affection of the system.

This is a point, I may remark, of much importance in practice : for were it once established, that cancers are at first always local, no objection could be made to their cure by extirpation, as at present there is by

many, who contend, that cancers, in every instance, proceed originally from some disease in the system; and consequently, that removing them can have no other effect than to make the disease again break out in the same or some other part of the body; in which they say they are confirmed, from the little success that we derive from the extirpation of cancer; the disease, as they allege, generally returning, in a great proportion of all that are cut.

If this argumant were founded in fact, it would no doubt merit much attention; though, even in this case, it would not be conclusive against the operation, as I shall hereafter endeavour particularly to shew: it will soon however be demonstrated, and to many indeed is already known, that a much greater proportion recover and do well after the extirpation of cancers, than many are apt to imagine; and it is probably the fault of surgeons, or of patients, only, who generally delay the operation too long, that the number of those who recover is not greater than hitherto it has been.

It is of the more importance to have the point in question considered, as the only account of the success from extirpation, which, till lately, has appeared in this country, gives so bad a prospect of recovery, that it seems to have had the effect of deterring many from submitting timeously to this operation; which, for every case of cancer, is the only remedy upon which we can depend for a cure.

I also think it probable that the same publication, as coming from good authority, has had much influence, even with practitioners, in making them more averse to the extirpation of cancers, than they otherwise probably would have been.

The publication to which I allude, is that of the late justly esteemed Dr. Alex. Monro, in Vol. V. of *Edinburgh Medical Essays*; where the Doctor says, “Of near sixty cancers which I have been present at the extirpation of, only four patients remained free of the disease at the end of two years: three of these

“ lucky people had occult cancers in the breast, and
“ the fourth had an ulcerated cancer on the lip.”

The doctor likewise observes, that of the few he had an opportunity of seeing the disease relapse in, it was always more violent, and made a quicker progress, than it commonly did in others on whom no operation had been performed. He therefore proposes by way of question, “ whether ought cancerous tumors to be
“ extirpated, or ought the palliative method only to
“ be followed when they cannot be resolved ?” and, upon the whole, he concludes against their extirpation, except in such as are of the occult kind, in young healthy people, and that have been produced by bruises or other external causes. In all other cases, the Doctor observes, it should be the patient’s earnest entreaty only, after the danger of a relapse has been explained, that should make a surgeon undertake the operation.

That Dr. Monro, from observing the disease return so frequently, should be of this opinion, is not surprising : and if no better success should, in general, attend the extirpation of cancers, it would no doubt be an objection to the practice ; and this especially, if all the cases which relapse, should be attended with more inveterate and more painful symptoms, than either occurred before the operation, or than probably would have taken place, if the tumors had not been extirpated.

But the experience of many practitioners since Dr. Monro’s publication, has been attended with much greater success ; and one late publication, which I shall presently notice, puts it beyond a doubt, that a much greater proportion have recovered from cancers by means of extirpation, than of those which were treated in the same manner in the course of his experience. It will not therefore appear to be improper, to attempt to discover the reason of the Doctor’s great want of success in such cases, in comparison with what

others have met with ; and this, it is presumed, it will not be difficult to do.

It may, I think, be considered as certain, that the sooner cancers are removed, the greater will be the chance of a permanent cure, and *vice versa*. Now, it is probable, that the high rank which Dr. Monro bore in his profession, both as an anatomist and surgeon, would be the means of his being consulted in more bad and old cases of cancer, as well as of other diseases, than perhaps any other practitioner of his time. Patients in the country, with slight cases of cancer, have them generally taken off by their own surgeons ; but whenever they become inveterate, by long standing or otherwise, they always resort to a town ; to the capital, when they can conveniently do so ; and there the most eminent in his profession is naturally consulted. This being the case, we need not wonder at the want of success in many of the operations performed in such cases of cancer as occurred to Dr. Monro. From the cause to which I allude, a great proportion of the whole would be of the worst kind ; so that we need not be surprised either at the bad success of the operations that were advised, or at the opinion which the Doctor afterwards formed of them.

While such unfavourable cases as these would most frequently occur to Dr. Monro in private practice ; those which he would meet with at the infirmary would, in general, be equally bad. For in every hospital, it is commonly the worst cases that are met with ; as, before applying for this kind of assistance, private surgeons are usually consulted, who generally retain the patient under their own management, if the case does not appear to be desperate, or if any reputation is likely to be got from an operation : while, on the contrary, when the disease is evidently inveterate, and when an operation therefore would be attended with much risk, the patient is always sent to a public hospital. So that no fair judgment, from the result of such experience, in cancerous cases especially, can ev-

er be formed, unless at the same time these different circumstances are properly considered, and due allowance made for them.

This, in my opinion, is the only way in which the great want of success which attended the extirpation of cancers in the course of Dr. Monro's experience, can be accounted for; and it explains it, I think, in a very satisfactory manner: so that the only conclusion that can be drawn from this part of the Doctor's paper, is, that there is little chance of success from extirpation in the more advanced states of cancer; a circumstance which ought, therefore, to make us advise the operation in the earliest stages of the disease, when there is much reason to think that in general it would succeed.

Such expectations will perhaps, by many, be considered as too sanguine; and they no doubt would be so, if the success which in general attends the operation, was all that could be attained; but that it has hitherto for the most part proved unsuccessful, should not be imputed either to the nature of the disease, or to the fault of the remedy; but entirely to its being, in a great proportion of cases, delayed too long, till the system has become so much infected, that we should rather wonder at the operation succeeding so frequently, as even in the general course of practice it appears to have done.

This being a very important practical question, I think it right, in support of the opinion which I have given of it, to introduce a short abstract from a late publication on cancers, by the late Mr. James Hill, an eminent surgeon in Dumfries, who, in the course of an extensive practice, had more experience in the treatment of cancer, than often falls to the share of an individual.

In the year 1772, the date of this publication, Mr. Hill had extirpated from different parts of the body, eighty-eight genuine cancers, which were all ulcerated except four; and all the patients, except two, recovered of the operation.

Of the first forty-five cases, only one proved unsuccessful ; in three more, the cancer broke out again in different parts ; and in a fifth there were threatenings of some tumors at a distance from the original disease. These tumors, however, did not appear till three years after the operation, and the woman was carried off by a fever before they had made any progress. All the rest of the forty-five continued well as long as they lived ; or are so, says Mr. Hill, at this day. One of them survived the operation above thirty years ; and fifteen were then alive, although the last of them was cured in March, 1761.

Of the next thirty-three, one lived only four months ; and in five more the cancer broke out afresh, after having been once healed. The reason why, out of forty-five cases, only four or five proved unsuccessful, and six out of thirty-three, was as follows :

“ The extraordinary success I met with,” continues our author, “ made cancerous patients resort to me from all corners of the country, several of whom, after delaying till there was little probability of a cure by extirpation or any other means, forced me to perform the operation, contrary both to my judgment and inclination.”

Upon a survey in April, 1764, made with a view to publication, the numbers stood thus : total cured of different ages from eighty downwards, sixty-three ; of whom there were then living, in all thirty-nine. In twenty-eight of that number, the operation had been performed more than two years before, and in eleven it had been done in the course of the last two years.

So that, upon the whole, after a course of thirty years practice, thirty-nine of sixty-three patients were alive and sound ; which gives Mr. Hill occasion to observe, that the different patients lived as long after the extirpation of the cancers, as, according to the bills of mortality, they would have done, had they never had any cancers, or undergone any operation.

The remaining twenty-five, which completes the eighty-eight, were cured since the year 1764. Twenty-two of these had been cured, at least, two years; and some of them, it may be remarked, were seventy years, and one ninety years old.

In the year 1770, the sum of the whole stood thus: of eighty-eight cancers, extirpated at least two years before; not cured, two; broke out afresh, nine; threatened with a relapse, one; in all, twelve; which is less than a seventh part of the whole number. At that time there were about forty patients alive and sound, whose cancers had been extirpated above two years before.

I have been the more particular in giving this account of Mr. Hill's success in cases of cancer, as it is the latest, and perhaps the most considerable, even in point of number, that the public was ever favoured with: and I am the more readily induced to it, from having assisted at many of the operations; and from knowing that no fallacy or mistake could occur in the relation, Mr. Hill having been so exact, as to keep a register of every case of importance that came under his management.

From these and other authentic facts, which if necessary might be adduced, of the success attending the extirpation of cancers, there is much reason to conclude, that the disease, in general, is local; and that a general cancerous taint seldom, or perhaps never, occurs, but in consequence of the cancerous virus being absorbed from some local affection.

The particular nature of the cancerous virus, I do not pretend to know; nor will it perhaps ever be discovered: but it is not unreasonable to suppose, that external accidents merely, may produce such an effect upon particular parts, as to induce the formation of a matter, even as acrid as that of cancer.

Thus we have daily instances of vitiated fores producing very acrid matter, which could not previously have existed in the blood: and, if this is the case,

why may not some peculiar affection of a part contribute to the formation of cancerous matter? the one may be conceived *à priori*, just as probably to occur as the other; and it does, I apprehend, as certainly do so.

The ordinary situation of cancers may, in some measure too, account for the discharge which they afford being even more acrid and virulent than that of any other kind of ulcer. For being in general seated in the glands, which are known, even in more simple affections, never to produce good matter, it is not improbable, but, by some peculiar irritation applied to a gland, that such a disposition may be induced in it, as to terminate in the formation even of cancerous matter; which being allowed to remain, and absorption to take place, the whole system comes at length to be as it were saturated with it; and thus a general affection, or what may be termed the cancerous diathesis, is produced, from what at first was only a local ulcer.

I have thus endeavoured to show, that cancer may be produced by external accident merely, without having recourse to the supposition of any internal affection. But those who think that the latter always previously takes place, allege, that, "Although external violence sometimes apparently excites cancer; yet that it would never be produced in this manner, unless a predisposition subsisted in the habit at the same time; and that although cancers from this cause succeed in some instances to external accidents, yet that in most instances they occur without the intervention of any violence whatever."

That this is the case will not by any practitioner be denied: but it may however, be explained upon very different principles from what it commonly has been; and in a manner, too, that will rather tend to confirm the opinion of cancer being, in general, a local disease.

I have already observed, that, in a great proportion of cases, the glands appear evidently to be the seat of

the disease ; which renders it probable, that, in all, they are the parts originally affected ; and that the neighbouring soft parts come only to suffer in consequence of their vicinity to these : or perhaps, in some few cases, cancerous ulcers may break out in parts not glandular, from the whole system being tainted by the absorption of diseased matter from the long continuance of a cancerous gland in any one part.

This being the case, we may easily conceive how single glands may become affected, without the intervention of any evident external cause : for the circulation in the glands, being carried on by a set of vessels much more minute than those with which other parts of the body are supplied, obstructions will more readily and easily form in them ; and a gland being once obstructed, the stimulus and irritation which it excites, may, it is probable, have nearly the same effect, and be attended with the same consequences, as commonly occur from a blow or a bruise.

In this manner, too, without having recourse to any peculiar cancerous disposition in the system, we may account for all those cases of cancer that occur from inflammation in the breasts of women ; as likewise those which so frequently happen to women about the period at which the menses leave them ; and also for such as sometimes succeed to fevers and other diseases, and of which, in some instances, they seem, as it were, to be the termination.

In every affection arising from any of these causes, there is always a preternatural flow of blood, or of some other fluid, to the diseased part : which, when it happens to be to the cellular substance, an abscess is produced ; when to the pleura, membranes of the eye, or any such parts as from their firmness of texture do not favour the extravasation of fluids, violent inflammation ensues ; and, when the substance of a gland is the part to which a determination is made, it being neither, as we know from experience, so proper as

the cellular membrane for the formation of pus, nor from its softness so susceptible of inflammation as a membrane, an indolent hard swelling, is, merely by the obstruction and distention of the vessels of the gland, very naturally produced. And a tumor of this kind having once taken place, it generally remains for some time in its original indolent state, till, by increase of bulk, or perhaps from external violence, an irritation sufficient to excite some considerable degree of inflammation is applied to it; which, being prevented by the nature of the affected part from ending in suppuration, generally at last terminates in what we call cancer, as in other soft parts of the body it would in gangrene, if not previously resolved, or brought to suppuration.

This objection, therefore, of cancer appearing more frequently without than with the intervention of external accident, does not, when properly considered, appear to be of any importance: and from the whole of what has been said, this conclusion, I think, may be drawn, that cancers, in very few instances, ever arise from a general disease of the system; but, on the contrary, are, at their first appearance, almost always local.

Such a conclusion, were we better acquainted with the nature of cancer than as yet we are, would, it is probable, appear to be founded in fact. The reasons for adopting it, appear to be stronger than any that have been adduced in support of the contrary opinion; and, at any rate, it can never prove so detrimental to mankind, as the contrary opinion would do, were it universally adopted; for, by preventing patients with cancer from having the disease extirpated, it would, as long as it prevailed, be the means of their neglecting the only remedy which, so far as we know, ought ever to be trusted.

With respect to that circumstance, taken notice of in the paper lately quoted from Dr. Monro, of cancer being always more violent, and making a quicker

progres upon returning after extirpation, than in patients on whom no operation had been performed, this may in some instances be the case, although I have met with no instances of its being so: but were it even to happen frequently, yet still it would not be a valid objection to the practice of extirpation; and would appear only to be an additional reason for our advising the operation at an early period of the disease, in order to guard as much as possible against the possibility of a return.

§ 3. *Of the Treatment of Cancer.*

FROM all that has been hitherto said, it is evident, that, in the treatment of cancer, no benefit is to be expected from internal medicines: nor is any dependence to be placed on external applications, further than with the view of palliating particular symptoms.

Various remedies have at different times been held out to the public as cures for cancer; but none was ever more extolled than cicuta; a remedy, however, which, in this country, has by no means answered the expectations that at first we were led to form of it.

The inefficacy indeed of cicuta has now proved so universal, that there seems little occasion here to say any thing with respect to it: I shall only just observe, that although in a great number of cases I have known it exhibited with all manner of attention; yet, in real cancer, I never knew it, nor indeed any other remedy, produce a cure.

In simple cases of enlarged glands, I have frequently, indeed, known cicuta prove useful; and in the advanced stages of cancer, where excision has not been agreed on, I have in different instances known it give relief, and render the discharge less acrid than it was before; but this is all the credit that it merits, and the removal of cancer by extirpation being the only

remedy upon which dependence should be placed, it ought in every instance to be advised almost as soon as the disease is known to exist.

Some remarks will be given on the mode of operating for the removal of cancer when we come to treat of cancer of the mamma and testis. It may not, however, in this place, be improper to offer a few general observations on the subject.

1. The removal of cancer should, even in the slightest and most trivial cases, be done with the scalpel in preference to caustic; the use of which, though in one form or another much recommended by many, ought, for obvious reasons, to be laid aside.

The irritation generally produced by caustic, together with the pain and inflammation which ensue from it, are, in all cases of cancer, very strong objections against it. Plunket's remedy, which is evidently a kind of caustic, and which appears to consist chiefly of arsenic, has, like every other medical secret, been greatly extolled; but it is not probable, if the cases in which it has been used were known, that it would be found to have produced any advantages which might not more speedily, and with more certainty, have been obtained from the scalpel.

2. In whatever part of the body cancer is seated, every part of it should be removed, otherwise no advantage will be derived from the operation. Even every indurated gland in the neighbourhood of a cancerous sore, should just as certainly be taken away as the ulcer itself; for if allowed to remain, a return of the disease may with certainty be looked for.

Although it is always proper, however, to extirpate every part that is diseased, none of the external teguments should be ever unnecessarily destroyed, nor should more of them be taken away than is altogether requisite: for the smaller the cicatrix that remains after the cure, the less will be the consequent irritation: and, perhaps from this circumstance, too, the chance will be less of the disease returning.

At least, in the infirmary of this place, the extirpation of cancerous lips has for a considerable time past proved much more successful than this operation usually does; and the only obvious cause for it is, that during that period, in a great proportion of cases, the operation has been performed in the manner commonly practised for the hare lip; whereby a very narrow cicatrix is always left.

I also think it right to observe, that very extensive ulcers in these parts admit of being cured in this manner; for the lip being composed of parts of easy extension, it cannot, but from experience, be imagined, how far they may be brought to stretch. In some instances, where more than half of the under lip has been taken away, I have brought the remaining parts to stretch so far, as to admit of a cure in the hare lip form, and with little deformity being produced. And, in like manner, in cancers of the mamma, when the external teguments are not wholly diseased, so much of them may, in general, be preserved, as will be sufficient for covering a considerable part of the wound, by which the cure will be accomplished, both with more certainty and expedition than it otherwise would be.

When the skin and teguments which have thus been preserved, can be retained in their situation, either by the uniting bandage, or pieces of adhesive plaster, it ought always to be done; but in general it answers better to secure any loose portions of the parts which have been divided, by means of the interrupted or twisted futures. The difference of pain produced by this is inconsiderable; and we are always more certain of securing the skin with ligatures, than by any other means.

In the ordinary method of extirpating cancerous breasts, a very extensive sore is always left: by the retraction of the divided skin, it frequently appears to be at least twice the size of the tumor newly removed: by this means a copious suppuration takes place,

which in weakly constitutions is apt to do harm ; the cure is always tedious ; and the cicatrix which remains, being of considerable extent, the parts are afterwards more exposed to injuries. No more skin should therefore be removed than is really diseased : if a simple incision is made through the skin and cellular substance along the course of the tumor, all the found teguments which cover it may thus be separated from it ; and on the tumor being extirpated, and the teguments again replaced, they may be retained in their situation in the manner I have mentioned, either by ligatures, the uniting bandage, or with the assistance of adhesive plasters. In this manner I have, in different instances, accomplished the cure of sores remaining after the extirpation of cancerous breasts, in the space of three weeks or a month ; which, in the usual method of performing this operation, would not have healed in less than eight or ten weeks.

3. After all the cancerous parts have been removed, if the sore cannot be entirely covered by such portions of the skin as have been saved, and if any considerable quantity of blood is discharged by the smaller vessels, the remaining wound should be dressed in the usual manner with dry lint ; but when this does not happen, no dressings answer so well as pledgets of one or other of the mild ointments that I have already had occasion to mention ; and, when the dressings can be easily removed, by a free suppuration coming on, the sore being now in the state of a simple ulcer from any other cause, must be treated accordingly, and a cure promoted as quickly as possible.

4. Some little time before the sore heals up, an issue should be introduced, so that it may come to discharge freely before the cicatrix is formed. This is particularly proper when the disease has been of long duration, or produced by a redundancy of fluids in the system, either from suppressed menses, or any other cause. In this manner, issues I conceive may fre-

quently prove useful in preventing the return of cancers after extirpation.

It has been sometimes advised, as the best method of forming an issue, to keep the part open from whence a cancerous tumor has been extirpated. I strongly suspect, however, that the irritation produced by an issue, directly upon the old seat of a cancer, may sometimes do mischief: and as all the advantages attending the practice are probably to be obtained from issues wherever they are seated, I would therefore always advise the sore itself to be healed quickly, and an issue introduced in some other part. After cancers of the mamma it was at one time a frequent practice in the royal infirmary here, to put a seton into the side near to the original seat of the disease: as it appeared to produce considerable advantages, and as the side is perhaps as convenient a situation for a drain as any other, it may therefore be preferred.

These are, in general, the different circumstances requiring attention in the extirpation of cancers: and as, from what has already been said, the removal of the diseased parts seems to be the only effectual remedy in cancer, there are few circumstances only, which should ever prevent us from putting it in practice: and these, in general, are,

1. When cancerous ulcers, and scirrhus glands, have appeared in different parts of the body, the removal of one of these, as it would not probably prove effectual, so, in such circumstances, the operation ought not to be advised.

2. When a cancerous tumor adheres so firmly to the parts beneath, that the whole cannot be removed, whilst at the same time it might be dangerous to extirpate along with it those parts with which it is connected, extirpation can never be advisable. Thus cancers adhering to the trachea arteria, or to the coats of a large artery, can never, without much hazard, be extirpated.

One instance of the rashness of a surgeon, in attempting an operation in such circumstances, fell within my own knowledge. In an attempt to cut out a large scirrhus tumor, seated upon, and lying immediately contiguous to, the femoral artery, and so high in the thigh, that a tourniquet could not be applied, the artery was unfortunately opened, and the patient died immediately.

But the attachment of cancerous tumors to the circumjacent muscles or tendons, should never entirely prevent their extirpation; for considerable portions of these may, without much inconvenience, be taken away along with them. Thus we are often under the necessity of taking away large portions of the pectoral muscle along with cancerous tumors of the mamma, and for the most part without any important consequences.

In a paper upon cancer, by the celebrated Monsieur le Cat of Rouen, inserted in the first volume of *Memoirs of the Academy of Surgery at Paris*; the author is clearly of opinion, that extirpation is the only remedy to be depended on, and advises it in the most desperate cases. On the point which we are now considering, he goes a much greater length than from experience I could venture to do: but, independent of the authority of such a respectable author, and of the instances he mentions of the success of his practice, I think there is no cause to doubt of its being better to follow his advice, than to allow a patient labouring under cancer to remain with the certain prospect of suffering a miserable death, without making trial of the only remedy which art can afford. For, however fixed a cancerous tumor may be, if the parts to which it adheres, can, without much danger, be removed, and if the case is otherwise favourable, the operation ought undoubtedly to be advised.*

* Upon this subject M. le Cat expresses himself thus: "L'adhérence d'un cancer aux muscles pectoraux, aux côtes même, ne fera pas un excuse valable, si ces muscles, si ces attaches de la tumeur aux côtes, peuvent être emportés, de façon qu'il ne reste que de sain au delà." *Loco citato.*

This was my opinion several years ago, when the first edition of this work was published. Since that period, I have met with many instances of very bad cancers, particularly of the mamma; in some of which, attachments occurred to the periosteum of the ribs; and in others, the disease was found to extend to the corresponding clavicle, and frequently by a chain of indurated glands to the very bottom of the axilla. Very few cases, however, have occurred, in which, by cautious dissection, the diseased parts were not totally extirpated; and in every instance where this was found to be practicable, much advantage was evidently derived from it: many have, no doubt, experienced returns of the disease; but in many, no return of the disease has been as yet experienced; and, even in those cases which relapsed, much relief has been derived from the operation, by the pain, and misery of the patient being for some time removed by it; whilst, in no instance, were the symptoms which ensued from a return of the disease more severe than those to which the patient had previously been liable.

3. This operation ought never to be advised, where the diseased parts are so situated as to prevent them from being totally removed, as is the case in cancers of the uterus, of the liver, rectum, and some other parts.

When, from the existence of one or all of these causes, a cancer cannot with propriety be removed, our next objects is to palliate the different symptoms, so that the disease may be rendered as easy as possible.

Whatever might excite heat or inflammation, should be carefully guarded against: a diet consisting almost entirely of milk and vegetables, I have found to answer best: animal food, spirits, wine, and fermented liquors of every kind, excepting small beer and spruce beer, do harm. And I have uniformly found, that the progress of cancer has been hastened by bodily fatigue, and whatever excites anxiety, or an uneasy state of mind.

The fetor of cancerous ulcers being at all times disagreeable, and the matter usually thin and acrid, are circumstances which, in the treatment of this disease, merit particular attention. In this view, hemlock frequently proves useful, both as an internal medicine and an external application. For internal use, two preparations of the remedy are commonly used; the powder, and extract: but as the powder seems to possess all the virtues of the extract, and not being liable to be injured in the preparation, it should, for this reason, be in general preferred. The extent of the dose, and number of repetitions, can only be determined by trial; and are circumstances to be at all times regulated by the strength of the patient, and state of the stomach at the time.

When recent hemlock can be got, a quantity of the juice being mixed with the common emollient poultice, affords a very useful application for cancerous sores; and in the winter season, when the juice cannot be obtained, the dry powder made into a poultice in the same manner, answers nearly the same purpose. Carrot poultices are frequently used for lessening the fetor of the discharge; and in this view they often prove useful. I have commonly found, however, that hemlock proves still more effectual.

A good discharge being obtained, the common unguentum cereum is the mildest and most simple application we can employ, and the parts should be dressed with it more or less frequently, as the discharge is more or less copious: care, however, should be taken at the different dressings, to prevent as much as possible the admission of air, which in every ulcer, but more especially in cancer, always does harm, both by exciting irritation, and in vitiating the discharge.

The violent shooting pains which prove always so distressful in cancer, become frequently moderate by a continued use of cicuta; but when this does not happen, opiates must be employed in doses sufficient for the purpose. These pains, too, are sometimes re-

lieved by warm emollient fomentations ; and, in other instances, by bathing the parts from time to time with a weak solution of saccharum saturni.

One very distressful symptom of the late stages of cancer requires particular notice. I mean the hæmorrhagy, which, in some instances, occurs from the arteries, corroded by the acrimony of the matter, and in others from the veins on the surface of the tumor becoming turgid, and bursting from time to time : when blood proceeds from arteries destroyed by the progress of the disease, dossils of soft lint dipped in tincture of myrrh or æther, and applied with gentle pressure, is perhaps the best remedy we can employ ; but when it proceeds from the bursting of turgid veins, we have it in our power to prevent it, by opening one of them occasionally with a lancet, so as to take away an ounce or two at once : this relieves the painful burning sensation with which patients labouring under cancer, are often severely distressed, and it prevents that sudden eruption of blood to which they are liable, and which, by coming unexpectedly, proves much more alarming than when they are prepared to look for it : neither does the operation appear to be hazardous : it was first proposed and adopted by a patient whom I saw along with Dr. Gilchrist and Mr. Harley of Dumfries : the lady herself, from being frequently alarmed, and incommoded with the blood bursting out in the night time, and in some instances when in company, insisted at last on the turgid veins being opened ; it answered the purpose completely ; and I have since that period advised the same operation to others, with equal advantage : it gives little or no pain ; the relief derived from it is considerable ; and it is done without hazard, for the flow of blood from the orifice made with the lancet, is, for the most part, inconsiderable.

With due attention to the circumstances I have pointed out, particularly to the preservation of a well conditioned discharge, and by a well timed use of opi-

ates, very bad cases of cancer may in some instances be so far palliated, as to render them, in some measure, tolerable; though never to such a degree as to prevent the sufferers from regretting daily their not having, in due time, had recourse to extirpation.

Various remedies have at different times been proposed for the cure of cancers, of which, in the course of this treatise, I have taken little or no notice. Of these, cicuta, belladonna, and different preparations of arsenic, have been most frequently employed. But although cicuta, as I have observed above, has, in some instances, appeared to correct the discharge of cancerous sores, yet neither this nor any other remedy, so far as I know, has ever accomplished a cure. We have heard of arsenic proving useful in cancers, not only as an external application, but as an internal remedy: but although I have employed it in various cases, the result of these trials has never proved in any degree adequate to the accounts which have been given of it; while even the smallest doses, when long continued, have excited severe degrees of nausea, pains in the bowels, and other symptoms of poison.

In a publication by the late Mr. Justamond of London, we find an escharotic much recommended for the removal of cancer: it was long employed in Vienna and other parts of Germany; and as Mr. Justamond, whose experience in cancer appears to have been extensive, speaks highly of it, I think it right to mention it. Although I have often used it, however, I have not as yet observed any real advantage to ensue from it; but as no remedy should be hastily rejected, when recommended by an author of reputation, I am resolved to give it a further trial. This application is a composition of steel and sal ammoniac infused in spirit of wine, with a certain proportion of oil of tartar and spirit of vitriol. The edges, as well as the hard tumors or excrescences, which frequently arise in cancerous ulcers, are, by Mr. Justamond's method kept constantly moist with this liquid; and

during the use of it, he likewise recommends an internal use of steel and sal ammoniac in the form of flores martiales.

In other ulcers attended with a discharge of thin fetid matter, and in which tonics appear to be indicated, I have in different instances used the flores martiales with advantage; but, as I have already observed, neither this, nor any other medicine, has ever, in the course of my experience, produced any material benefit in cancer.

The flores martiales, may be given either in the form of pills, or in powders. They seldom produce sickness, and may therefore be given in larger doses than those commonly employed. The first should not exceed twelve or fifteen grains; but in a gradual manner they may be increased to half a drachm or more, to be repeated three, four, or five times daily. In every case where steel medicines are proper, the flores martiales, by conveying the remedy in a very subtle form, are perhaps preferable to any other preparation.*

* Those who have not an opportunity of perusing Mr. Justamond's treatise, may wish to have the prescription for the liquid which he recommends so warmly as an application in cancer. It is as follows:

R. Ramentor. ferri lotor. et supra ignem in vase aperto siccatorum et minutissime contusorum, salis ammoniaci in pulverem redacti, aa unc. iv. Mixta dentur in retortam terream optime in fundo et circumferentia lege artis minutam, imponatur hæc capellæ, admoveatur vas vitreum recipiens, quod bene lutetur: detur ignis in gradu digestionis; et dum retorta calefieri incipit, augeatur successive ad sublimationis, finitaque sublimatione ad calcinationis, gradum. Hoc facto successive refrigeratione committatur retorta, et ex refrigerata fractaque accipatur calcinatum in fundo hærens, caput mortuum teratur, et subigatur minutissime in mortario lapideo; dein subactum imponatur in vas vitreum, et affundantur spiritus vini rectificatissimi, empyreumaticum odorem non redolentis, lb. ij. Agitentur sæpius primis octo horis: post viginti quatuor horas agitatis, denuo instilletur, tribus quatuorve interstitiis observatis, acerrimi, ut vulgo vocatur, olei vitrioli nigri unc. i.; ad quamvis instillationem semper mixta agitando; deinde in quiete permittantur per viginti quatuor horas; his elapsis, decantetur tinctura; residuo vero in fundo, affundantur prioris spiritus vini lb. ij. Agitentur iterum pluries, dein extractio de novo relinquatur per viginti quatuor horas; his transactis instilletur iterum, ut prius, olei vitrioli supradicti unc. i. Intervescentiâ finitâ vero, infundantur spiritus tartari simplicis unc. iv. Agitentur, et finitâ agitatione aliquoties repetitâ relinquuntur in vase per viginti quatuor horas; his elapsis secunda hæc

SECTION IX.

Observations on the cutaneous Ulcer.§ 1. *General remarks on cutaneous Affections.*

FEW diseases are less understood by practitioners, than those of the skin. This, indeed, is the case, both with such as are attended with fever, and those that are not: it is, however, more especially so with the latter, which only it is here necessary to mention; those of the exanthematous kind, as they are termed, belonging more properly to the province of medicine.

The appearances of skin diseases are exceedingly various, and the descriptions given of them by authors very confused and intricate: different authors have given different names to the same appearances; eruptive diseases are enumerated by old writers, which are now never to be met with; and diseases of a similar nature, though still, in some respects, different, are described by modern authors, which do not formerly appear to have been known. It is indeed greatly to be wished, that a more complete investigation were given of all that relates to the history and theory, as well as to the treatment, of cutaneous diseases, as scarcely any part of the practice of medicine requires it so much.

To give a particular detail of all the varieties of these diseases, would of itself require an extensive volume, and it would also be foreign to our purpose: all that I propose is to give a few general observations upon such eruptions as, when neglected or improperly treated, are apt to give rise to ulcers.

solutio misceatur priori decantatæ, et optime simul agitentur; tunc parata est ad usum PANACEA NOSTRA ANTI CANCROSA.

This was originally published by Dr. Francis Xaverius de Mare, in a treatise which he published some years ago at Vienna. He had long kept this liquid a secret, but at last made it public in the year 1767.

§ 2. *Of the different Species of Herpes.*

A VARIETY of cutaneous eruptions have been described by authors under the general term of herpes ; but many of these are taken from very trivial circumstances, and from such as have no influence on the cure. Every necessary distinction of all the varieties which have been enumerated, are, I think, comprehended in the four following varieties, namely, the herpes farinosus, pustulosus, miliaris, and exedens.

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

The second variety of the disease, viz. the herpes pustulosus, appears in the form of pustules, which originally are separate and distinct, but which afterwards run together in clusters. At first they seem to contain nothing but a thin watery serum, which afterwards turns thick and 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 occasionally, when the matter has probably been more acrid, on the scab falling off, the skin is found in a state of ulceration. These eruptions appear most frequently on the face, behind the ears, and on other parts of the head ; and they occur most commonly in children.

The third variety of herpes, viz. the 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 the millet seed, has given rise to the denomination of the species. The pimples are at first, though small, 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 likewise forms into cakes, and so falls off as before.

The heat and itching in this variety of herpes prove commonly distressful; and the matter discharged from the pimples is so tough and viscid, that any dressings that may be applied to them adhere firmly, and excite much uneasiness on being removed.

All the varieties of herpes are usually, in England, distinguished by the names of tetter, shingles and ring-worm; but the last is most frequently applied to that which we are now considering, 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 larger 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 serum; which sometimes forms into small crusts, that in a short time fall off; but most frequently the discharge is so thin and acrid, that it spreads along the neighbouring parts, where it soon produces the same kind of affection.

Though these ulcers or excoriations do not, in general, go deeper than the cutis vera, yet in some the discharge is so very corrosive, as to destroy the skin,

cellular substance, and occasionally even the muscles. It is this which should properly be termed the depascent or phagedenic ulcer, from the great destruction of parts with which it is accompanied; but herpetic ulcerations of every kind being commonly, though improperly, supposed to be connected with scurvy, they have in general been distinguished by the appellation of scorbutic. Whereas, there is nothing more certain, than that herpes is generally, if not always, connected with that state of the system, probably the most opposite of any to that which takes place in true scurvy. The symptoms are all of the inflammatory kind; whilst in scurvy, they proceed evidently from a high degree of putrefaction.

And, besides, the real scorbutic ulcer, hereafter to be described, exhibits appearances perfectly different from herpes; insomuch that there is scarcely a possibility of mistaking the one for the other; and the remedies necessary in the two diseases are just as opposite as their several symptoms and appearances are different.

Herpes exedens appears, at times, in every part of the body, but most frequently about the loins, where it often spreads to such a degree as to surround the whole circumference of the waist. It seems to be easily communicated by contagion, that is, by the application of the virus, either through the intervention of clothes, spoons, or other table utensils. This, indeed, is the case, in some degree, with herpes in every form; but we do not meet with it so frequently with herpes farinosus as with the others, probably from the skin remaining dry, and not discharging matter.

§ 3. *Of the Cure of the cutaneous Ulcer.*

TILL of late, it was very universally believed, that every variety of herpes arose from a morbid affection of the system; and various internal remedies have ac-

cordingly been recommended by every author who has written upon the subject. It has even been considered as a dangerous practice to attempt the cure of these eruptions, in any other way than by correcting the original disorder of the fluids, by which they were at first supposed to be produced.

That this should so long have remained uncontroverted by regular practitioners, cannot be accounted for, as, from the writings of many of them, it appears, that cutaneous affections were in former times frequently and easily cured, as they still are by itinerants, with local applications alone.

This might have been expected soon to have overturned the opinion which prevailed of the nature of these diseases, and which seemed to have no other foundation than antiquity for its support. Modern practitioners, however, not being shackled by such authority, have, in many instances, ventured to dispute, and boldly to deviate from, the opinions of their predecessors; and the improvements which have universally resulted from this free spirit of enquiry, have never yet given them cause to repent their having done so.

This, in no instance, has been more remarkable, nor attended with more useful consequences, than in the treatment of cutaneous eruptions, which, from having been very perplexed and intricate, will soon, there is cause to hope, become a very simple and easy part of the practitioner's employment.

Instead of the tedious and debilitating courses of medicines which patients distressed with these eruptions were formerly put under, and which they are still perhaps too frequently obliged to undergo, it is now found, that herpetic eruptions are much more certainly and speedily removed by local remedies alone. This, probably, is one reason, among others, why all these eruptions are classed among local diseases, in the *genera morborum* of our late justly celebrated professor Dr. CULLEN; and which, without

any other function, would, of itself, be sufficient authority for their being here considered as of a local nature.*

That internal remedies may sometimes prove useful in cutaneous eruptions, will not, probably, ever be doubted; but that they act by correcting particular kinds of acrimony, supposed to exist in the mass of blood, is very improbable. Nor does the benefit sometimes derived from medicines given internally, render it less certain that these eruptions are entirely local.

Thus, in many diseases of the skin, antimonials frequently prove useful. But the chief advantage we derive from them, seems, in a great measure, to depend on the determination which they produce to the skin, and the perspiration which they keep up; which frequently from want of cleanliness, and sometimes from other causes, being long retained on the surface of the body, and there turning acrid, may often I conceive, give rise to eruptions. And accordingly we find, that all of these remedies prove more or less useful, according as they are more or less powerful in keeping up a free perspiration.

By those who maintain that acrimony of the fluids is the most common cause of these diseases, it is supposed, that the beneficial effects of antimonials and other diaphoretics, depend entirely on their evacuating or carrying off the morbid matter, with which the blood is imagined to abound.

Many arguments, however, evince the futility of this opinion. It cannot be shewn how morbid matter, supposing it really to exist, can be more readily evacuated by sudorifics, than the other parts of the blood with which it must in the course of the circulation be intimately mixed. But what puts it beyond a doubt

* The character given by Dr. Cullen, of the class *Locales*, in which herpes is included, is, "*Partis, non totius corporis, affectio.*" Vid. *Synop. Nosolog. Method. Edinburgi.*

that these medicines act by preserving a free perspiration, and not by evacuating any fluids particularly morbid, is, that the same advantages are frequently obtained from warm bathing, and other remedies applied to the parts affected only.

From this view of the theory of herpetic eruptions, many of the symptoms can be more clearly explained than on any other supposition. I cannot here, however, enter upon the full discussion of these, and I shall only observe, that by this we may account for the partial appearance of these eruptions, an occurrence that we daily meet with where they form in single spots, without affecting any other part of the skin. This we cannot suppose would happen, were they produced by disease of the system; while it may readily occur from a local stoppage of perspiration, occasioned by the application of such causes to particular parts as we know to be generally followed with this effect. And upon this principle, as I have already remarked, we account for, much more obviously, than on any other, the operation of the several remedies usually employed in the cure of herpes.

In conducting the cure, the chief circumstance requiring attention 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 more importance than frequent warm bathing, accompanied with gentle frictions with clean linen cloths; which, in dry herpetic eruptions, may be applied even to the diseased parts; but in the others, especially where the skin is tender, or in a state of ulceration, those parts only can be rubbed which have not been attacked.

With due attention to cleanliness alone, almost all the slighter degrees of herpes may be cured: I often succeed with no other remedy but washing the diseased part daily with soap and water: in all varieties of the disease, particularly in dry herpetic eruptions, lime water is an useful application: the diseased parts

should be bathed with it three or four times a day, and in like manner we often employ a saturnine solution with advantage, or a solution of the vegetable alkali in water, in the proportion of two drachms of pure alkali to four ounces of water.

In the more inveterate varieties of herpes, the most effectual wash I have employed is a weak solution of corrosive sublimate, in the proportion of ten grains to each pound of distilled water.

A due perseverance in the use of these remedies very commonly proves successful in the milder varieties of these eruptions; but when the disease is inveterate, of long duration, and discharging large quantities of matter, other remedies must be employed.

The internal exhibition of antimonials frequently proves useful, particularly when conjoined with a decoction of sarsaparilla, mezereon, or gum guaiacum. Fifteen or twenty drops of the vinous tincture of antimony, taken three or four times a day in a cupful of decoction of guaiacum, seldom fails to excite a free discharge by the skin, from which, in all cutaneous eruptions, much advantage is commonly derived. It is chiefly in herpetic eruptions that Plummer's pill, a composition of sulphur, antimony, and mercury, proves useful.

In this view, too, crude antimony proves likewise useful, whether by itself or conjoined with gum guaiacum: it should be finely levigated, and it may with safety be given to the extent of two drachms daily.

Where plethora prevails, laxatives prove particularly useful, and we chiefly prefer those of the saline kind, such as soluble tartar, Glauber's salt, Rochelle or Brazil salt, or cream of tartar; and sea water is often employed for the same purpose.

In all herpetic affections of long duration, issues prove useful: we do not advise them in slight degrees of the disease, but a permanent cure can seldom be obtained without them, where the eruption is either extensive or of long continuance.

Parts affected with herpes, particularly with herpes exedens, are very apt to inflame, and the remedies most frequently employed for this, are, warm fomentations and poultices : I have seldom found, however, that they answer the purpose, and in no case whatever does the superiority of saturnine applications appear more conspicuously than in this. Emollients very universally promote the secretion of that acrid humour which always prevails here ; and thus, instead of removing inflammation, they rather in such instances tend to promote it : whereas, the different saturnine applications appear not only to correct the acrimony of the matter, but tend greatly to prevent it from spreading so far as it otherwise would do.

In all superficial ulcerations of the herpetic kind, the saturnine and sublimate solutions, already pointed out, prove in general effectual ; but whenever the ulcers have penetrated to the muscles and other deep seated parts, an ointment prepared with calcined zinc I have commonly found to answer better : about two drachms of zinc in fine powder, to six drachms of axunge or simple ointment, seems to be in general a proper proportion. It lessens the inflammation, and has often a considerable effect in altering the nature of the discharge from a thin acrid sanies to a thick purulent matter.

Goulard's form of unguentum saturninum, for which I have already given the prescription, is also, when newly prepared, a very proper application for the same purpose. But it ought never to be used after being long kept ; for the lead seems thereby not only to lose its activity, which it in some measure, in unctuous preparations, always does ; but that ointment, probably from being prepared chiefly of axunge, or of wax and oil, without any addition of the antiseptic gums and resins, is more apt to turn rancid than almost any other ointment in common use.

By a due continuance of the remedies which I have thus pointed out, whilst proper attention is at the same

time given to cleanliness, the most troublesome varieties of herpes will in general be removed. But in some instances, notwithstanding the use of these, and every other remedy, they still continue obstinate, and even become more inveterate.

In this situation, sulphureous mineral waters often prove useful, such as those of Harrowgate and Moffat, by which I have known cures accomplished, where every other remedy had previously been tried in vain. It is proper, however, to remark, that it is not from the internal use of these waters that we derive advantage, but from their frequent application to the diseased parts. The eruption should be bathed four or five times in the course of every day, and every second night the whole body should be immersed for the space of fifteen or twenty minutes in the water, heated to eighty-eight or ninety degrees.

Herpes frequently continues to resist the remedies employed for it, from being combined with other diseases: in some instances we meet with it combined with lues venerea, but more frequently with itch: connected with itch, it forms a very obstinate disease, what may be considered as a tertium quid, or a production of the two: this in its appearance is exceedingly loathsome, not less so perhaps than the lepra described by the ancients, and it frequently proves almost as inveterate.

When combined with lues venerea, no remedy will be of any avail till a course of mercury is employed, and in all cases of this kind the most effectual preparation of mercury is corrosive sublimate, now termed hydrargyrus muriatus corrosivus. Besides bathing the parts two or three times a day with a weak solution of this preparation, such as I have mentioned above, the patient should take as much of the medicine internally as he can easily bear: I think it right, however, to remark, that it answers much better in very small doses than in those usually given: a grain of corrosive sublimate being dissolved in three ounces

of distilled water, from one to two tea spoonfuls of the solution may be given three times a day, and continued with safety for a considerable time, but more than this very commonly excites sickness, retching, and pain in the stomach and bowels.

In herpes conjoined with itch, sulphur is the most effectual remedy, particularly in those herpetic eruptions to which children are liable. When the usual remedies therefore do not succeed, sulphur should always be employed: and to practitioners of experience, it is scarcely necessary to remark, that sulphur vivum, as it is termed, in fine powder, proves more certainly effectual than the flowers of sulphur. As this remedy evidently loses much of its strength by the process of sublimation, this preparation should never be employed for any cutaneous eruption. Even in this variety of herpes, sulphur sometimes fails: in such cases I have known a cure accomplished by a due perseverance in the internal exhibition of corrosive sublimate, as mentioned above, which appears indeed to be nearly, if not entirely the same, with some of the antiscorbutics so liberally dispensed to the public by the itinerants of the present day.

There is a variety of herpes to which, in some constitutions, especially in females, the face is particularly liable; and no variety of the disease proves either more distressful to patients, or more perplexing to practitioners. All the common preparations of sulphur, as well as different ointments and washes of the mercurial kind, are commonly employed with little or no advantage; but the following combination of sulphur with saccharum saturni, I have seldom known to fail.

℞. Lac. sulphuris	-	-	ʒij.
Sacch. saturni	-	-	ʒj.
Aq. rosarum	-	-	ʒviiij. M.

The eruption to be bathed with this morning and evening, care being taken to shake the vial when used.

In what manner this remedy acts, I know not : but I have known different instances of a complete cure being obtained by a frequent use of it.

When, however, it may be thought proper to make use of mercury instead of sulphur, an ointment termed in the dispensatories *unguentum citrinum*, may be employed with advantage. But as this ointment is prescribed with two great a proportion of mercury, it frequently acts as a caustic, and excites much irritation. This, however, is easily prevented, whilst at the same time all the advantages of the remedy are preserved, by using a smaller proportion of mercury : half an ounce of mercury dissolved in an ounce of strong spirit of nitre, mixed with a pound of axunge or fresh butter, have, upon trial, been found to be proper proportions : or, as this ointment is apt to become too hard, it may at first be made with a double proportion of mercury and spirit of nitre ; and, by adding an equal quantity of axunge at the time of using it, with a fifth or sixth part of olive oil, nearly the same strength of the remedy is preserved, whilst, at the same time, an ointment is obtained of a better consistence.

This makes a very effectual and perfectly safe ointment for all such eruptions as are combined with lues venerea or itch, and may be used for itch in preference to other mercurials, by those who, on account of its offensive smell, or for other reasons, do not incline to employ sulphur. Indeed, no preparation of mercury, in the course of my experience, has ever proved so useful as this ointment ; not only in real herpes, but even in common itch. It only indeed requires to be more generally known, in order to be very universally employed in herpetic eruptions.

By a proper and continued use of the several remedies that I have mentioned, and particularly by due attention to cleanliness, almost every case of herpes may at last be removed.

Children are liable to eruptions, which by authors are described as distinct and different diseases, but which may all be traced to one or other of the varieties of herpes which I have enumerated: thus, *tinea capitis*, and *crusta lactea*, are commonly described as distinct diseases, and as different from each other; but they are of the same nature, and are only to be considered as varieties of the same species of herpes: they seem evidently, indeed, to belong to the second, or what I have termed *herpes pustulosus*, and appear to differ only in situation; the *tinea* being exactly on the hairy scalp, what the *crusta lactea* and other such eruptions are upon the face.

The means of cure that I have enumerated for herpes in general, apply with equal propriety to any of these; but in the *tinea capitis* a peculiarity occurs from its situation, which, in the treatment, requires attention; the hair, by occasioning a more considerable remora of the exfused matter than is met with in any other variety of herpes, produces in it a greater degree of acrimony, which sometimes gives rise to bulbous swellings at the roots of the hair; and hence it has been supposed, that these swellings, by being perhaps the first parts that are diseased, tend to produce and keep up all the other symptoms: so that we are advised in the cure of *tinea*, to extract entirely all the hairs by the roots, either with pitch plasters, or some other adhesive application.

This, however, is always attended with much pain; it sometimes produces very severe degrees of inflammation; nor is it ever a necessary measure in the first stages of the disease: for though in long continued cases of *tinea*, these tuberosities at the roots of the hair sometimes become so considerable as to render the cure more tedious than it otherwise would be; yet, merely by keeping the hair short, and the parts affected clean, a cure may always be accomplished without having recourse to that disagreeable and painful operation of extracting the hair.

I have already recommended a watery solution of corrosive sublimate as an external application for different eruptions; but in no variety of herpes does it prove so obviously useful as in tinea capitis; insomuch that, except in very inveterate cases, a cure may generally be obtained by the use of this remedy alone.

I have already had occasion to speak favourably of issues in eruptions of every kind when of long duration; but in those which prevail in childhood, they seem to be still more necessary, and more useful, than in the advanced periods of life; for, as children particularly liable to these eruptions are commonly of gross plethoric habits, it is scarcely possible often to remove those eruptions to which they are liable, without in the first place introducing adequate drains.

Indeed, issues alone, with due attention to cleanliness, will frequently, in the first years of childhood, get the better of all these complaints, without the assistance of any other remedy; and they do not prove so hurtful to the constitution as the frequent use of purgatives, which in such cases are commonly employed. Purgatives no doubt, frequently prove useful by unloading the system of fluids, which might probably do harm if allowed to remain, but never in such an easy gradual manner as is done by issues.

An objection is commonly made to issues, that they are apt to become so far habitual as to prevent them from being afterwards healed, without considerable risk. No hazard however of this kind occurs from them in childhood; for, about the fifth or sixth year, when children are able to take more regular exercise; when the system, having acquired a firmer tone, is rendered more capable of preserving a due balance between the solids and different contained fluids; and when, in fact, the latter are never so abundant as in the preceding years of childhood; there is not then the same necessity for such drains, and it might even in some instances prove hurtful to continue them longer. We accordingly observe, about this period, that

many of the eruptive diseases which had prevailed before, now disappear entirely: nature then requiring a greater supply of fluids for the different secretions, throws off by their means, what had formerly been discharged by eruptions upon the surface.

SECTION X.

Observations on the venereal Ulcer.

§ 1. *Varieties of the venereal Ulcer.*

BY venereal ulcers, in general, are meant, such as proceed from a syphilitic affection of the system. But as chancres may with equal propriety be termed venereal ulcers, although not always connected with a general infection, yet, in order to prevent confusion and ambiguity, it will here be proper to enter upon the consideration of these also.

Venereal ulcers, then, may be divided into two varieties; namely those which appear as primary symptoms of the disease, and such as may more properly be considered as symptomatic.

Of the former kind are chancres in general, whether upon the parts of generation, communicated by venereal intercourse; upon the nipples and breasts of women, by nursing infected children; or on the lips and parts adjacent, communicated by salutation: for, all such sores, though seated on different parts, are of one and the same nature. Those ulcers, too, may sometimes be reckoned primary, which remain after the opening or bursting of buboes arising from infection lately communicated, and before there is any probability of the whole system being diseased.

These ulcers, again, I consider as symptomatic, which proceed from the matter of infection having entered the system. Of this kind are those which succeed to old buboes, or appear along with other venereal symptoms a considerable time after infection; the most ordinary situations for 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.

Although this distinction cannot always be ascertained in venereal sores, yet in a great proportion of cases, it may be easily done, either by information from the patient, or from the appearances which the ulcers exhibit.

If, soon after exposure to infection, an ulcer appears upon the parts to which there is cause to imagine the virus has been applied, together with swellings of the glands in the course of the lymphatics, we may be almost convinced that these are local affections, and that they should be considered accordingly as primary symptoms. Ulcerations thus produced by the immediate application of the venereal virus, are in general termed chancres: they appear, at first, as small miliary spots, which soon rise and form little vesicles, that discharge sometimes a thin acrid serum, and at other times a more thick yellow matter. Chancres are generally hard and painful; and, together with the glandular swellings already described, are commonly attended with more or less inflammation.

Ulcers produced by the virus having entered the system, are distinguished from chancres, as likewise from every other variety of ulcer, by information from the patient; by their situation; and by their appearances.

Whenever an ulcer is suspected to be venereal, certainty with regard to it may frequently be obtained from the patient. Thus, if a person, at the time labouring under other symptoms of syphilis, is attacked with one or more ulcers, whether in consequence of

external injuries or not, if they resist the common methods of cure, there will be little reason to doubt of their being venereal.

It sometimes happens, however, that such information is not to be obtained: for patients infected with lues venerea often refuse to acknowledge it; while others are infected without having suspicion of their being so. In such circumstances, we must be directed by the situation and appearances of the ulcer itself.

A great proportion of venereal ulcers from an old infection, appear, as I have already remarked, immediately above the bones, and particularly upon those most thinly covered with muscles. They first appear in the form of a red, or purple coloured efflorescence, not circumscribed, but in general rather diffused. This at last forms into a number of 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; accompanied with a copper coloured appearance of the skin for a considerable space beyond the boundaries of the ulcer.

These ulcers have frequently a very remarkable appearance, being hollowed as it were into the form of a cup, generally narrow and contracted at the bottom, with the edges rising gradually till they reach the outward circumference. This at least is generally the case, unless the bones beneath are carious, and then the sores are for the most part filled up with soft fungous excrescences.

Venereal ulcers are not commonly attended with much pain; at least, not with so much as, from their extent and appearances, might be expected. In some instances, however, it is otherwise; and the discharge, although at first thin, at last commonly assumes a very particular and characteristic appearance, being of a consistence rather more tough and viscid than good pus; with a very loathsome fœtor, though not the

ordinary smell of putrescency; and a very singular green colour.

These are the most common appearances of old venereal ulcers; and when they occur upon any of the situations that I have mentioned, we may almost always, with certainty, conclude, that they proceed from lues venerea.

The distinction that I have proposed of venereal ulcers into primary and symptomatic, is, in the treatment of the disease, a matter of considerable importance: for the primary ulcer might be frequently removed without the aid of internal medicine, merely by converting an incipient chancre into the state of a simple ulcer, either by cutting out the spot, or destroying the venereal matter contained in it with caustic.

But although a cure might in this manner be in some instances obtained with safety, yet having no means of distinguishing whether the virus has entered the system or not, the cure even of the slightest chancre should never be trusted to any other remedy than the internal use of mercury; with this material difference, however, that in this incipient stage of syphilis, a very small quantity of the remedy commonly proves sufficient, whereas a much larger quantity is required for the cure of old venereal ulcers.

Another circumstance of importance is also pointed out by this distinction: in ulcers from an old infection, we should never make use of mercurials and other dressings, with a view to heal them quickly; but should rather trust to the internal exhibition of mercury, and in the mean time continue to apply such remedies only as are necessary for keeping the parts clean and easy.

By healing ulcers of this description with internal medicines only, we obtain the most convincing proof of the virus being extinguished: but while for this reason I judge it to be the best practice in venereal ulcers of long duration, I do not agree with those who think that it should be applied to chancres: in recent

ulcers, produced by the application of the venereal virus to a particular spot, and not connected with any disease of the system, mercury given internally does not act with such certainty in the cure, and accordingly we often find, that, after it has been used in this manner for a great length of time, we are obliged to employ external remedies at last.

This, however, is not the greatest objection to the practice: for as long as a chancre continues open, there is much more reason to suspect that the system may be injured, than if the chancre or source of that matter had been healed soon after its appearance.

But in answer to this it is said, that if the practice was adopted, of treating chancres with the internal use of mercury only, no risk would occur from their being kept open; as mercury, by acting as a certain antidote to the venereal virus, would soon exert its influence on the system, in such a manner as to prevent the virus from having any further influence.

Such reasoning, however, is, in practice, not to be trusted. For, in the first place, though mercury in general proves a certain cure for lues venerea already subsisting in the constitution; yet, even where it has been previously exhibited in large quantities, it does not prevent a new infection from taking place: of this I have met with many instances, and every practitioner must have done so.

But again, although we were even certain, that, on a proper quantity of mercury being thrown in, no further infection could take place from the introduction of a larger portion of venereal matter; yet we can never be sure that the medicine will so soon enter the circulation as to produce this prophylactic effect. For when we consider how frequently practitioners are disappointed in attempting to introduce a sufficient quantity of mercury, either from the fault of the preparation, from its running off by stool, or from some other cause, no dependence, it is evident, ought to be placed upon this.

Upon the whole, therefore, the cure of chancres and of all venereal ulcers of the primary kind, should be hastened as much as possible, not only by internal medicines, but by the aid of external applications.

§ 2. *Of the Cure of the venereal Ulcer.*

IN all cases of chancre our object is to destroy the virus in the part to which it has been applied, and to throw in such a quantity of mercury as may prevent the system from being injured: in common practice, caustic is applied to chancres as soon as they appear, for the purpose of converting them as speedily as possible into the state of simple sores; but I have elsewhere endeavoured to shew, that it answers better to give mercury for several days before applying the caustic, as the irritation produced by caustic, applied to chancres before mercury is employed, has an evident influence in promoting the absorption of the virus, and in thus producing buboes: * after mercury has been given for five or six days, lunar caustic may be applied with freedom, and it should be done in such a manner as to form an eschar of considerable thickness: this being thrown off, the sore may be dressed with simple wax ointment as long as it continues clean, but on the least appearance of becoming foul, the ointment should be mixed with a sixth or eighth part of calomel or red precipitate finely levigated.

In this manner almost every chancre may in general be cured, and with much less mercury than if allowed for any considerable time to remain open.

By long continuance, however, and from neglect of proper remedies, even these primary ulcers, come to put on all the appearances of such as depend upon

* Vide a Treatise on Gonorrhœa Virulenta and Lues Venerea, in two volumes 8vo. in which this as well as various other points relative to the venereal disease, are more fully considered.

a general infection ; in which situation their treatment must vary accordingly : instead of placing much dependence on external applications, we in this case trust chiefly to a well directed course of mercury.

Two different modes are employed for throwing mercury into the system ; the one by the mouth, and the other by introducing it through the absorbents on the skin by means of friction : but as the first of these is liable to many inconveniencies which do not attend the other, the latter should in general be preferred. When the first editions of this work were printed, I entertained a different opinion upon this point, but I think it fair to acknowledge, that more extensive experience has convinced me, that I was wrong, and that the best method of using mercury is in the form of unctio, by which we for the most part avoid that sickness at stomach, pains in the bowels, and violent purging, which mercury, given by the mouth, is very apt to induce, and by which the constitution is often greatly injured.

Occasionally, however, we are under the necessity of giving mercury by the mouth : in such instances those preparations should be preferred that we obtain from simple triture, and of these the quicksilver pill of the Edinburgh Dispensatory is perhaps the best : they prove commonly more effectual, and are seldom attended with any of the inconveniencies which often ensue from the exhibition of the calces of mercury.

But whatever preparation of mercury is employed, it should be always continued till the mouth becomes sore, this being the most certain indication of the medicine having entered the system : nor is it proper to stop at this point, as is commonly done : it has hitherto been very universally supposed that venereal ulcers, as well as every other symptom of syphilis, will be cured with as much certainty by such a quantity of mercury as is merely sufficient for making the mouth sore, provided it be continued for a due length of time, as by the greatest quantity we can give : I own

too, that at one time I was also of this opinion, but after much experience in this branch of business, I am now convinced, that our practice in syphilis would prove much more certain, were we in every instance, and particularly in all symptoms of long continuance, to give as much mercury as the patient can with safety bear : in the treatise to which I have already referred, I have endeavoured to shew, that it is not upon the long continuance of a course of mercury that we ought to depend, but upon the quantity of the medicine thrown into the system in a short space of time : an alterative course, as it is termed, in which mercury is given only so far as to render the gums slightly sore, will frequently prove effectual in recent cases ; but even in these, it often fails, with whatever care it may be conducted, and in those of long duration, no dependence ought to be placed on it.

The quantity of mercury to be given, and the time to which the course should be carried, are circumstances to be chiefly determined by the effects of the medicine, and must ultimately rest on the judgment of the practitioner in attendance ; but I may observe in general, that the mercury should be continued for two or three weeks after every symptom of syphilis is removed.

It sometimes however happens, that venereal ulcers do not heal, although the virus by which they were produced is removed : in this case we depend upon due attention to local management, and chiefly upon the repeated application of caustic, which in sores of this description proves often the most effectual remedy : caustic not only acts by destroying that tendency to fungous excrescences, which often prevails in these sores, but it also proves useful by acting as a stimulus to parts which have long remained in a state of inaction : by a proper application of caustic, I have known such a healing tendency induced in sores, that cures have been accomplished in a very short space of time,

when all the ordinary remedies had for a considerable time before been used in vain. While the whole surface of the ulcer is touched with lunar caustic every second or third day, it ought to be dressed daily with basilicon or wax ointment, impregnated with a sixth or seventh part of red precipitate, finely levigated.

SECTION XI.

Observations on the scorbutic Ulcer.

§ 1. *Of the Symptoms and Causes of the scorbutic Ulcer.*

THE several varieties of scurvy enumerated by authors, namely, the muriatic, the alkaline, &c. so named from the nature of the causes supposed to produce them, are now known to be false and improper distinctions; the true scurvy being always of the same nature, and always produced by the same causes, wherever these occur, in whatever climate, and whether at sea or land.

Among other symptoms of scurvy enumerated by Dr. Lind in his ingenious treatise on this subject, the ulcers which are so common in that disease, are particularly described; and as he gives a very clear and distinct idea of them, I shall here transcribe verbatim, the Doctor's description of them.

“ The distinguishing characteristics of scorbutic ulcer are as follow: they afford no good digestion; but a thin fetid sanious stuff, mixed with blood; which at length has the true appearance of coagulated gore lying caked on the surface of the ulcer, and is with great difficulty wiped off or separated from the parts below.

“ The flesh underneath these sloughs feels to the probe soft or spongy, and is very putrid. No detergents or escharotics are here of any service ; for though such sloughs be with great pains taken away, they are found again at next dressing, where the same sanguineous putrid appearance always presents itself : their edges are generally of a livid colour, and puffed up with excrescences of proud flesh arising from below under the skin.

“ When too tight a compression is made in order to keep the fungus from rising, they are apt to leave a gangrenous disposition ; and the member never fails to become œdematous, painful, and for the most part spotted.

“ As the disease increases, they at length come to shoot out a soft bloody fungus, which the sailors express by the name of bullock’s liver ; and indeed it has a near resemblance to that substance when boiled, both in colour and consistence. It often rises in a night’s time to a monstrous size ; and, although destroyed by cauteries, actual or potential, or cut smooth with a bistoury, in which case a plentiful hæmorrhagy generally ensues, it is found at next dressing as large as ever. They continue, however, in this condition a considerable time, without affecting the bones.

“ The slightest bruises and wounds of scorbutic persons degenerate into such ulcers : their appearance, on whatever part of the body, is so singular and uniform ; and they are so easily distinguished from all others, by being so remarkably putrid, bloody, and fungous ; that we cannot here but take notice of the impropriety of referring most of the inveterate and obstinate ulcers in the legs, with very different appearances, to the scurvy.”*

This accurate description of the scorbutic ulcer comprehends almost the whole appearances which it ever affords : only it may be remarked, that at land,

* See Lind’s Treatise on the Scurvy.

unless in very particular situations, and from a constant exposure to all the more active causes of scurvy, such inveteracy as is described by Dr. Lind, is not often met with: but in every country, and none, perhaps, more frequently than in some parts of this, slighter degrees of the same kinds of sores very often occur, forming what by practitioners in general are termed foul or malignant ulcers.

In the Royal Infirmary of this place, sores of this kind are frequently met with, accompanied sometimes with the most characteristic symptoms of scurvy, soft spongy gums. In the worst cases, however, that I ever met with here, there never was the appearance of such a high degree of putrescency in the system as we are told happens frequently in long voyages at sea.

The reason of this may be, that such complaints of the scorbutic kind as occur in this country, appear generally among the lowest class of people, and proceed rather from the want of a sufficient supply of food, than from confinement to any that can be considered as particularly septic, or as predisposing to scurvy.

In such patients, the putrid diathesis seldom ever prevails to such a degree as to produce ulcers in parts previously sound; but it never fails to show itself in ulcers either already formed, or in such wounds as happen to be inflicted while this state of the fluids subsists. Indeed, many of the ulcers upon the legs, and other parts, of our poor people, frequently partake, more or less, of the real scorbutic disposition; as is evident both from their appearances, causes, and particularly from the method of cure; a good nourishing diet contributing more towards a cure, than all the applications that we usually employ.

The immediate or proximate cause of these ulcers, as well as of every other scorbutic symptom, may be referred to a certain degree of putrescency in the fluids; which again may be induced by a variety of causes, but of which the most material are, living con-

stantly upon salt provisions; a total want of vegetables; with exposure to a cold moist atmosphere. Many other exciting causes of scurvy might be mentioned; but as this would lead to a more extensive discussion of the subject than is here intended, for further information, Dr. Lind, Sir John Pringle, Huxham, and other authors who treat more directly on the subject, may be consulted.

§ 2. *Of the Cure of the scorbutic Ulcer.*

THE cure of scorbutic ulcers, it is evident, must depend chiefly upon the putrid diathesis by which they were produced, being corrected; for which purpose vegetables of all kinds, but especially those of an acerb nature, with milk and whey, are found to be almost certain remedies. The different secretions, especially those by the skin and kidneys, should be gently promoted; and as the matter of perspiration is in a particular manner much obstructed in scurvy, our being able to restore it, is found to have much influence in the cure; probably by carrying off many of the putrid particles with which the fluids in such cases always abound. Gentle laxatives, too, for the same reason, prove useful, and in this view, tamarinds and cream of tartar with manna, answer well.

These, together with a total abstinence from salted food, and guarding against other exciting causes of the disease, very commonly effect a cure of every scorbutic symptom, and, among others, of these ulcers; the best external applications for which, are, antiseptics of the most powerful kinds. Lind recommends unguentum *Ægyptiacum* and mel rosarum acidulated with spiritus vitrioli.

These, in general, are the remedies which prove most effectual, and which are commonly employed in very bad cases of scurvy; but in the putrid ulcers most frequent in this country, the septic state of the fluids, as I have observed above, seldom advances to

such a high degree, as to render it particularly necessary to confine patients to what may properly be called an antiscorbutic course.

The common malignant or scorbutic ulcer of this climate proceeding more frequently from a real deficiency of food, than from any other circumstance, putting the patients by degrees upon a full allowance, with a daily, though moderate, proportion of generous wine, has always a powerful influence on their recovery.

This, I must observe, is a point of more importance in the cure of these ulcers, than is commonly imagined, and the attention of practitioners should be more directed towards it than we generally find it to be. Instead of prescribing medicines for the cure of ulcers of this description, more advantage would accrue from a nourishing diet, and especially when to this is conjoined a moderate proportion of wine, or, what I have frequently imagined has answered better, a proper allowance of porter or strong beer. The foul old ulcers of poor people in every country, are most frequently induced by indigence, and are kept up by a real want of nourishment. In all such cases, therefore, the practice of hospitals would probably prove more beneficial, by laying the use of internal medicines almost totally aside; and employing the savings thus produced, in furnishing such a diet as I have ventured to suggest.

Peruvian bark, however, is a remedy which, in ulcers of this kind, proves frequently useful; it commonly, indeed, proves more serviceable here than in any other variety of ulcer. When given in sufficient doses, a circumstance to be entirely determined by the state of the stomach, it seldom fails of producing, in the course of a few days, a considerable change for the better. In the scorbutic ulcers, indeed, of this country, the bark is almost the only internal medicine I have ever found necessary,

With respect to the use of mercury in this kind of sore, it ought to be kept in view, that in ulcers really scorbutic, instead of acting as a remedy, if given in any considerable quantity, it proves always hurtful. Lind, from a great deal of experience, says, with respect to this point, “mercury, in a truly scorbutic ulcer, is the most pernicious medicine that can be used.”* So that a proper distinction between sores of this nature, and the several varieties of herpes or eruptive diseases commonly termed scorbutic, appears in the method of cure to be a matter of no small importance: in the latter, mercury may not only be given with impunity, but in some instances with much advantage; whereas, in the other, this can never be done but with much hazard.

Peruvian bark, as an external application, too, answers exceedingly well in these ulcers; pledgets dipped in a strong decoction of bark, and applied to the sores, have generally a considerable effect in correcting the fetor and putrescency of the discharge: but the best application for this purpose is the carrot poullice, which, when conjoined with the internal use of bark, and a proper regimen, in the course of a short time, generally corrects the putrescency which prevails, so effectually, that the sores being dressed for a few days longer with pledgets of basilicon and red precipitate, with a view to procure the removal of any sloughs that remain, a cure is afterwards commonly easily obtained, merely by attending to the directions formerly pointed out for the management of ulcers in general, and particularly to the introduction of an issue, along with moderate compression with a roller.

What I have hitherto said of the treatment of scorbutic ulcers, applies, in a great measure, with equal force to every sore connected with a putrescent state of the fluids, from whatever cause it may have arisen. Thus, those ulcers that remain after critical abscesses

* Vide Treatise on the Scurvy, Part II. Chap. 11.

succeed to putrid fevers, require the same general method of cure: and the same will probably prove most effectual in those which succeed to the plague; but as we have no opportunities of seeing the plague in this country, I cannot from experience venture to assert it.

SECTION XII.

Observations on the scrofulous Ulcer.

§ 1. *Of the Symptoms and Causes of the scrofulous Ulcer.*

SCROFULOUS ulcers, are such sores as remain after the opening or bursting of those swellings which appear in different parts of the body as symptoms of the scrofula or evil.

From the frequent occurrence of scrofula, it is such a well known disease, that it is almost unnecessary to describe it. It begins with indolent, somewhat hard, colourless tumors; which at first chiefly affect the conglobate glands of the neck; but, in process of time, it attacks the cellular substance, ligaments of the joints, and even the bones.

In scrofula the swellings are much more moveable than those of the scirrhus kind; they are generally softer, and seldom attended with much pain: they are tedious in coming to suppuration: in some instances they disappear in one part, and again form in other parts, of the body. I may likewise mention, as characteristic circumstances of this disease, a fine soft skin, a kind of fulness of the face, with generally large eyes, and a very delicate complexion.

Scrofulous ulcers seldom yield a good discharge; affording, upon their first appearance, a viscid, glairy, and sometimes a whitish curdled matter, which afterwards changes into a more thin watery sanies. Their edges are frequently, though not always, painful; and are constantly much raised or tumefied. As long as the scrofulous diathesis subsists, these ulcers often remain for a great length of time, without showing any disposition either to heal or to turn worse; at other times they heal quickly, and again break out in some other part of the body.

A variety of causes have been mentioned as tending to produce scrofula; namely, a crude indigestible food; bad water; living in damp situations; the disease being hereditary, and in some countries endemic.

Many other causes have been enumerated by authors; but these we cannot propose to consider at present: this, however, may be observed, that whatever may, in different circumstances, be the exciting or predisposing causes of scrofula, the disease itself either depends upon, or is at least much connected with a debility of the constitution in general, and of the lymphatic system in particular; for it very commonly at first appears in the conglobate or lymphatic glands; and that debility has at least a considerable influence in producing it, is probable, not only from the evident nature of many of the causes which appear to give rise to scrofula, but from such remedies as prove most serviceable in the cure, which are all of the tonic invigorating kind.

§ 2. *Of the Cure of the scrofulous Ulcer.*

It was long supposed, that scrofula depended on an acid acrimony of the fluids; and this, it is probable, gave rise to the use of burnt sponge, different kinds of soap, and other alkaline substances, as being the best correctors of acidity. But although a sourness of the stomach and primæ viæ is a frequent symptom in scro-

fula; yet this ought not to be imputed to a general acescency of the fluids, but merely to that relaxation which so universally prevails in this disease.

Nor is it probable, that acrimony of any kind occurs in scrofula, of which we have a proof in the long continuance of matter collected in the different swellings which take place in this disease, without occasioning either much pain, or shewing any tendency to corrode the surrounding parts; there being many instances of these collections subsisting even for years, without exciting uneasiness: and, in fact, the several remedies recommended for correcting the acrimony supposed to exist in scrofula, never have, at least so far as I have seen, any influence in the cure.

Gentle mercurials and cicuta have sometimes appeared to prove useful, as resolvents, in scrofulous swellings; but nothing has such influence as a frequent and copious use of Peruvian bark, conjoined with sea bathing. Chalybeate and sulphureous waters, too, have frequently proved serviceable in scrofula; and a long continued use of mild aperients of the saline kind has likewise had some influence in resolving the tumors. Moderate exercise proves always useful, particularly in dry air, and in a temperate climate.

Till the scrofulous diathesis is eradicated, no permanent cure of the ulcers can be looked for, and all that should be done to the sores, is to give a free vent to the matter, so as to prevent effectually the formation of sinuses.

The best applications for common use in scrofulous ulcers, are the different saturnine preparations: of which the watery solution of saccharum saturni, acetum lythargyri duly diluted, Goulard's cerate, and unguentum saturninum, are to be preferred; for they tend to prevent the spreading of scrofulous sores, which otherwise is apt to happen, and to remove that inflammatory complexion which they so frequently put on when relaxing applications are long continued.

When the granulations become fungous, as often happens in these ulcers, any ointment we employ should be strongly impregnated with red precipitate, and in some cases, it even becomes necessary to apply more powerful escharotics, such as calcined alum, either by itself, or mixed with red precipitate, finely levigated.

In some instances scrofulous sores prove more obstinate than usual, and at the same time the granulations cannot be kept down, from one or more of the contiguous bones being carious. In this case, no cure can be obtained till the diseased parts of the bone are thrown off, which sometimes happens when the middle parts of the large bones are affected, but never when the disease extends to the joints. When the bones of a joint are diseased, our only resource is to amputate the limb, a practice seldom adopted in scrofulous patients, from a dread of the disease returning in some other part of the body; but, in a subsequent chapter, I will shew, that in various instances, it may be proper to deviate from this, as I have often done with the most obvious advantage.

In the cure of scrofulous ulcers, tonics of every kind prove useful: Peruvian bark, of which I have already made mention, should be continued, together with sea bathing, and an invigorating diet: of late, a preparation of terra ponderosa has also been used as a tonic, under the form of what is termed muriated barytes; and although it, no doubt, often fails, I have in various instances made use of it with very obvious benefit. The dose, at first, is eight or ten drops to an adult, in a glass of water; to be repeated three times a day, and increased gradually to twenty, thirty or forty drops, if they do not previously excite sickness.

In long continued scrofulous ulcers, issues prove always useful, and the pressure which we derive from a proper application of the laced stocking, or of a spiral roller, is often one of the most useful remedies we can employ: it prevents those fungous granulations,

to which ulcers connected with scrofula are particularly liable, and by which alone a cure is often prevented, which otherwise would take place.

SECTION XIII.

General Corollaries relating to the Management of Ulcers.

IN the preceding sections, I have endeavoured to point out every circumstance of importance in the cure of ulcers : at present I shall exhibit, by way of conclusion, such general corollaries as seem to result from what has been said.

1. It appears, except in a few instances, namely, in lues venerea, scrofula, and scurvy, that ulcers are always to be considered as local.

2. That, excepting in one or other of these diseases, the varieties in the matter of ulcers, depend always on some particular affection of the solids in the part diseased, and not on any morbid state of the fluids.

3. That ulcers appear to be useful or prejudicial, not by the quality of the matter which they discharge, but by the quantity : and, accordingly, that the cure even of the oldest ulcer is rendered safe by the introduction of such an issue as will yield the same quantity of fluids, which the system, by means of the ulcer, has been accustomed to throw off.

4. That, in the cure of ulcers, the first circumstance to be determined, is, whether they are to be considered as general or local. If they appear to be of the former kind, such remedies must be advised as are known to be most effectual for removing the disease with which they are combined : in other respects,

the treatment of these is nearly the same with that of local ulcers.

5. That, in the treatment of ulcers of every kind, the chief object to be kept in view, is, to reduce them as quickly as possible to a state of purulency; for which purpose the remedies have been pointed out in the several preceding sections.

6. When brought to this situation, the cure is to be accomplished by due attention to the three following circumstances:

1. The introduction of an issue, of such a size as may carry off nearly the same quantity of fluids which the system, by means of the fore, has been accustomed to throw off.

2. The preservation of the matter in a purulent form, the several means for which have been already pointed out; but the most important, it may here be remarked, are, obviating every kind of irritation, and preserving, in the parts affected, a proper degree of heat.

3. The application of gentle pressure, not only upon the ulcer itself, but on the neighbouring sound parts also.

In the course of this work, I have often had occasion to speak of the influence of pressure in the cure of ulcers. In addition to what has already been said upon this point, I think it right to observe, that this remedy is not as yet sufficiently known, otherwise it would be more generally employed. Those who have not used it freely would scarcely give credit to the accounts which I could give of its universal utility in the cure of sores; but, from much experience of its effects in almost every variety of ulcer, I can venture to assert, that those who have not employed it, have deprived their patients of the most powerful application hitherto proposed for the cure of ulcers.

These are, in short, the principal points to be kept in view in the cure of ulcers, as in different parts of the preceding sections have been more fully explained.

CHAPTER VI.

OF SUTURES.



SECTION I.

General Observations on Sutures.

AS futures are often necessary, not only in the treatment of wounds, but in almost every chyrurgical operation, the subject obviously merits particular attention.

A variety of futures have been practised by surgeons, each of which has, from long experience, been applied to a particular purpose; namely, the interrupted future; the quilled future; the glover's, and the twisted future. Many others are enumerated by authors; but these four are the only futures at present in ordinary use; and even of these, some might with propriety be laid aside.

The intention of every future, is to unite parts, which, either by accident or design, have been divided. Another mode of effecting this, is through the intervention of adhesive plasters: and this, by surgeons, has been termed the false or dry future, in opposition to those that are performed by the needle, which are denominated the true or bloody future. But as the method of uniting divided parts, with the assistance of plasters, has already been noticed in chapter II. when treating of wounds, it will not be necessary to enter upon the subject here.

SECTION II.

Of the Interrupted Suture.

IN deep wounds, when a reunion of the divided parts is intended, we, for the most part, have recourse to the interrupted future; but from what has already been fully explained, when treating of wounds, and from what will presently further appear, it does not seem to be so well adapted to this purpose as the twisted future. When it is determined, however, to make trial of the interrupted future, the following is the easiest mode of performing it.

In every wound where futures are necessary, it has commonly been considered as good practice, to carry the needle and ligature to the bottom of the sore, so as to give as little room as possible for matter collecting underneath; and the usual method of effecting this, is by introducing the needle from without inwards, and again from the bottom of the wound to the same distance on the opposite side. But this future, it may be remarked, is much more neatly, and at the same time more easily performed, by passing both ends of the thread from within outwards; as may be readily done by using two needles upon each thread, instead of one. A needle being put upon each end of the same thread, and each needle being inserted at the bottom of the sore, and pushed outwardly, so as to pass out at a proper distance from the edge of the wound, the needles are then to be taken off, and the threads allowed to remain till all the ligatures are passed which the extent of the sore seems to require.

The number of ligatures necessary for any wound, must in a great measure depend upon the extent of the divided parts. By authors, in general, it has been

laid down as an established rule, that one suture is sufficient for every inch of wound. It will frequently, indeed, happen, that this number is sufficient; but in some instances, particularly where muscular parts are deeply cut transversely, and where consequently a great degree of retraction takes place, more stitches are necessary: whenever a number of angles, too, occur in wounds, more ligatures are required than in straight wounds of the same extent; for, at every angle, however inconsiderable it may be, there ought to be a suture.

In passing the ligatures the skin should be pierced at a sufficient distance from the edge of the wound: for if they do not comprehend a thickness of parts, in some measure proportioned to the depth of the wound, and to the extent of retraction that may take place, they will be apt to cut through the parts entirely. By some, we are desired to enter the ligatures, at a distance from the edges of the fore, nearly equal to the depth of the wound. This rule, however, will not always answer in practice. Thus, in very deep wounds, such, for instance, as are three inches or upwards in depth, there can be no necessity for carrying the ligatures three inches from the edges of the fore; and again, in very superficial cuts, it sometimes happens that the ligatures ought to be passed out at a distance from the edges of the wound greater than its depth. It ought not, in almost any case, to be less than half an inch from the edge of the fore; and it will seldom happen, even in the largest wounds, that the distance of an inch is not found to be sufficient.

It will be readily understood, that the strength of the ligatures, and size of the needles, ought always to be proportioned to the depth of the fores and retraction of parts. The several sizes of needles represented in Plate III. are such as are found to answer best; and the ligatures to be used along with them ought to be such as nearly, though not entirely, fill the eyes of

the needles. In order to make the ligatures pass with more ease, to render them more durable, and at the same time to make them more susceptible of a flattened form, which does not so readily cut through the contained parts as those that are round, they ought all to be well waxed.

As soon as the threads are all passed, the lips of the wound should be pressed together and supported by an assistant, till all the ligatures are firmly tied; beginning either in the middle of the wound, or at one end, as the operator may incline: in tying the knots, it is usual to pass the ends of the threads twice through the first noose; and when this is done, some have imagined that there is no necessity for more than one knot upon each ligature; but as two knots are easily made, and as every chance of their giving way is in this manner prevented, this precaution should not be omitted. It is a practice with some surgeons to insert a piece of lint between the first and second knots, or between the first knot and the skin below, in order to save the skin from the pressure of the knots; but no advantage of importance, is derived from it, while it prevents the knots from being made with sufficient accuracy.

By some, we are desired not to bring the knots of the ligatures immediately upon the edges of the wound, but rather to carry them to one side upon the sound teguments: but whoever has tried both methods, will at once be sensible, that this is no improvement; for in no way can both sides of the fore be so equally supported, as when the knots are passed immediately above the lips of the divided parts.

SECTION III.

Of the Quilled Suture.

AS the quilled future is still employed by some practitioners, I shall here mention the mode of performing it.

In deep wounds, attended with much retraction, it is always necessary to assist the operation of the ligatures, by means of bandages so applied as to afford as much support as possible to the divided parts: but, even with every assistance of this kind, it sometimes happens, that the divided parts cannot be kept together; retraction occurs to a greater or lesser degree, and the ligatures cut asunder the parts that they were at first made to surround.

With a view to prevent the teguments and other parts from receding, it was long ago proposed to add to the interrupted future what was supposed would afford an additional support; namely, quills, or pieces of plaster rolled up into the form of quills; one of which being placed on each side of the wound, the doubling of the ligature is made to include the one, and the knot to press directly upon the other, instead of being made immediately on the edges of the fore, as was directed for the interrupted future.

It is at once evident, however, that the ligatures must here make the same degree of pressure on the parts through which they pass, as they do in the interrupted future; and this being the case, it is equally obvious, that the interposition of these substances cannot be of any use. This future is accordingly now very rarely practised, and it is probable that it will be soon laid entirely aside.

SECTION IV.

Of the Glover's Suture.

THIS suture receives its name from being that which glovers commonly use. As it is exceedingly simple, and very universally known, it does not here require a particular description: I shall therefore just shortly observe, that it consists in a series of stitches all connected with each other, and continued in an oblique spiral direction along the course of the divided parts intended to be kept together.

This suture has hitherto been universally employed for reuniting such parts of the intestines as have been divided by wounds: but, in treating of injuries of the intestines, I shall endeavour to show, that the same end may be more perfectly attained, and probably with less danger, by means of the interrupted suture; so that as this suture has almost never been applied to any other purpose, it will likewise in all probability soon fall into disuse.

SECTION V.*Of the Twisted Suture.*

BY the term twisted suture is meant that kind of ligature, by which parts, either naturally or artificially separated, are united together, by means of strong threads properly twisted round pins or needles pushed through the edges of the divided parts.

This suture is commonly employed for uniting the parts in the operation for the hare lip; and this indeed is almost the only use to which it has been hitherto applied: but I may here remark, that it may

with much advantage be put in practice in other cases, particularly in all artificial or accidental divisions of the lips or cheeks : and, in every wound in other parts that does not run deep and in which futures are necessary, this future is preferable to the interrupted or any other.

In very deep wounds, for instance in all that extend to a greater depth than an inch, the interrupted future is the only one that is admissible ; for, in all deep cuts, the pins necessary in the twisted future cannot with propriety be employed, as they cannot be introduced to such a depth, and afterwards so twisted with ligatures as to reunite the divided parts, without exciting severe pain. In such wounds, therefore, we must of necessity employ the interrupted future. But it may here be remarked, that wounds of this depth requiring the aid of futures, are seldom met with : so that, in by much the greatest proportion of wounds requiring futures, the twisted future may be in our power ; and whenever it is so, it ought certainly to be preferred, as being obviously better calculated, even than the interrupted future, for the retention of divided parts. The pins made use of for twisting the threads upon, should be of a flat form, so as not to cut the parts through which they pass so readily as the ligatures employed in the interrupted future ; and thus we obviate one great objection to the latter ; for, every practitioner must be sensible of this being the chief inconvenience of the interrupted future, that when muscular parts are divided, so as to produce much retraction, the ligatures employed for retaining them, almost constantly cut them through before they unite ; an occurrence which the flatness of the pins that we employ for the twisted future, is particularly well calculated to prevent.

The pins used in this operation have commonly been made of silver ; and, in order to make them pass with more ease, they are made with steel points. As gold pins, however, are capable of receiving a suf-

ficient degree of sharpness, which renders steel points unnecessary; and as gold is more cleanly than silver, from its not acquiring so readily that kind of crust which immersion in fluids is apt to produce upon the other; pins of this metal are therefore better.

The form and size of pins represented in Plate IV. are by experience found to be the best for every ordinary purpose; but for particular cases, the size must no doubt be subject to some variety.

The manner of performing this operation is as follows: the divided parts must, by the hands of an assistant be brought nearly into contact; leaving just as much space between the edges of the wound, as to allow the surgeon to see that the pins are carried to a proper depth. This being done, one of the pins must be introduced through both sides of the wound, by entering it on one side externally, pushing it forwards and inwards to within a little of the bottom of the wound, and afterwards carrying it outwards through the opposite side, to the same distance from the edge of the sore that it was made to enter at on the other.

The distance at which the needle ought to enter from the edge of the sore, must depend on the depth of the wound, and degree of retraction that takes place; but whatever the deepness of the wound may be, the pins should pass within a very little of its bottom; otherwise the parts which lie deep will run a risk of not being united, which will be very apt to give rise to sores or collections of matter.

In passing the pins through the sides of the wound, if the skin and other teguments are not more firm than ordinary, it may commonly be done with the fingers alone, especially if the pins are made with small heads or knobs for the fingers to press upon; but when firmness of parts and other circumstances render the entrance of the pins difficult, the instrument termed by the French *porte-aiguille*, very effectually removes this inconvenience. In Plate IV. fig. 1, is represented the best form of this instrument that has yet been invented.

The first pin being passed in this manner near to one end of the fore, and the parts being still supported by an assistant, the surgeon, by means of a firm waxed ligature, passed three or four times round and across the pin, so as nearly to form the figure of 8, is to draw the parts through which it has passed into close contact; and the thread being now secured with a loose knot, another pin must be introduced in the same manner at a proper distance from the first; and the thread with which the other was fixed, being loosened, and in the same manner carried round this pin, others must be introduced at proper distances along the whole course of the wound, and the same ligature should be of a sufficient length for securing the whole.

The number of pins to be used, must depend upon the extent of the wound. But whether the wound is large or of small extent, a pin should be inserted near to each end of it, otherwise the extremities of the cut are apt to separate, so as not to be afterwards easily reunited. In large wounds, the pins being introduced at the distance of three quarters of an inch from each other, will in general answer; but, in wounds of smaller extent, a greater number of pins are necessary in proportion to their dimensions.

Thus, in a wound of an inch and half in length, three pins are requisite; one near to each end, and another in the middle: whereas, five pins are sufficient for a wound of three inches and a half long, allowing one to be within a quarter of an inch of each end of the wound, and the others along the course of it, at the distance of three quarters of an inch from each other.

The pins being all introduced and secured in the manner I have mentioned, nothing remains to be done, but to apply a piece of lint, wet with mucilage, or spread with any emollient ointment, along the whole course of the wound, in order to exclude the external air as much as possible.

With the view of preventing the ends of the pins from hurting the skin below, it is usual to apply a small bolster of lint under each of them; but as this always does harm, by tending to press the pins against the parts through which they have passed, it ought certainly to be omitted. When, however, the patient complains of being hurt by the ends of the pins, this may be easily prevented by introducing between them and the skin beneath pieces of thin linen, spread with adhesive plaster.

In order to give as much chance as possible to this operation, it has commonly been advised, immediately after the pins are secured, to apply the uniting bandage over the whole, with the view of supporting the contiguous parts. The least reflection, however, renders it evident, that every degree of pressure made in this manner must do harm; for, the bandage being made to rest immediately upon the pins, a considerable degree of pain must of course ensue from it; which happens indeed in such a degree, that, in every instance in which I have known it employed, it either did harm, by pressing upon the pins, or, if this did not happen, no advantage was derived from it, from its not being applied with such tightness as to afford any support to the parts below. In some instances, indeed, I have employed adhesive plasters with obvious benefit, along with the twisted suture: by applying a portion of plaster, spread upon leather, between every two of the pins, we are enabled to draw the parts very forcibly together with pieces of thread or small tape previously attached to each portion of the leather, and where the retraction of the divided muscles is more than usual, this precaution should never be omitted: I have had recourse to it with much advantage in the operation for the hare lip.

We have next to consider the length of time which the pins should be allowed to remain. When they remain long, they generally do harm, by the irritation and consequent retraction of parts, which they are apt

to produce; and again, if not long enough continued, that degree of adhesion is not formed between the divided parts that is necessary for their retention, so that the effect of the operation is in a great measure, if not entirely, lost.

In wounds of no great depth, I have, by experience, found, that firm adhesion takes place in the space of five days; and that six, or at most seven days, are sufficient for wounds of the greatest depth.

But, in speaking of this, it must always be understood, that the patient's state of health will have much influence on the length of time that may be necessary. In specifying the time required for this purpose, the operation is supposed to be done in a healthy state of body. When the patient labours under disease it is impossible to ascertain this circumstance with precision: in such cases we must be determined by the age of the patient and state of his constitution at the time.

As soon as the pins are withdrawn, the uniting bandage may be applied with much advantage as a support to the parts newly united; but, as slips of adhesive plaster, when applied, as I have advised above, to each side of the cicatrix, may be made to answer the purpose in a more exact manner, this mode of supporting the parts will in general be preferred.

As the twisted future, when properly performed, is a very neat operation; as its consequences are in general of importance; and as it may, with much advantage, be made to supersede the use of almost every other future, a few instances only excepted, I have here judged it proper to consider it with more attention than has hitherto been commonly bestowed on it.

CHAPTER VII.

Of the Ligature of Arteries, and other Means employed by Art for putting a stop to Hæmorrhagies.

IN every wound, whether produced by accident, or by surgeons in performing operations, the first circumstance requiring attention, is the hæmorrhagy; which may proceed either from one or more large arteries, or it may be produced by a general oozing from the smaller vessels over the surface of the sore.

A surgeon being called to a person losing much blood from a large artery, the first step to be taken, is, to put a temporary stop to the discharge, by means of pressure, till by the application of ligatures a more effectual remedy is obtained. In the head, as well as in the trunk of the body, the easiest way of effecting this is to press dossils of soft lint or dry sponge upon the mouths of the divided arteries, either by the hands of an assistant, or by the proper application of a bandage: or, when pressure can be effectually applied to the superior part of the artery, it ought to be preferred; as it not only secures the vessel equally well, but more readily admits of a ligature being afterwards applied to the divided part of it.

When, again, hæmorrhagies take place in any of the extremities, and where pressure can be made with ease on the superior parts of arteries, for such cases we are in possession of a remedy, which, when skilfully applied, never fails to put an immediate stop to all further loss of blood: I mean the tourniquet.

Till the invention of this instrument, and it was not known till the last century, surgery remained extremely defective indeed. No operation of importance could be performed on any of the extremities,

but with much hazard ; so that large wounds frequently proved fatal from the want of it, which otherwise would have been attended with no danger.

As the invention of the tourniquet is claimed by different persons, and even by different nations, I shall not here pretend to say from whence it originally came : but whoever was the inventor, the first with which the world was made acquainted, was exceedingly simple ; insomuch, that we are now apt to be surpris'd at the discovery having been left to such a late period. A small cushion being placed upon the course of the principal artery of a limb, a circular rope or bandage was made to pass twice round it ; and a small wooden handle being then introduced into one of the folds of the rope, for the purpose of twisting it, the cushion by these means was press'd with so much force upon the artery, as to put an effectual stop to the circulation in all the under part of the limb.

Mr. Petit, an eminent surgeon of Paris, was the first who improved this instrument : he connect'd the circular bandage with a screw, which was so contriv'd as to produce the pressure chiefly on the principal arteries, without materially affecting the rest of the limb. It had also this advantage over the other instrument, that the operator himself could manage it, without employing an assistant ; but it was liable to one great inconvenience from the very circumstance which, by the inventor, was considered as an improvement. This instrument of Mr. Petit being made to act upon the principal arteries only, the smaller vessels communicating with these, not being properly compress'd, discharge blood freely from the instant they are cut ; and as this proves always troublesome in the course of operations, different improvements have of late been made on it. Fig. 1. Plate II. represents the best that has yet been invented.

By means of this instrument in its now improved state, the blood is very easily and effectually stopp'd ; and as it grasps the whole member equally, all the

collateral branches, as well as the principal arteries, are equally compressed by it. It has also this material advantage over every other instrument of this kind, that, when properly applied, a single turn, or even half a turn of the screw, is sufficient either for allowing a flow of blood, or for putting a total stop to it. The manner of using it, is this :

Let a cushion, three inches in length, by one inch and a half in diameter, be formed of a linen roller, tolerably firm, but yet not so hard as to render the pressure produced by it painful : this being placed upon the course of the principal artery of the limb, let it be firmly secured by one or two turns of a circular roller of the same breadth with the cushion itself.

The instrument *A*, with the strap connected with it, being now placed upon the limb, with the handle of the screw *B* on the side of the member opposite to the cushion upon the artery, the strap *C* is to be carried round the limb directly over the cushion, and to be firmly connected on the other side to the buckle *D*. In thus connecting the strap and buckle together, it ought to be done with much firmness, so that the screw may afterwards operate with as much advantage as possible, in producing a sufficient degree of pressure. When proper attention is given to this, a single turn of the screw proves sufficient, as I have observed above, for putting a stop to the circulation of blood in the limb ; but when the strap has not been made tight at first, several turns of the screw become necessary ; which never fails to prove troublesome in the course of an operation, and which ought therefore to be guarded against.

When it is therefore determined, that any further loss of blood from a divided artery is to be prevented, pressure on the superior part of the vessel should be immediately applied, by the hands of an assistant, or by a proper bandage, when the cut is on the head or trunk of the body ; and by the tourniquet in any of the extremities.

The patient being in this manner secured from immediate danger, the practitioner must endeavour to prevent a return of the hæmorrhagy on the tourniquet being removed.

The ancients, as I have observed above, were ignorant of the use and application of the tourniquet, and they were equally deficient in the employment of means for giving a permanent security against the flow of blood from divided vessels. It will therefore readily occur to practitioners of the present day, that in this imperfect state of chirurgical knowledge, they must in all important operations have incurred much risk of doing harm: to the smaller vessels they applied dossils of linen covered with astringent powders or tinctures; and for divisions of the larger arteries, searing with hot irons was their only resource.

On this last remedy, however, although it commands a temporary stoppage of the blood in every case of hæmorrhagy, we ought not to place much dependence; for, if not carried to a greater depth than in general is consistent with safety, the pulsation of the larger arteries very soon overcomes all the resistance produced by the eschar obtained from the cautery.

In ancient times, however, when this was the most effectual remedy with which the world was acquainted, practitioners were under the necessity of employing it; and, at that period, it is not surprising to find them exercising their genius in inventing a variety of styptic applications: but since surgery became enriched with that material improvement of securing the larger arteries with ligatures, a practice easily effected, and with very little pain to the patient, we are rather surprised to find that remedies of this class are still searched after. If the use of ligatures were in itself attended with difficulty; if, by experience, it had been found to produce any dangerous consequences; or, if it had been frequently known to fail in answering as a full security against the hæmorrhagies of the

largest arteries; in any of these events, it ought to be the business of practitioners to endeavour to procure a more effectual remedy. But, as the ligature of arteries is very simple in its nature; as the pain arising from it is trifling; as few instances occur of any thing bad being produced by it; and especially as, when properly performed, it never fails to prove a sure preventative against all loss of blood from the larger arteries; there can be no good reason for anxiously seeking after other remedies.

Agaric, common sponge, and other fungous substances have been much extolled for their styptic powers; and chalybeate and vitriolic solutions, as well as all the variety of mineral acids, have in different forms been held forth to the public as effectual remedies of this nature; not only as nostrums, by those of less liberal principles, but, what is more surprising, in some instances by practitioners of character.

With the former class of men, this happens as a common occurrence in the course of their profession, and is therefore to be expected; but a perseverance in quest of new styptics on the part of surgeons of reputation, who are well acquainted with the beneficial effects of ligatures, must proceed from a degree of nicety and refinement, which may create much trouble to themselves, and which in all probability can never be productive of any advantage to their patients.

I may therefore venture to say, that it should be considered as an established maxim in surgery, that in hæmorrhagies from the larger arteries, no styptic whatever ought to be trusted, and that we should place dependence only on the use of ligatures: I shall now therefore proceed to consider the easiest and most effectual method of putting this remedy in practice.

Various methods have been proposed for securing arteries with ligatures. The practice now in common use, is, by means of a curved needle, to pass a ligature of sufficient strength round the mouth of the bleeding vessel, including a quarter of an inch all round of the

contiguous parts,* and afterwards to form a knot upon the vessel and other parts comprehended in the noose.

One important objection, however, to this practice, is, that the nerves accompanying the blood vessels, together with a considerable portion of the muscular substance through which they pass, must always be tied with ligatures formed in this manner. From this circumstance, much unnecessary pain is produced, by the nerves and contiguous parts being compressed along with the arteries; and, in some instances, severe convulsions have arisen from this, not only of the part chiefly affected, but of the whole system.

Spasmodic twitches frequently take place after the amputation of limbs, and are often the source of much distress. In some instances, this symptom is no doubt the effect of other causes; but in various cases it has happened, that the clearest proof has been obtained of its arising from the ligatures of arteries applied in an improper manner. When convulsions occur after amputations, and the usual means of preventing them are found to fail, effectual relief may be frequently obtained by undoing the ligatures, so as to remove the compression upon the nerves; care being taken at the same time to renew the ligatures upon the arteries alone, without comprehending any of the contiguous parts.

Thus, it is not from the mere application of ligatures to blood vessels, but from the improper manner in which the operation is performed, namely, the including nerves and other parts, instead of tying the arteries alone, that the bad symptoms in such cases proceed.

Practitioners have commonly been afraid of tying arteries by themselves, without the intervention of some of the surrounding parts: this has happened from an idea that has prevailed of the coats of blood

* Sharp's Surgery,—on Amputation.

vessels not being sufficiently firm to bear a degree of compression necessary for the prevention of hæmorrhagy.

This, however, proceeds upon the supposition, of the coats of arteries not being so strong as they really are; and that a great degree of force is necessary for retaining their sides in contact.

But it is now well known, that even very small arteries are possessed of much firmness; and it is also known, that even in the largest arteries of the arm and thigh, a very slight degree of compression is sufficient, not only for restraining hæmorrhagy, but for securing the ligature on the very spot to which it is first applied: in small vessels, the force necessary for this purpose is trifling indeed; being much less than is commonly employed.

It has also been objected to this mode of securing blood vessels by themselves, that the ligatures are more apt to slip than when some of the surrounding parts are tied along with them; and, in some instances, it is said that arteries retract so far, that they cannot in any other way be laid hold of, than with the crooked needle in the ordinary method.

Long and repeated experience, however, of a few individuals, in regard to this mode of taking up arteries by themselves, has put the fact beyond a doubt, that it is as secure as any other yet invented. Fatal hæmorrhagies, after capital operations, either from inattention, or some other cause, sometimes indeed happen in the hands of the most expert surgeons, but they occur more frequently when the curved needle has been employed, than when the blood vessels are secured by themselves, without any of the contiguous parts being included.

From the result of my own experience, indeed, I should be induced, even in this point of view, to draw a conclusion in favour of the practice I recommend. For both among hospital patients, and in private,

I have known different deaths occur from the bleeding of stumps after the apputation of limbs : and whether this proceeded from the ligatures having slipped from the arteries ; or, that some of the vessels which did not appear during the operation, had been of course passed over, and had afterwards burst out ; I shall not pretend to determine : but in all of these, *the crooked needle only* had been used during the operation ; and it has so happened, that I never met with a single instance of a similar occurrence where the arteries were secured by themselves with the tenaculum ; an instrument to be hereafter mentioned.

In a few instances it may happen, that a bleeding vessel, by lying at the bottom of a deep wound, cannot be laid hold of in any other manner than by passing a curved needle and ligature round it. Such occurrences, however, are so rare, that I have met with few instances in which hæmorrhagy could not be as easily restrained with the tenaculum, as with the crooked needle.

In all operations whatever, to save unnecessary pain, is a very important point. The object in view ought no doubt to be attained in the most complete manner ; but that mode of operating, which is equally effectual with any other, at the same time that it is the least painful to the patient, ought in every instance to be preferred. Now, with respect to the point in question, as I have already made it appear that arteries may be tied with as much safety by themselves as when connected with any of the neighbouring parts, the difference of pain arising from the two modes of operating, ought at once to give the preference to that which is productive of the least degree of it.

When any of the contiguous parts, particularly when the nerves, which generally accompany blood vessels, are included in the same ligature with an artery, a circumstance scarcely to be avoided when the curved needle is employed, a very severe degree of pain is often excited by tying the knot. I have known

various instances of patients, bearing the amputation of limbs, and of cancerous breasts, without shrinking, but who complained severely of the pain excited by tying the arteries with the crooked needle: while, on the contrary, the pain arising from the use of the tenaculum, is so trifling, that, when properly done, even the most timid patients seldom complain of it.

For some time after I first made use of the tenaculum, curiosity induced me, in different instances, to put the point in question to the test of experiment: and to render the trial fair and decisive, it was always made upon the same subject, under the same operation. Different vessels were secured in the ordinary manner with the crooked needle; whilst others were laid hold of with the tenaculum: but so great was the difference, that the one seldom gave much uneasiness; while the patient commonly complained of the other as the most painful part of the whole operation.

Among other advantages attending the tying of arteries with the tenaculum, there is one which I have not mentioned: it often happens after the amputation of limbs, as well as in other operations, that the ligatures do not come easily away, from their being made to run so deep as with the curved needle is commonly necessary. In some instances, much pain and trouble has occurred from this, the ligature remaining immoveable for a great many weeks: and after all, I have known it necessary to cut it out with a scalpel. But when the tenaculum is used, every risk of this is avoided, as the ligatures generally drop of their own accord, in the course of the third or fourth dressing of the fore.

I shall, therefore, consider it as a practice that should be established, that in forming the ligature of arteries, the nerves and other contiguous parts ought to be avoided.

For the purpose of performing this with ease and safety, various kinds of forceps have been invented,

with which the divided arteries are laid hold of and pulled out, so as to admit of the ligatures being applied.

For the larger blood vessels, forceps have been found to answer; but for smaller arteries, they are not so useful as the tenaculum, represented in Plate III. fig. 1. and 8. And as a hook of this form answers equally well in the larger arteries also, the use of forceps may therefore be laid aside. The manner of using the tenaculum is this.

In order to discover the arteries to be tied, the tourniquet with which they are secured must be slackened by a turn or two of the screw; and the moment the largest artery of the fore is discovered, the surgeon should fix his eye upon it, and immediately restrain the blood with the tourniquet again. A noose having been previously formed on the ligature, and passed upon the tenaculum, the operator should now push the point of the instrument through the artery; and at the same time should pull it out to the extent of an eighth part of an inch or thereby: the noose should now be pulled over the point of the tenaculum by an assistant; and being pressed sufficiently upon the artery, a knot should be formed with it of such tightness as may be necessary: in forming this ligature, the surgeon's knot, as it is termed, should be preferred: it is done by passing the thread twice through the first noose, and as some additional security is obtained by forming a second knot above the first, it should never be omitted. It is easily done; and on security in this point, the patient's life may in a great measure depend.

The strength of the ligature should always be proportioned to the size of the artery; but this is a circumstance to be at all times determined by the judgment of the practitioner, as must also the force to be employed in forming the knots. To what was already said upon this point, I shall here add, that a very trifling force is sufficient for securing even the largest

arteries : and that, after such a force has been applied, as evidently restrains the flow of blood, no further compression should be made.

The principal artery being in this manner secured, all the arteries which have been cut must be taken up in a similar manner, by first loosening the tourniquet in order to discover them, and afterwards applying a ligature upon each.

It often happens, however, that the loss of blood, in the course of an operation ; a tendency to deliquium which may continue for some time ; the fear which the patient labours under ; and the degree of cold to which the fore is exposed ; have altogether such an effect upon the smaller arteries, as to prevent them for the time from discharging their contents : and as arteries left in this state, without being secured, generally burst out afterwards, a circumstance which always occasions much trouble to the practitioner, as well as pain and risk to the patient, nothing should be omitted that can in any manner of way tend to prevent it.

With this view, the tourniquet should be made perfectly loose ; any coagulated blood on the surface of the fore should be carefully washed off with a sponge and warm water ; and the patient, if likely to faint, should take a glass of wine, or some other cordial : and after all, the surgeon ought to examine, with the most minute attention, the course which the vessels of the part usually take.

This being done, every artery that can be distinguished, should be secured with a ligature ; for such as may seem to be very small, while the part is yet exposed to the air, may discharge large quantities of blood after the patient becomes warm in bed ; when the solids are thereby relaxed, and the fluids expanded : and, as no harm can arise from ligatures being applied to every artery that is cut, it ought in every instance to be done.

When the principal arteries of a stump have been taken up, and blood still continues to be discharged, but which appears to come from a few small vessels only, the surgeon, unless he is much accustomed to this kind of business, is apt to think, from their trifling appearance, that he need not be at the trouble of tying them, and that the pressure of the necessary bandages will prove sufficient: where the discharge proceeds from the whole surface of a wound, and when no particular vessel can be distinguished, we must of necessity trust to this remedy; but, whenever an artery can be discovered, of whatever size it may be, it ought unquestionably to be secured with a ligature. I have insisted the more upon this, from having often observed both distress and danger induced, by want of attention to this part of an operation, and from some late publications having very improperly endeavoured to shew, that there is no risk in leaving all the small arteries untied that are cut in operations; a practice fraught with much perplexity to practitioners, and with the utmost hazard to patients.

When, from the deepness of a wound, or from any other cause, some particular artery cannot be properly secured with the tenaculum; we are under the necessity, as I have already observed, of trusting to the crooked needle, and the following is the mode of using it.

The operator should be provided with needles of various sizes, and of different forms. The needles in ordinary use, are for many purposes too much crooked; for, in general, they are more easily managed when their curvatures are less.

The needles that I have mentioned for the interrupted suture, represented in Plate III. answer equally well for the ligature of arteries.

Those in common use are made with three edges, one on each side, and a third on the concave part of the needle. There is no necessity, however, for more than two. Needles enter, indeed, more easily with two

than with three edges ; and as the third edge on the concave side renders them liable to injure arteries and other parts in the course of their introduction, it ought to be omitted.

A needle of this shape, armed with a ligature of a size proportioned to itself, and to the vessel to be taken up, is to be introduced at the distance of a sixth or eighth part of an inch from the artery ; and being carried at least one half round the artery, at a depth sufficient for retaining it, it must now be drawn out ; and being again pushed forward, till it has completely encircled the artery, it is again to be pulled out, and a knot tied in the manner that I have advised in using the tenaculum.

In this manner, either by the use of the crooked needle, or the tenaculum, every hæmorrhagy arising from the division of one or more arteries, may in general be restrained ; but it frequently happens, that considerable quantities of blood are discharged, not from any particular vessel, but from all the small arteries over the surface of a wound : in wounds of great extent, particularly after the extirpation of cancerous breasts, and in other operations where extensive fores are left, this kind of hæmorrhagy often proves troublesome, from being very difficult to suppress.

Hæmorrhagies of this kind seem evidently to proceed from two very different and opposite causes ; which, in the method of cure, require particular attention.

First, They sometimes take place in very robust constitutions, and proceed either from too great a quantity of blood in the arteries and veins, or from an excess of tone in the vessels themselves ; or perhaps, from both of these causes being combined. But, secondly, They appear to happen most frequently in constitutions quite the reverse of this, namely, in such as are weak and relaxed, either from a putrid dissolved state of the blood, from want of tone in the vessels, or in some instances from a concurrence of both.

In healthy patients, when the fluids are not tainted with putrescency, and the solids are possessed of their natural tone, as soon as the large arteries of a wound are secured, the smaller vessels for the most part recede within the surface of the surrounding parts: this they do in consequence of that contractile power with which, in a state of health, they are endowed, and from the stimulus of the external air to which they are now exposed. This of itself would often prove sufficient for restraining hæmorrhagies from small arteries; but in the sound state of constitution to which I allude, another powerful agent is provided for producing the same effect. From the extremities of the divided vessels which at first discharged red blood, there now, in their contracted state, oozes out a viscid fluid, containing a certain proportion of the coagulable part of the blood; and this on spreading over the surface of wounds, has, by its balsamic agglutinating powers, a very considerable effect in restraining the hæmorrhagy.

Where the constitution is sound, and where neither of these states of disease preponderates over the other, it is observed, as soon as the larger arteries of wounds are secured, that nature, in the manner I have described, generally puts a stop to all further discharge. So that when this does not happen, and when a tedious oozing continues from the surface of a fore, we ought to pay particular attention to the habit of body with which it is combined.

In young vigorous patients, where the tone of the muscular fibres is considerable, the most effectual means of putting a stop to this variety of hæmorrhagy, is to relax the vascular system, either by opening a vein in some other part, or by undoing the ligature on one of the principal arteries that have been tied, so as to allow it to bleed freely: those violent spasmodic twitchings, too, so frequent after the amputation of limbs, when they do not depend on a nerve being tied

in the ligature with the artery, are in this manner more effectually relieved than by any other means.

By the same means, the patient from being in a febrile heat and much confused, soon becomes tranquil: the violent pulsation of the heart and larger arteries abates, and the blood not being propelled with such impetuosity, the smaller vessels of the part are thereby left at more liberty to retract; and as in this state they do not pour forth red blood so freely, they are the more readily covered with that viscid glutinous fluid which I have already shewn to be one of the most important means provided by nature for the cure of hæmorrhagies.

At the same time that we thus endeavour to allay the commotion produced in the system, the patient should be kept exceedingly cool; wine and other cordials should be avoided; cold water, acidulated either with the mineral or vegetable acids, should be his only drink; motion of every kind should be guarded against; and the wound being covered with soft lint, moderate pressure should be applied over the whole surface of the fore with a proper bandage.

In every extensive wound, attended with this kind of hæmorrhagy, and particularly when violent spasmodic affections of the muscles supervene, together with the means that I have mentioned, large doses of opiates often prove useful: by allaying irritation and pain, they often prove more beneficial than any other remedy.

As soon, therefore, as a sufficient quantity of blood has been discharged, and the wound is dressed, and the patient laid to rest, a dose of opium, proportioned to the violence of the symptoms, should be given. It must, however, be remarked, that in all such circumstances, opiates should be given in large doses, otherwise, instead of answering any good purpose, they seem frequently rather to do harm; so that, whenever opium is employed, it ought to be in such quantities as may be sufficient for the intended effect.

Although this kind of hæmorrhagy sometimes occurs in firm constitutions, yet it is certainly more frequent in relaxed enfeebled habits, where the solids have lost part of their natural strength, and the fluids have acquired some degree of putrescency. As the vessels in this situation are supposed to be deprived of that degree of tone of which we wish them to be possessed, instead of restraining the patient from cordials, as is usually done in cases of hæmorrhagy, a moderate use of wine should be prescribed; for nothing tends so much in such circumstances to restrain hæmorrhagies, as a well directed use of cordials. By tending to invigorate and brace the solids, they enable the arterial system to give a due resistance to the contained fluids, while the same cause has no inconsiderable effect in restoring to the fluids that viscosity of which in all such instances we suppose them to be deprived.

When, therefore, tedious hæmorrhagies occur in relaxed debilitated habits, a free use of Port, Madeira, or any other wine equally good, should be allowed; a nourishing diet also becomes proper; the patient should be kept cool; and the mineral acids, from their known utility in every kind of hæmorrhagy, ought also to be prescribed. Rest of body is likewise proper; and opiates, when indicated either by pain or spasmodic affections of the muscles, ought never to be omitted.

Together with remedies of this kind, particular dressings, appropriated to the state of the injured parts, should be applied. I have already remarked, that in firm healthy constitutions, as soon as the discharge of blood which naturally occurs in large wounds is over, the parts come soon to be covered with a viscid coagulable effusion from the mouths of the retracted arteries; but in constitutions of an opposite nature, where the solids are much relaxed, the blood in general is in such a dissolved state as to afford no secretion of this kind.

In order to supply as much as possible the deficiency of this natural balsam, different artificial applications have been employed. Covering the parts with starch or wheat flour has sometimes proved useful; and I have known gum arabic, myrrh, and galbanum, in fine powder, prove successful when these have failed.

Applications of this kind, indeed, have been used with success in all such hæmorrhagies, with whatever habit of body they are combined; but they prove more particularly useful in relaxed constitutions, attended with a dissolved state of the blood, and an enfeebled muscular system. We may here also use a remedy which in circumstances of this kind very seldom fails; but which, in those of an opposite nature, ought never to be employed. The remedy to which I allude is alcohol, or any other ardent spirit, impregnated with as great a quantity as it can dissolve, of myrrh, or any other of the heating viscid gums. The balsamum traumaticum of the shops, a remedy of this kind, has long been famed for its influence in such cases; but the indiscriminate use of this, and remedies of a similar nature, which has long prevailed with some practitioners, I am confident has done much harm; for, as they all act as stimulants, they of course tend to aggravate every symptom in wounds connected with tense fibres, when much pain, and especially when spasmodic muscular affections prevail. But, in constitutions of an opposite nature, where the blood appears to be in a dissolved state, and the arterial system seems evidently to require a stimulus, remedies of this class prove highly useful: insomuch that where the hæmorrhagies in such constitutions prove distressful, no remedy answers better than lint, immersed in a balsam of this kind.

By due perseverance in this mode of treatment, hæmorrhagies of this kind will for the most part be soon restrained: but when this does not happen, and when, notwithstanding of these, a discharge of blood

still continues ; together with the means that I have advised, an equal moderate pressure should be applied over the whole surface of the fore, and continued as long as the necessity of the case may indicate.

In finishing the dressings of wounds of this class, after the lint and compresses have been applied, a bandage should be adapted to the part in such a manner as to produce an equal pressure over the whole surface of the fore. But it sometimes happens, that no bandage can be made to produce the desired effect : in such cases, the hand of an assistant is our best resource. The hand being firmly applied over the dressings, so as to produce an equal pressure, will commonly succeed when no other remedy has any effect.

Having thus endeavoured to point out the most effectual means of putting a stop to hæmorrhagies, we shall now proceed to consider the different modes employed by art for effecting a discharge of blood when indicated by the existence of some disease in the constitution.

CHAPTER VIII.

OF BLOODLETTING.



SECTION I.

Of Bloodletting in general.

BLOODLETTING, whether we consider it as to its influence on the system, or with respect to the nicety with which it ought to be performed, is perhaps one of the most important operations in surgery. From being so frequently practised, and every pretender to knowledge in the healing art being able to perform it, the public have been induced to consider it as trivial with respect to its execution; but every practitioner of character will acknowledge, that, in order to perform it properly, the greatest nicety, steadiness, and accuracy, are required. Every other operation in surgery I have frequently seen well performed; but I have seldom seen bloodletting with the lancet correctly done. When properly performed, it is a neat operation; but when not done with exactness, it is the very reverse.

I do not here mean to consider the various causes which in different circumstances point out the propriety of abstracting blood from the system; nor do I intend to enter upon a particular discussion of the different effects of general and topical bloodletting: these considerations, as being highly important, would of themselves extend to a great length, so that they will not be looked for in a system of surgery. All that is here intended, is to describe the various modes of performing the operation of bloodletting.

In all inflammatory diseases not entirely local, the method of taking away blood, as established by immemorial practice, is, by such means as discharge the quantity to be taken, at an opening made with a lancet, either in an artery or a vein. Whether there is any real difference in the effects which these two modes of discharging blood produce, it may be difficult, with precision, to determine; but there is reason to think, that, independent of the quantity taken, the difference is of less importance than is commonly imagined. The latter of these termed phlebotomy, and the former arteriotomy, are the means employed for what we term general bloodletting; the particular consideration of which we shall presently enter upon.

But it often happens in local inflammation, that little benefit is derived from general bloodletting, while considerable advantage is obtained from what we term topical or local bloodletting in which blood is discharged from the diseased part, by dividing a number of the small vessels by which it is supplied. The means employed for this I shall hereafter point out, while, in the mean time, we proceed to consider phlebotomy.

Wherever a vein can be reached with safety, an opening for the discharge of blood may be made in it with a lancet; but the following are the parts from whence blood is usually taken in this manner; the veins of the arm at the flexure of the cubitus; the jugular veins; and the veins of the ankles and feet. In particular instances, blood is also advised to be taken from the veins of the hand, of the tongue, and of the eyes, and penis, as well as other parts.

Some general observations relate equally to this operation in whatever part of the body it is practised; these I shall in the first place point out, and shall afterwards proceed to treat particularly of bloodletting in the arm and other parts.

I. In this as in every operation, the posture of the patient, as well as of the operator, merits particular attention, and it ought to be different, according to the effects that we wish to result from it.

In some diseases, it is the object of this remedy, to discharge a large quantity of blood without inducing fainting: when this is the case, and when from former experience it is known that the patient is liable to faint during the evacuation, a horizontal posture, either upon a bed or on a couch, should be advised, for every practitioner knows that fainting does not so readily take place in a horizontal posture, as when the patient is erect.

It sometimes, however, happens, that one material advantage expected from bloodletting, is its inducing a state of deliquium; as is the case in strangulated hernia, where a general relaxed state of the system proves sometimes useful. In all such circumstances, instead of a horizontal posture, the more erect a patient is kept, the more readily will fainting be induced. So that the particular object in view from the operation, must at all times determine this matter.

While we thus attend to the posture of the body, the particular position of the limb or part to be operated upon, must not be overlooked. In every operation, it is a point of importance, to have the patient seated in a proper light, but in none is it more material than in bloodletting. The best general rule that can be given for it, is, that the patient should be so placed, that the principal light of the apartment shall fall directly on the part to be operated upon, so that the vein to be opened may be made as apparent as possible. When clear day light can be obtained, it ought to be preferred; but when this cannot be procured, one or more candles should be used.

But, whatever may be the position of the part itself, and whether the patient is placed on a bed or a chair, the surgeon should always be seated. The operation may, no doubt, be done while the surgeon is standing: and it is perhaps most frequently performed in this manner: but it can never be done either with such steadiness or neatness, as when the operator is firmly seated.

II. From the coats of veins being more flaccid than those of arteries, and from the circulation which takes place in veins being slow, an opening made in a vein will not discharge freely if the vein be not cut entirely across, unless the blood is stopped in its return to the heart by means of a ligature placed between the heart and that part of the vein in which the opening is made.

The patient being properly seated, our next step therefore is, by means of a proper bandage, so to compress the vein intended to be opened, as to prevent the blood from returning to the heart; and for the same reason, an equal degree of pressure, it is obvious, should be applied to all the other veins of the part; for, were this to be neglected, the communication preserved by the collateral branches would render the pressure upon any particular vein of little importance. But, besides producing a more free discharge of blood than could be otherwise obtained, this pressure upon the veins, by causing an accumulation of their contents, tends to bring them more obviously into view, and consequently renders it easier for the surgeon to make a proper opening than might otherwise be in his power.

Although compression, however, to a certain extent, is necessary for the purposes of accumulating blood in the veins, and for afterwards discharging it at an opening made by the lancet, it is at the same time obvious that any considerable degree of pressure, instead of forwarding these purposes, would obstruct them entirely; for, if the pressure meant to be applied to the veins only, should be carried so far as to affect the arteries, all farther access of blood to the veins would be cut off, so that no discharge of importance would take place at any opening that could be made. Whenever we mean, therefore, to discharge blood in this manner, the pressure ought to be moderate: it should always be carried so far as effectually to compress the veins, but never to such a

length as to obstruct the circulation in the corresponding arteries. When we see that the pressure raises the veins more conspicuously into view, and if at the same time the pulsation of the artery is distinctly felt in the inferior part of the limb, we may then be sure of its being applied in a very proper degree, and that it should not be carried farther: for by the swelling of the veins we are sure that they are sufficiently compressed; and by the arteries continuing to beat, it is evident that a continued flow of blood passes into them.

III. The reflux of blood to the heart being in this manner cut off, we have next to advert to the best method of opening the vein. Different instruments have been invented for this purpose, but two only have been retained in use. These are, the lancet and phleme. This last, on being placed immediately on the part to be cut, is, by means of a spring, struck suddenly into the vein, and forms an opening of the exact size of the instrument.

The phleme, in various parts of Germany, has acquired some reputation, particularly in taking blood from the jugular veins: but various objections occur to it, so that it is not likely ever to be in general use: from the nature of the instrument, the deepness to which it should go, ought to be regulated before making use of it: now, we know well that this can never be ascertained; for we frequently find it necessary, after the introduction of a lancet, to go much deeper than was at first supposed to be requisite; so that when a phleme is used, unless we employ one in every instance of a length which cannot be frequently required, disappointments must often take place.

But the most material objection to this instrument is, that where arteries or tendons lie beneath the veins, and in danger of being hurt in the operation, the risk is much greater with the phleme than with the lancet: for when the lancet is used, after the vein is

opened, the orifice may be enlarged at pleasure without an additional risk, merely by carrying the instrument forward along the course of the vein, at the same depth to which it was at first introduced; whereas the phleme, after entering the vein, must pass directly down to its full depth; which adds greatly to the risk of wounding the parts underneath.

Besides, in using a lancet, we have it more in our power to command an orifice of a determined size, than with the phleme: so that, without hesitation, we may venture to pronounce the phleme to be an instrument in no degree necessary; but, for such as incline to use it, the most convenient form of one is represented in Plate II. fig. 2.

The manner of using the phleme is this. The bandage for producing the turgescency of the veins being applied in the manner already directed, the point of the instrument A, with the spring properly bent, must be so placed upon the part of the vein to be opened, that an orifice of an oblique direction may be made in it on the spring B being let loose. The subsequent management is the same here as when the lancet is used, and will be presently pointed out.

In using the lancet, the form of the instrument is a point of the first importance, although it seldom meets with that attention which it merits: the form of lancet in ordinary use, represented in Plate VI. fig. 3, should never be employed in bloodletting: it is well calculated for opening abscesses; but it ought never to be used in this nice operation.

The most obvious objection to this form of lancet is, that the broadness of its shoulders makes a wound in the external teguments, perhaps three times the size of the opening made in the vein; which adds no advantage to the operation; while it gives much unnecessary pain in the first instance, at the same time that it often renders it difficult to stop the flow of blood: I may also mention, that the wounds made by

it are so extensive, that they are apt to terminate in partial suppurations, which always prove both disagreeable and painful to the patient.

The spear pointed lancet, represented in Plate VI. fig. 1, and 2, is an instrument well calculated for the purpose of venesection. From the acuteness of its point, it enters the vein easily, a circumstance of no small importance with many: it makes the opening in the vein nearly equal to the orifice in the teguments; and the discharge of blood at an opening made with one of these lancets, is commonly stopped with ease, immediately on the ligature being removed.

For these reasons, the spear pointed lancet should be preferred; and although, with timid practitioners, the acute point of this instrument may appear to render more dexterity necessary in using it than the broad shouldered lancet; yet the difference in this respect is so inconsiderable, that all who give it a fair trial will soon be able to use it with equal freedom. Indeed no surgeon ought to be trusted in letting blood with the one, whose steadiness and dexterity would in any degree be doubted with the other.

IV. The form of lancet being thus fixed on, we come now to speak of the method of using it. The surgeon and patient being both properly seated, and the ligature applied, that vein should be made choice of, which, while it appears sufficiently conspicuous, is not so loose as to roll, on being compressed: some veins, although they rise sufficiently, yet roll so much, that they are more difficult to open than others which lie at a greater depth. That vein, therefore, is to be preferred, which not only rises, so as to become obvious, but which appears to be connected with some degree of firmness to the contiguous parts. It is scarcely necessary to observe, when a vein appears to be so immediately connected with a contiguous artery or tendon, that there must be some risk of injuring these parts in the operation, if another vein not liable to

such hazard can be procured, it ought undoubtedly to be preferred.

Veins may lie directly above both arteries and tendons, and yet no manner of risk be incurred in opening them, provided the operator is sufficiently steady and attentive; but it must be admitted, that in some instances veins are so nearly and intimately connected with these parts, as to render it hazardous even for the most dexterous surgeon to attempt this operation.

The vein being at last made choice of, the surgeon, if he is to use his right hand in the operation, must take a firm hold of the member from whence the blood is to be drawn, with his left, and, with the thumb of the same hand, he must now make such a degree of pressure upon the vein, an inch and half or two inches below the ligature, as not only to render the skin, and teguments tense, but at the same time to interrupt all communication between the under part of the vein, and that portion of it lying between the ligature and thumb placed as thus directed.

The lancet being bent to somewhat more than a right angle, the operator must now take it between the finger and thumb of his right hand; and, leaving at least one half of the blade uncovered, must rest his hand on the middle finger, ring finger, and little finger, all placed as easily as possible near to the vein from whence the blood is to be taken; and having pushed the point of the instrument freely through the skin and teguments into the vein, he must now carry it forward in an oblique direction, till the orifice is of a proper size; taking care, during the time of pushing on the lancet, that the point of it be kept in as straight a direction as possible, to prevent it from injuring the parts below.

The instrument is now to be withdrawn; and the surgeon removing the thumb of his left hand, the vein must be allowed to empty itself freely into cups provided for the purpose.

It is here of importance to observe, that the limb should be kept steadily in the same posture during the whole time that the blood is flowing off; otherwise, the orifice in the skin is apt to slip over the opening in the vein; a circumstance which always proves inconvenient, and in some instances exceedingly troublesome, by the blood from the vein passing into the surrounding cellular substance.

In taking hold of the lancet, I have directed the scales to form rather an acute angle with the blade of the instrument. It will even answer when they are more widely separated; but a farther separation proves always troublesome, by throwing the scales too much back upon the hand of the operator.

The length of instrument that ought to project before the finger and thumb, is another circumstance requiring attention; for unless a sufficient quantity is left uncovered, the surgeon cannot act with freedom. In lancets of an ordinary length, one half of the blade, as I have mentioned already, should always be left out.

The entry of the lancet into the vein is the next circumstance deserving notice; and it is readily discovered; for as soon as the point has entered the vein, the resistance to its farther progress is immediately diminished, and as soon as the opening is in any degree enlarged, the blood begins to rush out, and thus gives the clearest proof of this part of the operation being complete. On being thus rendered sure that the lancet has got into the vein, I have also desired that it may be carried forward in an oblique direction, taking care to keep the point of it in the same elevation from the instant it has passed fairly through the coats of the vein; and to this part of the operation the most particular attention is required. To the want of caution in this important point, much of the risk attending this operation may be assigned.

The propriety of an oblique direction for the course of the orifice is obvious: for, when quite longitudi-

nal, the sides of the wound are apt to close, so as not to admit of a free discharge; while, on the other hand, when the vein is cut entirely across, troublesome consequences commonly ensue from the wound being difficult to heal: an orifice somewhat oblique with respect to the course of the vein, is therefore preferable to either. But the material circumstance to be kept in view, is the direction of the point of the lancet after it has got fairly into the vein. By almost every author who has written on bloodletting, as soon as the lancet has got into the vein, in order to extend the orifice to a sufficient length, we are directed, very properly, to carry the instrument forward: but in what manner are we desired to do so? by raising the heel of the lancet, as it is termed, at the same time that the point and edge of it is in some degree pushed forward, so as to make the point of the instrument the centre of motion.

The reason of this last direction is, that the internal orifice of the vein may not be farther extended upwards than the external wound in the skin and other integuments; ecchymoses, or effusions of blood into the cellular substance, being the frequent effect of a different management when broad shouldered lancets are used: but when the spear pointed lancet is used, this may be always avoided; as, from the narrow point of the instrument, it may with safety be carried on in the cavity of the vein as far as is necessary. When the operation is properly done, the orifice in the vein must be nearly of the same extent as the wound in the skin; and by the same management we avoid that important risk which must always occur from an implicit obedience to the direction I have mentioned: for one certain effect of raising the heel, or back part of the lancet, is, that the point must in the same proportion be depressed; and the consequence of lowering the point, already perhaps sliding along the under side of the vein, must in all such circumstances prove extremely hazardous; for if, in this sit-

uation, the point of the instrument is depressed, which must undoubtedly happen when the heel is elevated, it must for certain pass through the back part of the vein ; so that if either an artery, nerve, or tendon, lie contiguous, they must of necessity be wounded ; and I am perfectly convinced, that this alone has often been the origin both of wounds in the arteries, and of pricks in the nerves and tendons. This practice, therefore, as being highly dangerous, ought in every instance to be laid aside.

The size of the orifice in bloodletting should at all times depend on the nature of the disease for which the evacuation is prescribed. When it is meant to discharge a large quantity of blood suddenly, either with a view to excite fainting, or for any other cause, the orifice ought to be large ; but in common practice, no necessity occurs for this.

In using a spear pointed lancet, an orifice of an eighth part of an inch in length will in general answer every purpose ; but when a broad shouldered lancet is used, an opening of twice that size becomes necessary ; for with this instrument the orifice in the vein will seldom be more than half the extent of that in the skin.

After withdrawing the lancet, I have desired that the thumb of the left hand should be removed from the spot on which it was placed : it may perhaps appear that some circumstances are here pointed out, with unnecessary minuteness, and this among others may possibly be considered as one : but it must be remembered, that the whole of this work is chiefly meant for beginners, to whom every circumstance in operations of importance ought to be explained : now one material use of the thumb placed below the point where the lancet enters, is, to keep the parts firm, so as to prevent the vein from rolling. But another advantage derived from it is, that by making a sufficient degree of pressure upon the vein, it prevents any blood from escaping between the time of removing

the lancet, and the application of a cup for receiving the blood. During this period a good deal of blood is often discharged, to the great annoyance both of the patient, the operator, and bystanders; a circumstance which, with due attention, may very commonly be prevented.

V. When the vein is properly cut, and the orifice made sufficiently large, there is seldom any difficulty in procuring all the blood that is wanted. But we are in some cases disappointed in this, either from the orifice of the skin having receded from the opening in the vein, or from the patient having become faintish; circumstances always unfavourable to a free discharge of blood. When it happens from fainting, a stream of fresh air should be admitted to the apartment, wine or some other cordial should be administered, and the patient should be placed in a horizontal posture. By these means he will in general soon recover; but if still the blood should not flow freely, the member should be placed in every variety of posture that may tend to bring the opening in the skin to correspond with that of the vein, which will soon be known to have happened by the blood beginning to flow. Throwing the muscles of the part into constant action, by giving the patient a cane, or any other firm substance, to turn frequently round in his hand when the operation is done in the arm, will often excite a constant flow of blood from a vein, when all other means have failed: and, lastly, when the pulse in the inferior part of the member is feeble, and cannot be easily distinguished, we may judge that the ligature is too tight, and may have it in our power to excite an immediate flow of blood, by removing or lessening the compression thus improperly made upon the arteries.

VI. A quantity of blood proportioned to the circumstances of the case, being thus discharged, the pressure upon the superior part of the vein should be

removed ; and this being done, if the spear pointed lancet has been used, all further discharge of blood will in general stop. It sometimes, however, happens, that the blood continues to flow freely even after the ligature is removed. When this is the case, the operator should compress the vein both above and below the orifice with the finger and thumb of one hand, so as to prevent any farther loss of blood : this being done, the limb should be washed, and entirely cleared of blood : the orifice must also be cleared of every particle of blood, and the sides of it being laid exactly together, a piece of court plaster, or any other that is sufficiently adhesive, should be so applied as to retain them. This will in many instances render a bandage unnecessary ; but when the blood has issued with much violence during the operation, and has been difficult to stop after the removal of the ligature, in such instances it is right to apply a small compress of linen over the plaster, and to secure the whole with a roller round the limb.

Before applying the plaster, I have directed the orifice to be cleared of every particle of blood ; a circumstance, I may remark, of more importance than is commonly imagined : by inattention to this point, and want of exactness in closing the orifice, painful swellings and consequent suppurations are often induced, which with ease might be prevented. When the operation is properly done, the wound heals by what surgeons call the first intention, that is, by the parts adhering without the formation of matter ; but this can seldom happen, if the lips of the sore have not been neatly laid together after all the blood has been cleared away.

There is still another important argument for neatness in this matter. Among other troublesome consequences arising from bloodletting, inflammation sometimes occurs in the cavity of the vein ; and as nothing tends more to produce this than the admission of air,

this circumstance of itself strongly points out the propriety of attention to the point in question. For although inflammation in the internal surfaces of veins is not frequent, yet in various instances it is met with; and as the consequences arising from it, if suppuration ensues, must commonly prove fatal, they ought in every instance to be strictly guarded against.

VII. We come now to treat more particularly of some troublesome consequences which occasionally proceed from bloodletting, and which every operator ought to be as much as possible prepared to obviate. The most material of these are, tumors produced by blood effused from the orifice of the vein into the surrounding cellular substance; wounds of the artery lying contiguous to the vein; pricks of the nerves and tendons; and lastly, inflammation, induced in the internal cavity of the vein, as has just been mentioned. These we shall, under separate heads, proceed to consider.*

* Among other reasons which I have given for preferring a spear pointed lancet, it was observed, that with it the operation is done with less pain than with the broad shouldered lancet: and the prevention of pain is of such importance, that nothing should be omitted that can in any degree tend to insure it.

In every operation our instruments should be in the most complete order; but in none is this of more importance than in bloodletting. Well tempered lancets will answer tolerably well after being frequently used; insomuch that I have heard even well employed surgeons assert, that they have used one or two lancets only during the course of many years' practice, without their ever being in the hands of a cutler. But it is certain, that every time a lancet is used, it must be more or less injured; and as the prevention of pain is with most patients a point of no small importance, I think it ought to be laid down as a rule not to be departed from, never to use the same lancet twice, without putting it into the hands of a cutler. This I have long been in the practice of doing, not only with lancets, but with every cutting instrument; and the trouble and expence attending it is inconsiderable, when compared with the advantage derived from it.

SECTION II.

Of a Thrombus, or Ecchymosis.

I HAVE already desired, that in bloodletting, the member should be retained in the same posture, till the whole quantity of blood intended to be taken is discharged. When this is neglected, a small tumor is apt to form immediately above the orifice in the vein, by the blood insinuating into the cellular substance of the neighbouring parts. This kind of tumor, when round and small, is termed a thrombus; and when more diffused, an ecchymosis.

Immediately on the appearance of these swellings, the ligature should be removed; and the member being put into that posture in which it was held when the lancet was introduced, the ligature may be again renewed. A free return of blood will probably in this manner be induced; by which, if the tumor be not entirely removed, it will at least be prevented from becoming larger.

It sometimes, however, happens, that these swellings come at once to such a size, as entirely to preclude every possibility of finishing the operation at the orifice first made in the vein. Even here, however, the ligature should be immediately removed as the most effectual method of preventing an increase of the tumor. By continuing the bandage on the vein, as is often done, the blood still continues to be forced into the surrounding cellular substance; by which, such degrees of swelling are induced as are apt to create a good deal of trouble, which, with due attention, might, in every instance, be prevented.

In this situation, it would be vain to expect any considerable quantity of blood from the orifice first made. The only way in which the operation can be completed, is by making another opening, not in the

same vein, which in such circumstances would seldom bleed freely, but in any other that lies most convenient.

When these tumors do not become large, they are for the most part easily dispersed: in this state, indeed, they seldom require attention; but when they become larger than usual, an immediate application of discutients should be advised. Astringents are to be more depended on than any other remedy, and of this class brandy and other ardent spirits are perhaps as useful as any. Compresses, wet in a solution of crude sal ammoniac in vinegar, and applied with moderate pressure, have likewise proved effectual.

Instances, however, sometimes happen, although not frequently, of the collection of blood being in too great quantities to admit of being all absorbed: in such cases, as no suppuration can happen, from nothing but red blood being contained in the tumor, which cannot be converted into purulent matter, it ought to be immediately laid open as soon as there is reason to suppose that no farther diminution of size will probably occur from absorption. This being done, and the coagulated blood evacuated, the sore falls to be treated like any ordinary wound.

But these tumors are in general of little importance when compared with other accidents which sometimes proceed from bloodletting. The first of these of which we are to treat, are wounds of arteries.

SECTION III.

Of Wounds of the Arteries.

IN all the smaller arteries, openings may be made with little or no risk; but we know from experience, that wounds in the larger arteries often prove hazardous, and seldom heal easily.

When, in bloodletting, we have reason to suspect that an artery has been wounded, by the lancet having passed through the vein, and that blood is discharging at the same orifice, both from the artery and vein, it becomes a matter of importance for an operator to know with precision whether it is so or not. There is only one way in which complete certainty can be obtained on this point; and it is this:

When the blood comes from the vein only, if a degree of pressure is applied both immediately above and below the orifice sufficient for compressing the sides of the vein, all farther evacuation of blood should instantly stop, even when the pressure is not so considerable as to affect the artery below; but if part of the blood comes from a wound in the artery, this pressure upon the vein, instead of putting a stop to the discharge, will rather tend to increase it. When at the same time the blood is discharged *per saltum*, this will no doubt serve as a farther proof, but this test of itself, I may remark, is not so decisive as is commonly imagined; for, a vein lying immediately contiguous to a large artery, receives the influence of the arterial pulsation in such a degree, that any orifice made in it discharges blood very nearly in the same manner as if the artery itself was cut. No other proof, however, is necessary of the artery being wounded, than the one I have mentioned; for, if after the veins are thoroughly compressed, both above and below the orifice, blood should still flow with force, no doubt could remain of the artery being wounded. In all such trials, it is scarcely necessary to observe, that in compressing the veins, care should be taken not to affect the artery.

In such circumstances, it is the common practice to tie up the part with as much firmness as possible, in the first place with different compresses placed over the orifice of the vein; and lest these should not be sufficient, a piece of money or other hard substance is commonly added, and the whole secured with a roller

very tightly applied. But what are we to expect from much pressure applied in this manner? it will not be said, that it should be so considerable, as to compress the artery itself; for, in that case, a stop would be put to the circulation in the whole limb: while, again, if the force is in such a degree as to compress the sides of the veins only, one certain effect of this must be, to occasion a considerable resistance to the flow of blood from the artery: and the blood being thus obstructed in its natural course, will necessarily be much more readily effused at the opening in the artery, than if the veins had been all left free and pervious to receive and transmit it.

In all such cases, therefore, instead of applying much pressure, such means should be advised as will with most certainty tend to relax the veins; and in order to command the blood, the lips of the wound should be laid together, and retained by straps of adhesive plaster, without any bandage. And as there is not a more effectual method of relaxing the whole system, and the vascular system in particular, than by discharging large quantities of blood quickly, as soon as it is known that an artery is hurt, as much blood should be discharged by the orifice newly made, as the patient can easily bear. In this manner, and by enjoining strict attention to rest of body, in order to prevent as much as possible the undue action of the arterial system, and by keeping the body cool, with the use of gentle purgatives, a low diet, and farther bloodlettings when necessary, there may always be some chance of such wounds in arteries being brought to heal: whereas, when much pressure is made upon the veins, the blood being thereby prevented from flowing through them, must necessarily be forced out at the newly formed orifice in the artery; and which must therefore, in the most certain manner, prevent it from healing: in this manner there is reason to think that many aneurifinal swellings have been pro-

duced, which, under the mode of treatment I have advised, would not have taken place.

In wounds of arteries, however, it frequently happens that no treatment whatever will succeed; the orifice in the artery will not reunite, and blood in large quantities is effused into the contiguous parts. Even in this state of the injury, strong pressure is often advised, with a view to dissipate the tumor: but unless the swelling is soft, and the blood contained in it still remains fluid, no pressure whatever will discuss it; for, whenever the accumulated blood has become firm, we cannot suppose that pressure will drive it back by the passage from whence it came. Nor does it appear, that in such circumstances, pressure tends to forward the absorption of extravasated blood. From theory alone we might be induced to draw this conclusion; and in fact I have not met with an instance of pressure in such cases affording any advantage.

There is indeed a variety of aneurism, formed by an artery being wounded by a lancet after passing through a vein, in which moderate pressure proves useful. When an artery wounded in this manner, lies quite contiguous to the corresponding vein, the opening between the vein and artery, in some instances, remains pervious after the external orifice in the vein is closed, so as to produce a direct communication between the one and the other; and the vein in this manner receiving the full force of the arterial pulsation, while its coats are not possessed of firmness sufficient to resist it, a swelling of the vein of necessity takes place. In all such instances, we may readily suppose, that moderate pressure will prove useful, by tending to support the distended vein, and thus preventing any farther increase of its bulk; but in no other swelling arising from blood effused from an artery, can pressure answer any good purpose; while, for the reasons I have enumerated, there is much cause to suspect that it has often done harm.

When we are certain that an artery has been opened, and that the tumor produced by it, arises from blood collected in the cellular membrane around it, if keeping the limb in an easy relaxed posture, and the veins free from pressure, together with the other means that I have pointed out, do not answer, no other mode of treatment will be productive of any advantage.

The tumor still continuing, by the communication between it and the artery being kept up, and none of the means employed for dispersing it, proving effectual, the disease in this state is to be considered as an aneurism, a variety of tumor of which we shall speak more particularly in chapter IX.

SECTION IV.

Of Wounds or Pricks in the Nerves and Tendons.

WOUNDS of arteries, as well as those of tendons, ought never to happen in the hands of a good surgeon; for, as arteries and tendons may both be distinguished by the finger, and their situation thereby ascertained, it must always be the fault of the surgeon, if the point of his lancet is not so directed as to avoid them. One principal cause of these accidents in bloodletting, is, as I have endeavoured to show, the ordinary practice of depressing the point of the lancet, after it has entered the cavity of the vein. This, however, I have shown to be always unnecessary, and in many instances highly dangerous. But although, by proper attention to this part of the operation, we may always with certainty avoid the arteries and tendons; yet it may be said, that the nerves, which are so small as not to be previously distinguished, run at all times a great risk of being injured; and

we know, that when wounded, the most alarming symptoms take place, that ever succeed to the operation of bloodletting.

But although the nerves cannot previously be distinguished, yet, if a proper direction is given to the lancet, so as to prevent the point of it from passing through the back part of the vein, the same means which tend to secure the arteries and tendons, will, with almost equal certainty, prove a safeguard to the nerves: for, if the operator enters his lancet, as ought always to be done, on the superior part of the vein, and does not cut the vein entirely across, by pushing it through the opposite side of it, he will seldom or never injure the contiguous nerves: for the nerves, though they run near to the veins, yet they either lie immediately below them, or so far down upon their sides as to be out of all risk of being wounded, if the orifice is made in the upper part of the vein only. I may venture to assert, that the nerves are never injured by a lancet entering the anterior part of a vein: it is always on the opposite side of the vein that any mischief of this kind is produced, when the lancet, as I have already observed, is pushed entirely through; which it ought never to be, and which every surgeon ought to have steadiness enough to prevent.

But although, with very ordinary care and attention, accidents of this kind may be guarded against, and although I have shown, that the surgeon is almost in every instance to blame when they take place; yet experience tends to evince, either from want of attention, or from want of steadiness on the part of the operator, that however easily such inconveniencies might be avoided, yet still they frequently occur. Nerves, and even tendons, are sometimes pricked, when the dreadful train of symptoms which such accidents usually produce, are, of course, very apt to ensue.

In some cases the patient complains of an exquisite degree of pain, instantly on the lancet being introduced; and this we may always consider as a certain mark of a nerve or tendon being pricked: with due care and attention, the violence of pain will often abate, and at last cease entirely, and no danger will ensue; but in some instances the pain, instead of abating, gradually becomes worse; the lips of the fore become hard and inflamed; and in the course of a day or two from the operation, a thin watery serum begins to ooze from the orifice.

If relief is not soon obtained, these symptoms generally continue in nearly the same state for several days: thereafter the pain becomes still more distressful; but instead of being sharp and acute, it is now attended with the sensation of a burning heat. The fulness in the lips of the wound becomes more considerable, and the swelling in the neighbouring parts extends over the whole member, from the foot upwards over the thigh, when the operation has been done in the lower extremity; and from the elbow down the fore-arm, and upwards along the humerus over to the pectoral muscle and other contiguous parts, when at the usual place of bloodletting in the arm.

The parts at last become tense and hard; an erysipelatous inflammatory colour frequently appears over the whole; the pulse by this time is generally hard and quick; the pain is now intense; the patient restless; twitchings of the tendons occur; in some a locked jaw supervenes; and, all these symptoms continuing to increase, it most frequently happens, that the misery of the unfortunate patient is only terminated by death.

Bloodletting, from being so frequently practised, may by many be considered as an operation neither so difficult to perform, nor so dreadful in its consequences, as those that I have enumerated; and it must be allowed, that they are not frequent; but they happen

often enough to evince the importance of this operation. In the course of my experience I have known many instances of bloodletting ending in death, and the dreadful train of symptoms I have mentioned occurred in all of them.

Different opinions have prevailed respecting the cause of these symptoms: by some they have been imputed to wounds of the tendons; while by others the tendons are supposed to be destitute of sensibility, and that the painful symptoms which sometimes succeed to bloodletting, proceed entirely from wounds of the nerves.

By Mr. John Hunter of London, these symptoms are supposed more frequently to proceed from an inflamed state of the internal surface of the vein, than from any other cause. Such a state of the vein he has often traced in horses that have died of such symptoms from venesection, where the internal coat of the vein was always found much inflamed, not only in the neighbourhood of the part where the orifice was made; but in some along the whole course of the vein, even to the heart itself. Some instances have also occurred, of the same appearances in the human body, where the veins after death were found highly inflamed. And on other occasions, inflammation having in this manner been once excited, suppuration has at last ensued from it; and the matter thus produced, being in the course of circulation carried to the heart, Mr. Hunter supposes, that in such cases death may have been induced by that cause alone.

There can be no reason to doubt the fact held forth by Mr. Hunter, that in such instances the vein in which the orifice has been made, has sometimes after death been found inflamed: but, however ingenious his arguments may be, for concluding that this state of the vein is the original cause of all the bad symptoms; and although we must allow, that inflammation of a vein must tend to aggravate all the symptoms

previously induced by other causes, yet I think we may conclude, that it could not in any instance account in a satisfactory manner for their first production.

In all the instances of this dreadful malady which I have met with, the patient at the very instant of the operation, felt a severe degree of pain. In some cases, the violence of the pain was almost insupportable. Now, this we can never suppose to happen from the mere puncture of a vein; for although the coats of veins are not perhaps entirely destitute of feeling, yet we know that they are not endowed with much sensibility. This inflamed state of the veins, therefore, which in some cases has been observed after death, must be considered rather as the effect, than the cause, of these symptoms; and that they should frequently excite inflammation in the contiguous veins, is highly probable. In the course of a short time from the operation, when the febrile symptoms commence, such a degree of hardness and inflammation is induced over all the contiguous parts, that it would be surprising indeed if the vein, which is thus perhaps surrounded with inflamed parts, should not be inflamed likewise.

We may therefore consider this inflamed state of the veins as a consequence, rather than the cause, of these symptoms; and of course we revert to the opinion of their proceeding either from the wound of a nerve or tendon.

Some have indeed attempted to show, as I have already remarked, that tendons are almost totally destitute of sensibility; and therefore, that wounds of tendons can never account for the various symptoms which sometimes ensue from bloodletting.

There is reason, however, to think, that, in different instances, the same train of symptoms have been induced by each of these causes; that in one instance a wounded nerve, and in others pricks of tendons, have given rise to them. Being decidedly of this opinion myself, I think every person must be so, who

has attentively considered the subject ; but as the same method of treatment proves equally applicable, whether the disease has originated from the wound of a nerve or tendon, I do not think it necessary to enter upon a more minute discussion of the question. Having in a former section shown how such accidents may be almost always avoided, we shall now proceed to consider the means best calculated for preventing the symptoms coming to an alarming height, when it is discovered that, either from inadvertence or any other cause, the mischief has actually happened.

Whenever a patient, at the time of the operation, complains of an exquisite degree of pain, we may conclude that some parts have been wounded which ought not to have been touched. When this unfortunately happens, if proper attention is immediately given, much may be done to obviate the accession of those symptoms which otherwise will undoubtedly take place.

In order to prevent as much as possible the accession of inflammation and other symptoms, a large quantity of blood should be immediately discharged at the orifice newly made ; the limb, for several days, should be kept in a state of perfect rest ; care should be taken that the muscles of the part are preserved in as relaxed a state as possible ; the patient should be kept cool ; on a low diet ; and, if necessary, gentle laxatives should be administered.

By this management alone, the fatal symptoms that I have enumerated, may frequently be prevented ; and when they take place where these precautions have been omitted, we may often conclude that they proceed more from negligence in the subsequent treatment, than from any thing peculiarly bad in the nature of the original accident.

If, however, notwithstanding of the means that I have advised, the symptoms continue to increase, if the lips of the orifice turn hard and more inflamed, if the pain becomes more considerable, and especially if

the swelling begins to spread, other remedies must be employed : in this situation, leeches applied upon the lips of the wound, frequently give relief ; and when the pulse is full and quick, it even becomes necessary to evacuate large quantities of blood, by opening a vein in some other part.

The external remedies usually employed here, are, fomentations and warm poultices ; but I have seldom known any advantage arise from them : on the idea of their being able to induce a free and kindly suppuration in the wound, and having reason to think, from their effects in symptoms of the same kind arising from other causes, that they would prove equally useful here, I must own that in various instances I adopted the practice in the greatest possible degree. Unfortunately, however, the advantages resulting from it never answered my expectation ; so that at last I was induced to make trial of very different remedies.

Although, on first entering on the free use of warm emollients, I did not particularly advert to the cause of their failure, yet I now think that it may be easily explained. The parts principally concerned here being almost entirely membranous, and being therefore, as I have elsewhere shown,* incapable of yielding purulent matter, a continued course of warm emollients, instead of producing the wished for effect, must probably render all the symptoms more severe ; for when remedies of this class do not induce a free suppuration, they tend, by the heat which they convey, to act as a stimulus, and hence increase the inflammation : and in fact we find, that all these applications, instead of proving useful, rather do harm. The heat of the part is here one of the most distressful symptoms ; so that instead of affording relief, any additional warmth rather tends to augment this very tormenting source of uneasiness. The lips of the wound, not being capable of yielding good matter, are, by the additional

* Vide Chap. I.

heat which warm poultices and fomentations convey to them, rendered still more hard, swelled, and of course more painful, and the swelling also becomes more diffused over the rest of the limb.

By Ambrose Paré, Dionis, Heister, and others, instead of emollients, oil of turpentine, tincture of myrrh, and other heating applications, are recommended. That these would not prove effectual, I cannot from experience pretend to say; for suspecting that they might prove too powerfully irritating to parts rendered already exquisitely sensible by disease, I have never ventured to use them: but I can from repeated experience assert, that cooling astringent applications afford much more ease, and prove much more effectual, than warm emollients; and of this class, the most effectual I have ever employed are the saturnine remedies: the parts affected being alternately covered with cloths wet with a solution of saccharum saturni, and pledgets spread with Goulard's cerate, are kept more cool and easy than by any other remedy I have used.

In all such cases, therefore, as soon as a sufficient number of leeches have been applied, and have discharged freely, the swelling should be covered with pieces of soft linen wet in a saturnine solution; and these being kept constantly moist for the space of a few hours, should be succeeded by Goulard's cerate; and thus every part in any degree swelled or pained, should be alternately covered with one or other of these applications, as long as these symptoms continue.

The febrile symptoms must at the same time meet with attention: the patient should be kept cool, and on low diet: his skin should be kept moist with Dover's powder: gentle laxatives should be given when necessary, and if the pulse becomes full, hard, or quick, farther quantities of blood should be taken.

In violent degrees of pain, opiates should be freely given, and when twitchings of the tendons and other convulsive symptoms supervene, they become still more necessary. In order, however, to have much influ-

ence in this state of the complaint, they require to be given in full doses ; otherwise, instead of proving useful, they constantly aggravate the symptoms, not only by increasing the heat and restlessness, but by rendering the system more irritable, and therefore more susceptible than it was before of the pain arising from the wound : whenever opiates, therefore, are in such circumstances employed, the doses ought to be large.

It often happens, however, in this very alarming situation, either from neglect at first, or from an improper subsequent treatment with warm emollients, that opiates and the other remedies I have mentioned are afterwards used in vain : the fever, pain, and swelling of the parts, continuing, convulsive twitches of the muscles at last supervene, all tending to indicate the most imminent danger. In this situation, if we do not immediately employ the most effectual remedy, the patient must soon be cut off ; and the only remedy from which any real advantage can ensue, is a free and extensive division of the parts in which the orifice producing the mischief was at first made. From the repeated experience of ages, we know, that much more pain and distress is excited by the partial division either of a nerve or tendon, than from their being cut entirely across. Now, the intention of this operation is to complete the division of the nerve or tendon that have been wounded by the point of the lancet, and which I am induced in all such cases to consider as the chief cause of the subsequent distress.

As the operation, however, is attended with much pain, and being put in practice for the removal of symptoms from which it is perhaps difficult to persuade the patient that any danger is to be dreaded, all the remedies I have mentioned should first be employed before it is proposed : but, at the same time, care should be taken, that the symptoms be not allowed to advance too far before we advise it ; for when the patient is much weakened by the feverish symptoms having continued long violent, neither this nor any other

remedy with which we are acquainted, has much influence. As soon, therefore, as the remedies I have advised have been fairly tried, and are found to be inadequate, we should immediately propose a free division of the parts chiefly affected; and the manner of doing it is this.

As all the contiguous parts are now supposed to be much swelled and inflamed, it is impossible to get clear access either to the nerve or tendons, but by means of a large and extensive incision; and as this cannot be done but with the risk of opening the contiguous arteries, the first step to be taken, is to guard against this occurrence by applying a tourniquet on the upper part of the limb. This becomes necessary, not only for preventing the loss of blood which would ensue from a division of any of the large arteries, but for preventing that interruption which would otherwise happen from a constant discharge of blood from the smaller vessels during the operation. The tourniquet indeed is more particularly requisite for this purpose, than for any other; for although it is proper, by means of it, to guard against the danger of wounding any of the large arteries, yet, with proper caution, this may for the most part be avoided.

The tourniquet, then, being properly applied, a transverse cut should be made with a common scalpel, in the parts chiefly affected, and it should run in a direction exactly across the original orifice in the vein.

In no operation is it more necessary than in this, to act with freedom in laying the parts sufficiently open by a free incision. A small incision excites nearly the same pain with a larger cut; and it has this material disadvantage, of preventing the surgeon from proceeding in the future steps of the operation with that ease and expedition which the nature of the case very commonly requires.

The skin and other teguments being thus freely divided, the operator must make one slight incision af-

ter another, taking care, if possible, to avoid the larger arteries and veins ; and he is to go on in this way, to discover the wounded nerve ; or if there is no possibility of doing so, he must still continue to proceed in this gradual manner, till he has divided every part between the skin and periosteum ; the tendons, larger arteries, and veins excepted.

At this time the tourniquet should be loosened ; when in all probability the patient will express much satisfaction at what has been done : for, if the part is thus divided which was originally pricked by the lancet, immediate relief will be obtained ; while, on the contrary, if the pain remains violent, we may be thereby convinced that the mischief lies in one or other of the tendons. An accurate examination, therefore, should now be made, by clearing the parts with a sponge ; and that tendon lying most contiguous to the vein in which the orifice was made, will most probably either be found pricked, or in an evident state of inflammation ; but at all events, whether any such appearances are discovered or not, there should be no hesitation in dividing that tendon which lies most contiguous to the vein ; or if two or even three tendinous extremities should lie in the way, and are all therefore equally liable to suspicion, they ought all to be cut across : this being done, relief will for the most part be immediately obtained ; and, at any rate, this being done, every attempt will have been made from which there could be reason to expect any advantage.

The parts being thus freely divided, the tourniquet should now be undone, and such arteries as have been wounded, should be secured with ligatures. The parts are then to be covered with easy dressings, and afterwards treated in the same manner as a wound from any other cause.

The means of relief which I have thus advised, if every circumstance be not duly weighed, may probably be considered as severe ; for an incision in these parts, carried to such a depth, must no doubt be at-

tended with much pain, while the division of one or more tendons will produce a partial lameness of the whole member : but if we consider for a moment the importance of the object in view, all such fears must immediately fall to the ground : it is not a trifling advantage we are in pursuit of, nor should such a painful operation be ever proposed but in the most urgent circumstances. In the present instance, however, the patient's life is obviously to depend on the event of this operation ; so that the most timid operator, if capable of reflection, must admit the propriety of putting it in practice ; and from the event of every case that has once advanced to the length for which I have advised this operation, it may with certainty be pronounced, that patients in such circumstances are in the utmost hazard ; so that in such a desperate situation, no remedy that affords any tolerable chance of a recovery, however painful it may be, can with propriety be condemned.

From reasoning alone, we might conclude, that in such circumstances no other remedy would prove so successful ; but when the propriety of the measure is enforced by the successful issue of repeated trials, no argument adduced against it can meet with much attention. In various instances of less importance, I have known much advantage derived from this practice ; and, in one instance, from bleeding in the median cephalic vein of the arm, the symptoms had got to such a height, and had so obstinately resisted every other remedy, that there was much cause to dread that death must have ensued, had it not been for the effects of a free and very deep division of the pained parts. The patient, from being in exquisite pain, and in imminent danger, experienced almost instantaneous relief ; and the swelling, which had previously continued obstinate, began soon to abate, and a perfect recovery was obtained in much less time than could have been looked for.

There is not therefore, a point in surgery, of which I am more convinced, than of the propriety of this operation in all such desperate cases as the one of which we have been treating; but to such as have not met with occurrences of this kind, the remedy proposed will not only appear to be too violent for the disease, but they will also be induced to consider the length of discussion I have gone into as more prolix than necessary: a single instance, however, of the dreadful symptoms induced by this kind of accident, will be sufficient to convince any one, of the subject we have thus been considering, being perhaps one of the most important in the department of surgery.

All that I have hitherto said on bloodletting, relates to the operation in general: I shall now proceed to consider the operation as it is done in particular parts; and first of bloodletting in the arm.

SECTION V.

Of Bloodletting in the Arm.

BLOODLETTING is more frequently practised on the forepart of the arm at the joint of the elbow, than in any other part. The veins are in general more conspicuous in this place; but no other reason can be assigned for it. On the contrary, the near contiguity of nerves, tendons, and large arteries to these veins, makes it more hazardous here than in other parts. From this, I have often been induced to consider our fixing on this part for the ordinary operation of bloodletting as a very important error; especially as blood may be drawn from veins in other parts, with the same ease as from those of the arm, and with less danger; particularly from the veins of the neck, hands, ankles, and feet.

Bloodletting in the lower extremities has chiefly been confined indeed to a particular set of diseases, especially to those of females: but no good reason can be assigned for this; for it is now known, that, in general bloodletting, the place from whence the blood is drawn, is of little importance, and that the effects of the operation depend almost entirely on the quantity discharged in a longer or shorter time.

Bloodletting at the arm may be safely performed by surgeons of steadiness and attention, as in the hands of such men there is little or no risk of the lancet going deeper than the vein, and in this case nothing bad can ensue: but in common practice, it would be better to fix upon some other part. It may almost always be done with ease in the hands, feet, and ankles; and if the operation is properly performed, the same quantity of blood may be drawn from the veins of these parts, as from those of an equal size in any other part of the body.

But whether this idea should ever be generally adopted or not, it is at least certain, if the cautions I have pointed out are proper in other parts, they are much more so in the arm, where the veins lie so very contiguous to parts which cannot be wounded, but with the risk of producing symptoms of the most alarming tendency.

Having already considered the various steps of the operation of bloodletting, so far as they relate to it in a general view, in order to avoid repetitions, nothing will be mentioned now but what is particularly required in taking blood from the arm.

In applying the ligature for compressing the veins, it should be placed an inch or an inch and half above the joint of the elbow; and, in order to prevent the ends of it from coming in the way of the lancet, the knot should be made on the outside of the arm. In general, one knot might answer; but a slip knot being made above the first, renders it more secure, and it is very easily done.

In making choice of a vein from whence blood is to be taken, the general rules we have laid down upon this point, in the first section of this chapter, must be kept in view. That vein which appears most conspicuous, at the same time that it rolls least under the skin, should in general be made choice of; but when an artery is found to lie immediately below, and quite contiguous to the vein, the operator, if not perfectly satisfied with his own steadiness, ought rather to prefer another. For the most part, however, the artery lies so low in this place, that the median basilic vein, under which it commonly runs, may be opened with safety; and as this vein is usually more conspicuous than the others, it is for this reason in general to be considered as the best. Besides, we prefer the median basilic, from its being less deeply covered with cellular substance than the cephalic or median cephalic; and by lying towards the inner part of the arm, it is more thinly covered with the tendinous expansion of the biceps muscle, than either of the others. From these circumstances, the operation is also attended with less pain in this than in the other veins; a consideration which in every operation merits our regard.

In bloodletting at this part of the arm, although it may be done with the right hand, either upon the right or left arm of the patient; yet we do it more neatly with the right hand upon the right arm, and with the left hand on the left arm of the patient; and whoever attempts the contrary, must find that it cannot be done but in an awkward manner, as the operator cannot in any other way apply his hand properly to that part of the arm on which it ought to rest.

In corpulent people, the veins sometimes lie so deep as not to be discovered by the eye; but when they are sensibly felt by the fingers, even although they cannot be seen, they may be opened with freedom. In a few instances, however, they can neither be distinguished by the eye, nor with the finger: in this case, the ligature should be removed from the upper

part of the arm, and applied about half way between the elbow and wrist, by which the veins below will be brought into view ; and wherever a vein can be evidently observed, there can be no danger in performing the operation. This I have often found necessary, nor has any inconvenience ever ensued from it.

SECTION VI.

Of Bloodletting in the Jugular Vein.

INFLAMMATION of the throat and of the eyes, as well as other affections of the head, frequently require blood to be taken from the contiguous parts ; particularly from the external jugular veins : the manner of opening these veins is this :

There is only one ramification of the jugular vein, namely, the principal posterior branch, that can easily be brought so much into view, as to be with propriety opened ; and even this lies deeply covered, not only with the skin and cellular substance, but with the platifima myodes muscle, so that a good deal of pressure is required to raise it. With a view to produce this, the thumb of the operator is commonly placed upon the vein, so as to compress it about an inch or inch and half below where the opening is to be made. This, however, is seldom sufficient, as the blood, on being stopped in its progress through this branch, finds an easy passage to the other veins ; so that unless the principal vein on the other side of the neck is also compressed, the vein to be opened can never be fully distended. In order to distend it sufficiently, a firm compress of linen should be applied on the largest vein on the opposite side of the neck ; and a garter, or any other ligature, being laid over it, a firm knot should be tied below the opposite armpit ; taking care

to make such a degree of pressure, as may put an entire stop to the circulation in the vein, which in this way is easily done, without obstructing respiration.

This being done, and the patient's head properly supported, the operator, with the thumb of his left hand, must make sufficient pressure upon the vein to be opened, while, with the lancet in his right hand, he should penetrate at once into the vein; and, before withdrawing the instrument, the orifice should be made sufficiently large for the intended evacuation. It may be proper to observe, that a larger opening is necessary in the neck than in the arm, otherwise the quantity of blood is procured with difficulty: and, besides, there is not here the same necessity for caution on this point that there is in the arm: for in the neck, we meet with no difficulty in putting a stop to the blood: after removing the ligature, all that is commonly necessary, even when the orifice is large, is to close it with a slip of adhesive plaster.

In order to bring the vein more clearly into view, so as afterwards to be able to open it with more accuracy, some have directed, that the skin, cellular substance, and muscular fibres covering the vein, should be previously divided with a scalpel. This, however, is unnecessary; and it renders the operation both more painful and more tedious than when done with the lancet at once.



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