

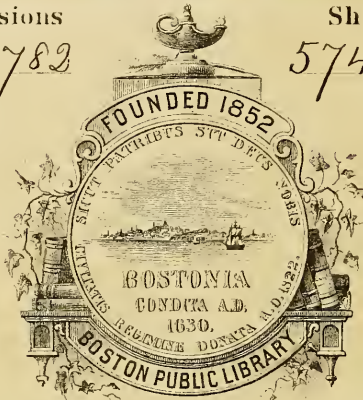
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A
T R E A T I S E
O N T H E
Operations of SURGERY,
W I T H A
DESCRIPTION and REPRESENTATION
O F T H E
I N R S T R U M E N T S
Used in Performing them:
To which is Prefixed an
I N T R O D U C T I O N
O N T H E
NATURE and TREATMENT
O F
WOUNDS, ABSCESSSES, and ULCERS.

By SAMUEL SHARPE,
Fellow of the Royal Society, and Member of the Academy of
Surgery at PARIS.

The ELEVENTH EDITION.

L O N D O N:
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Dec. 7. 1872



T O

WILLIAM CHESELDEN, Esq;

SURGEON to CHELSEA-HOSPITAL.

S I R,

AS I am chiefly indebted to the advantage of an education under You, for whatever knowledge I can pretend to in Surgery, I could not in the least hesitate to whom I should dedicate this Treatise: tho' was it my misfortune to be

DEDICATION.

a stranger to your person,
that merit which has made
the world so long esteem
You the ornament of your
profession, would alone have
induced me to show You
this mark of my respect,
which I hope will not be un-
acceptable from,

S I R,

Your most obedient

humble Servant,

S. SHARPE.

P R E F A C E.

AS the methods of operating in Surgery have of late years been exceedingly improved in *England*, and there is no treatise of character on that subject written in our language, I believe it is not necessary to apologize for this undertaking. It is true, we have a few translations from the writings of foreigners: but, besides that they are unacquainted with these improvements, their manner of describing an operation is so very minute, and in general so little pleasing, that could nothing new be added, or nothing false exploded, the possibility of only doing it more concisely and agree-

P R E F A C E.

ably would be a reasonable inducement to the attempt.

In the description of diseases, I have only mentioned their distinguishing appearances, and have not once dared to guess at the particular disorder in the animal œconomy, which is the immediate cause of them. Indeed the uncertainty there is in conjectures of this intricate nature, and the little service that can accrue to Surgery from such speculative inquiries, have entirely deterred me from all pretence to this sort of theory: and since the most ingenious men hitherto, have not by the help of *hypothesis* done any considerable service to the practice of Surgery, nay, for the most part have misled young Surgeons from the study of the symptoms and cure of diseases, to an idle turn of reasoning, and a certain style in conversation, which has very much discredited the art amongst men of sense;

P R E F A C E.

I hope I am right in my silence on that head.

It has been very much my endeavour to make this treatise short; and therefore I have given no histories of cases, but where the uncommonness of the doctrine made it proper to illustrate it with fact, and these I have recited in the most concise manner I was able. On this account too, I think I have not attempted to explode any practice which is already in disrepute; and if it appear otherwise to men of skill here in *London*, I beg they will refer to those books of Surgery which are now the best esteemed in *Europe*, and to which I have almost always had an eye in the criticisms I have made on the generality of opinions.

It is usual with most writers to describe at length the several bandages proper to be employed after each operation: but as the manner of applying them can hardly be

P R E F A C E.

learned from a description only, or, if it could, there is so little to be said on that subject but what must be copied from others, that I have forbore to follow the example; though, to say the truth, the purpose of bandage being chiefly to maintain the due situation of a dressing, or to make a compress on particular parts, Surgeons always turn a roller with those views, as their discretion and dexterity guide them, without any regard to the exact rules laid down in these descriptions, which are almost impossible to be retained in the memory without a continual practice of them, and therefore we see are not much attended to.

In the first edition of this treatise, I asserted (*p.* 99.) that the hæmorrhage, which sometimes ensues in the lateral operation, had been esteemed an objection of so great weight, as to have occasioned its being suppressed

P R E F A C E.

pressed in the hospitals of *France* by a royal edict. I have since been informed I was mistaken in that particular; and that it had only been forbidden in the *Charité* by Monsieur *Marechal*, the King's first Surgeon, who had the inspection of the practice of Surgery in that hospital. What were his motives for not suffering this method to be continued there, after having been performed a whole season, I will not take upon me to determine.

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INTRO-

INTRODUCTION.

CHAP. I. Of WOUNDS.

TO conceive rightly of the nature and treatment of wounds, under the variety of disorders that they are subject to, it will be proper first to learn, what are the appearances in the progress of healing a large wound, when it is made with a sharp instrument, and the constitution is pure.

In this circumstance, the blood-vessels, immediately upon their division, bleed freely, and continue bleeding till they are either stopped by art, or at length, contracting and withdrawing themselves into the wound, their extremities are shut up by the coagulated blood. The hæmorrhage being stopped, the next occurrence, in about twenty-four hours, is a thin serous discharge; and a day or two after an increase of it, though somewhat thickened and stinking. In this state it continues two or three days without any great alteration, from which time the matter grows thicker and less offensive; and

B when

when the bottom of the wound fills up with little granulations of flesh, it diminishes in its quantity, and continues doing so till the wound is quite skinned over.

The first stage of healing, or the discharge of matter, is by Surgeons called *digestion*; the second, or the filling-up with flesh, *incarnation*; and the last, or skinning over, *cicatrization*. These are the technical terms chiefly in use, and are fully sufficient to describe the state of wounds, without the farther subdivisions usually found in Books.

It is worth observing, that the loss of any particular part of the body can only be repaired by the fluids of that distinct part. As, in a broken bone, the *callus* is generated from the ends of the fracture; so, in a wound, is the cicatrix from the circumference of the skin only. Hence arises the necessity of keeping the surface even, either by pressure or eating medicines, that the eminence of the flesh may not resist the fibres of the skin in their tendency to cover the wound. This eminence is composed of little points or granulations, called *fungus* or proud flesh; and is frequently esteemed an evil, though in truth this species of it be the constant attendant on healing wounds; for when they are smooth,
and

and have no disposition to shoot out above their lips, there is a slackness to heal, and a cure is very difficultly affected. Since then a *fungus* prevents healing only by its luxuriancy, and all wounds cicatrise from their circumference, there will be no occasion to destroy the whole *fungus* every time it rises, but only the edges of it near the lips of the skin, which may be done by gentle escharoticks, such as lint dipt in a mild solution of *vitriol*, or for the most part only by dry lint and a tight bandage, which will reduce it sufficiently to a level if applied before the *fungus* have acquired too much growth. In large wounds, the application of corrosive medicines to the whole surface, is of no use; because the *fungus* will attain but to a certain height when left to itself, which it will be frequently rising up to though it be often wasted; and as all the advantage to be gathered from it, is only from the evenness of its margin, the purpose will be as fully answered by keeping that under only, and an infinite deal of pain avoided from the continual repetition of escharotics.

When I speak of the necessity of a wound being repaired by the same fluids of which the part was before composed, I mean, upon the supposition that the renewal be of the

same substance with the part injured; as callus is of bone, and a cicatrix is of skin: for a vacancy is generally filled up with one species only of flesh, though it possess the space, in which were included, before the wound was made, the distinct separate substances of *membrana adiposa*, *membrana muscutorum*, and *the muscle itself*; and even if we scratch or perforate a bone, there are certain wounded vessels in it that push out flesh which becomes the covering of it; and after fractures of the skull, when the surface of the brain is hurt, and part of the membranes and bones removed, the whole cavity is filled up by nearly the same uniform substance, till it arrive even with the skin, which spreads over it to complete the cure.

On this account it is, that after the healing of wounds, where the surface of the bone has been bare, the cicatrix is always adherent to it, and no absolute distinction of parts preserved; though if a wound be made of any certain magnitude, the adherence, after healing, will not be so wide as the wound itself was, but only of the extent of the cicatrix, which is always much smaller than the incision; because healing does not consist only in the forming of new matter, but also in the elongation of the
fibres

I N T R O D U C T I O N. v

fibres of the circumjacent skin and flesh towards the centre of the wound; which will cover it in more or less time, and in greater or less quantity, in proportion to their laxness; for the scar does not begin to form, till they resist any farther extension; hence arises the advantage in amputations, of saving a great deal of skin.

From what has been said of the progress of a wound made by a sharp instrument, where there is no indisposition of body, we see the cure is performed without any interruption but from the *fungus*; so that the business of surgery will consist principally in a proper regard to that point, and in applications that will the least interfere with the ordinary course of nature, which, in these cases, will be such as act the least upon the surface of the wound. And agreeably to this we find, that dry lint only is generally the best remedy through the whole course of dressing. At first, it stops the blood with less injury than any styptic powders or waters; and afterwards, by absorbing the matter, which in the beginning of suppuration is thin and acrimonious, it becomes in effect a digestive. During incarnation, it is the softest medium that can be applied between the roller and ten-

der granulations, and at the same time is an easy compress upon the sprouting *fungus*.

Over the dry lint may be applied a pledgit of some soft ointment spread upon tow, which must be renewed every day, and preserved in its situation by a gentle bandage: though, in all large wounds, the first dressing after that of the accident or operation should not be applied in less than three days; when, the matter being formed, the lint separates more easily from the part; in the removal of which, no force should be used; but only so much be taken away as is loose, and comes off without pain.

Perhaps it may appear surprising that I do not recommend either digestive or incarnative ointments, which have had such reputation formerly for their efficacy in all species of wounds. But as the intent of medicines is to reduce the wound to a natural state, or a propensity to heal, which is what I have already supposed it to be in, the end of such applications is not wanted; and in other respects, dry lint is more advantageous, as may be learnt from I what have said of its benefits. There are certainly many cases in which different applications will have their several uses; but these are when wounds are attended with a variety of circumstances not supposed in that I have
been

been speaking of; though even when these, by the virtue of medicines, are reduced to as kind a state, the method of treating them afterwards should be the same, as will be better understood by the next chapter, in which I shall treat more particularly of the dressing of wounds.

C H A P. II.

Of Inflammations and Abscesses.

AS almost all abscesses are the consequences of inflammations, and these produce a variety of events, as they are differently complicated with other disorders, it will be proper first to make some inquiry into their disposition. Inflammations from all causes have three ways of terminating; either by dispersion, suppuration, or gangrene. A scirrhus gland is always mentioned as a fourth; but, I think, with impropriety, since it seldom or never occurs but in venereal, scrophulous, or cancerous cases, when it is the forerunner, and not the consequence, of an inflammation, the tumour generally appearing some time before the discolouration.

But though every kind of inflammation will sometimes terminate in different shapes, yet a probable conjecture of the event

may be always gathered from the state of the patient's health. Thus inflammations happening in a slight degree upon colds, and without any foregoing indisposition, will most probably be dispersed: Those which follow close upon a fever, or happen to a very gross habit of body, will generally imposthume; and those which fall upon very old people, or dropsical constitutions, will have a strong tendency to gangrene.

If the state of an inflammation be such as to make the dispersion of it safely practicable, that end will be best brought about by evacuations, such as plentiful bleeding and repeated purges: The part itself must be treated with fomentations twice a day; and if the skin be very tense, it may be embrocated with a mixture of three fourths of oil of roses, and one fourth of common vinegar, and afterwards be covered with *unguent. flor. samb.* or a soft ointment made of white wax and sweet oil, spread upon a fine rag, and rolled on gently. I know that almost all Surgeons are averse to the application of any thing unctuous to an inflamed skin, upon the supposition of its obstructing the pores, and by that means preventing the transpiration of the obstructed fluids, which is imagined to be one of the ways that an inflammation is removed. But whether this reasoning be founded on
practice

practice or theory only, I am not clear: though I think it very certain, that inflammations left to themselves often grow stiff and painful, and are to be eased by any medicine that makes them more soft and pliable; which should not incline us to believe, that relaxing medicines interrupted the disposition to a cure. However, to preserve some sort of medium, in inflammations of the face, where they are esteemed most dangerous, it may be made a rule to use nothing more oily than warm milk, with which the face may be embrocated five or six times a day. If, after four or five days, the inflammation begins to subside, the purging-waters and manna may take place of other purges, and the embrocation of oil and vinegar be now omitted, or sooner, if it has begun to excoriate. The ointment of wax and oil may be continued to the last: or if, upon conclusion of the cure, the itching of the skin should be troublesome, it may better be relieved by the application of *nutritum*, which is an ointment made of equal parts of diachylon and sweet oil, melted softly down, and afterwards stirred together with a little addition of vinegar till they are cold. During the cure, a thin diet is absolutely necessary; and in the height of the inflammation, the drinking of thin liquors is of great service.

Here

Here I have supposed that the inflammation had so great a tendency to discussion, as by the help of proper assistance to terminate in that manner; but when it happens that the disposition of the tumour resists all discutient means, we must then desist from any farther evacuations, and, as much as we can, assist nature in the bringing on a suppuration.

That matter will most likely be formed, we may judge from the increase of the symptomatic fever, and enlargement of the tumour, with more pain and pulsation; and if a small rigor come on, it is hardly to be doubted. Inflammations after a fever, and the small-pox, almost always suppurate; but these presently discover their tendency, or at least should be at first gently treated, as though we expected an imposthumation. It is a maxim laid down in Surgery, that evacuations are pernicious in every circumstance of a disease which is at last to end in suppuration: But as physicians do now acknowledge, that bleeding on certain occasions in the small-pox, is not only no impediment to the maturation, but even promotes it; so, in the formation of abscesses, when the vessels have been clogged, and the suppuration has not kindly

ly advanced, bleeding has sometimes quickened it exceedingly. But, however, this practice is to be followed with caution. Purges are, no doubt, improper at this time; yet if the patient be costive, he must be assisted with gentle clysters every two or three days.

Of all the applications invented to promote suppuration, there are none so easy as poultices; but as there are particular tumours very slow of suppuration, and almost void of pain (such, for instance, are some of the scrophulous swellings), it will be less troublesome in these cases to wear the gum-plasters, which may be renewed every four or five days only. Amongst the suppurative poultices, perhaps there is none preferable to that made of bread and milk softened with oil; at least, the advantage of any other over it is not to be distinguished in practice. The use of suppurative plasters in hasty abscesses, or inflammations in a weak or dropical habit of body, is by no means adviseable, as they are apt to fit uneasy on the inflammation, are often painful to remove when we inquire into the state of the tumour, and by their compress in bad constitutions add something to the disposition of the part to mortify. The abscess may be covered with the poultice
twice

twice a-day, till it be come to that ripeness as to require opening, which will be known by the thinness and eminence of the skin in some part of it, a fluctuation of the matter, and generally speaking an abatement of the pain previous to these appearances. The manner of opening an abscess I shall describe, after having spoken of a gangrene, which is the other consequence of an inflammation.

The signs of a gangrene are these: The inflammation loses its redness, and becomes dusky and livid; the tenseness of the skin goes off, and feels to the touch flabby or emphysematous; vesications filled with ichor of different colours spread all over it; the tumour subsides, and from a dusky complexion turns black; the pulse quickens and sinks; and profuse sweats coming on, at last grow cold, and the patient dies.

To stop the progress of a mortification, the method of treatment will be nearly the same, from whatever cause it proceed, except in that arising from cold; in which case we ought to be cautious not to apply warmth too suddenly to the part, if it be true, that in the northern countries they have daily conviction of gangrenes produced by this means, which might have been easily prevented by avoiding heat; nay, they
carry

carry their apprehension of the danger of sudden warmth so far, as to cover the part with snow first, which they say seldom fails to obviate any ill consequence.

The practice of scarifying gangrenes by several incisions, is almost universal; and, I think, with reason; since it not only sets the parts free, and discharges pernicious ichor, but makes way for whatever efficacy there may be in topical applications. These are different with different Surgeons: but I believe the digestives softened with oil of turpentine are as good dressings as any for the scarifications; and upon them, all over the part, may be laid the *Theriaca Londinensis*, which should be always used in the beginning of a gangrene before the necessity of scarifying arises, or what is equally good, if not often preferable, a cataplasm made with lixivium and bran, and applied warm, which will retain its heat better than most other topicals. There are some who insist upon having had particular success in the stopping of gangrenes, from the use of the grounds of strong beer mixed with bread or oatmeal. But there are hardly any facts less proper to infer from, than the ceasing of a mortification; since we see, amongst the poor that are brought into the hospitals, how often it happens without any assistance

assistance. However, it is certain, that service may be done by spirituous fomentations, and the dressings above mentioned, which are to be repeated twice a-day. Medicines also given internally are beneficial; and these should consist of the cordial kind, though at present the bark is ordered by a great many surgeons as the sovereign remedy for this disorder. After the separation of the eschar, the wound becomes a common ulcer, and must be treated as such.

There are two ways of opening an abscess; either by incision or caustic; but incision is preferable in most cases. In small abscesses, there is seldom a necessity for greater dilatation than a little orifice made with the point of a lancet; and in large ones, where there is not a great quantity of skin discoloured and become thin, an incision to their utmost extent will usually answer the purpose; or, if there be much thin discoloured skin, a circular or oval piece of it must be cut away: which operation, if done dexterously with a knife, is much less painful than by caustic, and at once lays open a great space of the abscess, which may be dressed down to the bottom, and the matter of it be freely discharged; whereas, after a caustic, tho' we make incisions through the eschar, as is the usual practice,

practice, yet the matter will be under some confinement, and we cannot have the advantage of dressing properly, till the separation of the slough, which often requires a considerable time, so that the cure must be necessarily delayed; besides that the pain of burning, continuing two or three hours, which a caustic usually requires in doing its office, draws such a fluxion upon the skin round the eschar as sometimes to indispose it very much for healing afterwards. In the use of caustics, it is but too much a practice to lay a small one on the most prominent part of a large tumour, which not giving sufficient vent to the matter, and perhaps the orifice soon after growing narrow, leads on to the necessity of employing tents; which two circumstances more frequently make fistulas after an abscess, than any malignity in the nature of the abscess itself. The event would more certainly be the same after a small incision: but I observe, that surgeons, not depending so much upon small openings by incision, as by caustic, do, when they use the knife, generally dilate sufficiently; whereas, in the other way, a little opening in the most depending part of the tumour usually satisfies them. But as the method of making small orifices for great discharges is for the
most

most part tedious of cure, very often requiring dilatation at last, and now and then pernicious in the consequence above mentioned, and even making the adjacent bones carious, I thought it might not be useless to caution against this practice.

Here it may not be amiss to observe, that notwithstanding the depending part of an abscess is esteemed the most eligible for an opening, yet it is always on the supposition that the teguments are as thin in that place as any other part of it; otherwise it will be generally adviseable to make the incision where nature indicates, that is, where the tumour is inflamed and prominent, though it should not be in a depending part.

The indiscriminate application of caustick to all abscesses, often runs into the same mischief of tediousness in the cure, from a cause exactly the reverse of that I have been describing: for as, in great swellings, they are seldom laid on large enough, and the matter continues draining for want of a sufficient opening; so, in small ones, they make a greater opening than is necessary, and therefore demand a greater length of time to repair the wound. I confess, the disposition of abscesses to fill up after the discharge of matter, is so very different, that some few large ones do well after the
mere

the cure, tho' the malignity of the wound were corrected. Of this kind are venereal buboes; which, notwithstanding they often do well by mere incision, yet when the skin is in the state I have supposed, the caustic is always preferable, as I have had many opportunities of being convinced. It is to be observed, I confine this method to venereal buboes; for those which follow a fever, or the small-pox, for the most part are curable by incision only. There are many scrophulous tumours, where the reasoning is the same as in the venereal; and even in great swellings where I have recommended incision, if the patient will not submit to cutting, and the surgeon is apprehensive of any danger in wounding a large vessel, which is often done with the knife, (tho' it may readily be taken up with the needle and ligature), yet as this inconvenience is avoided by caustic, it may on such an occasion be made use of: but I think, after the eschar is made, it should be cut almost all away, which will be no pain to the patient, and will give a much freer discharge to the matter than incisions made thro' it. However, in scrophulous swellings of the neck and face, unless they are very large, caustics are not adviseable, since in that part of the body, with length of time, they heal after incision. Caustics

are

are of great service in destroying stubborn scrophulous indurations of the glands, also venereal indurations of the glands of the groin, which will neither discuss nor suppurate; likewise in exposing carious bones, and making large issues. The best caustic in use is a paste made with lime and *lixivium capitale*; which is to be prevented from spreading, by cutting an orifice in a piece of sticking plaster, nearly as big as you mean to make the eschar; which being applied to the part, the caustick must be laid on the orifice and preserved in its situation by a few slips of plaster laid round its edges, and a large piece over the whole. When issues are made, or bones exposed, the eschar should be cut out immediately, or the next day: for if we wait the separation, we miscarry in our design of making a deep opening; since sloughs are flung off by the sprouting new flesh underneath, which fills up the cavity at the same time that it discharges the eschar, so that we are obliged afterwards to make the opening a second time with painful escharotic medicines. To make an issue, or lay a bone bare, this caustic may lie on about four hours; to destroy a large gland, five or six; and to open abscesses, an hour and a half, two hours, or three hours, according to the thickness

of the skin; and what is very remarkable, notwithstanding its strength and sudden efficacy, it frequently gives no pain where the skin is not inflamed, as in making issues, and opening some few abscesses.

Hitherto I have supposed the surgeon has had the opportunity of opening the tumour at the most eligible time, that is, when the skin is thin, and the fluctuation of the matter very sensible, which is always to be waited for, notwithstanding it be very much taught, to open critical abscesses before they come to an exact suppuration, in order to give vent sooner to the noxious matter of the disease. But in opening before this period, practitioners miss the very design they aim at; since but little matter is deposited in the abscess before it arrives towards its ripeness; and besides, the ulcer afterwards grows foul, and is less disposed to heal.

When an abscess is already burst, we are to be guided by the probe where to dilate, observing the same rules with regard to the degree of dilatation as in the other case. The usual method of dilating is with the probe-scissars; and indeed in all abscesses the generality of surgeons use the scissars, after having first made a puncture with a lancet: but as the knife operates much more quickly and with less violence to the parts
than

than scissars, which squeeze at the same time that they wound, it will be sparing the patient a great deal of pain to use the knife, wherever it is practicable, which is in almost all cases, except some *fistulæ in ano*, where the scissars are more convenient. The manner of opening with a knife, is by sliding it on a director, the groove of which prevents its being misguided. If the orifice of the abscess be so small as not to admit the director, or the blade of the scissars, it must be enlarged by a piece of sponge-tent, which is made by dipping a dry bit of sponge in melted wax, and immediately squeezing as much out of it again as possible between two pieces of tile or marble; the effect of which is, that the loose sponge being compressed into a small compass, if any of it be introduced into an abscess, the heat of the part melts down the remaining wax that holds it together, and the sponge, sucking up the moisture of the abscess, expands, and in expanding opens the orifice wider, and by degrees, so as to give very little pain.

The usual method of dressing an abscess the first time is with dry lint only; or, if there be no flux of blood, with soft digestives spread on lint. If there be no danger of the upper part of the wound reuniting too soon,

the doffils must be laid in loose; but if the abscess be deep and the wound narrow, as is the case sometimes of abscesses *in ano*, the lint must be crammed in pretty tightly, that we may have afterwards the advantage of dressing down to the bottom without the use of tents, which are almost universally decried in these days, though they still continue to be employed too much by the very people who would seem to explode them most; so difficult is it to be convinced of the true efficacy of nature in the healing of wounds. Formerly, the virtues of tents have been much insisted on, as it was then thought absolutely necessary to keep wounds open a considerable time, to give vent to the imaginary poison of the constitution. It was supposed too, that they were beneficial in conveying the proper suppurative or farcotic medicines down to the bottom of the abscess; and again, that, by absorbing the matter, they preserved the cleanliness of the wound, and disposed it to heal. But this reasoning is not now esteemed of any force. Surgeons at present know that a wound cannot heal too fast, provided that it heal firmly from the bottom. They are very well satisfied also, from what they see in wounds where no medicines are applied, that nature of herself shoots forth new flesh,
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and is interrupted by any pressure whatsoever. Besides, as to the conceit of tents sucking up the matter, which is esteemed noxious to healing, they are so far from being beneficial in the performance of it, that they are of great prejudice: for if the matter be offensive in its nature, tho' they do absorb it, they bring it into contact with every part of the sinus; and if it be prejudicial by its quantity, they do mischief in locking it up in the abscess, and preventing the discharge it would find if the dressings were only superficial. But in fact, matter, when it is good, is of no disservice to wounds with regard to its quality; and surgeons should therefore be less curious in wiping them clean, when they are tender and painful. That tents are impediments to healing rather than assistants, we may learn from considering the effect of a pea in an issue, which by pressure keeps open the wound just as tents do; and if there are instances of wounds healing very well notwithstanding the use of tents, so there are also of issues healing up in spite of any measures we can take to keep a pea in its cavity. In short, tents in wounds, by resisting the growth of the little granulations of flesh, in process of time harden them, and in that manner produce a fistula: so that, instead of being used

for the cure of an abscess, they never should be employed but where we mean to retard the healing of the external wound; except in some little narrow abscesses, where, if they be not crammed in too large, they become as doffils admitting of incarnation at the bottom. But care should be taken, not to insinuate them much deeper than the skin in this case, and that they should be repeated twice a-day, to give vent to the matter they confine. Sometimes they are of service in large abscesses, particularly of the breast, where the matter cannot discharge itself by the orifice already made, and yet does not point sufficiently to any other part for an opening, tho' it makes signs whither it would tend if it were a little confined. In such an instance, a tent plugging up the orifice would make the matter recur to the part disposed to receive it, and mark the place for a counter-opening: but tents do most good in little deep abscesses whence any extraneous body is to be evacuated, such as small splinters of bone, &c.

The use of vulnerary injections into abscesses has been thought to bear so near a resemblance to the use of tents, that they both fell into disrepute almost at the same time. It has been said in their favour, that in deep abscesses, where no ointment
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can be applied, they digest, cleanse, and correct the malignity of the *pus*. But the fact is, that they do so much mischief by frequently distending the parts of the abscess, first when they are injected, and afterwards by their addition to the matter generated in the abscess, that they are hardly proper in any case: though one of the great mischiefs of injections and tents both has been a mistaken faith amongst practitioners, that wherever their Medicines were applied, the part would heal; and, upon that presumption, they have neglected to dilate abscesses, which have not only remained incurable after this treatment, but would often have done so for want of a discharge, if they had been dressed more superficially.

In dressing wounds, it is common to apply the medicines warm or hot, upon the supposition that heated ointments have a stronger power of digesting than cold. But as any medicines will soon arrive to the heat of the part it is laid on, whether it be applied hot or cold, the efficacy of the heat can avail but little in so small a time: and as doffils dipt in hot ointments are not cleanly, and even grow stiff and painful, besides that the patient is liable to be burnt by laying on too hot, I think it rather preferable

ferable to apply them cold, or perhaps in winter a little warmed before the fire after they are spread; observing, if the ulcer be uneven, to make the doffils small in order to lie close. Over the doffils of lint may be laid a large pledgit of tow spread with basilicon, which will lie softer than a defensive plaster. For this, though designed to defend the circumference of wounds against inflammation or a fluxion of humours, is often the very cause of them: so that the dressings of large wounds should never be kept on by these plasters where there is danger of such accidents; and it is on the account of the unfitness of plasters of any kind for an inflammation, that I have omitted to mention any of them as proper discutients in that disorder. In this manner, the dressings may be continued till the cavity is incarned, and then it may be cicatrised with dry lint, or some of the cicatrifying ointments; observing to keep the *fungus* down, as directed before. If the drying ointment be the *cerat. de lapid. calam.* the stone must be thoroughly levigated before it be put into it, otherwise the ointment will be corrosive.

In the course of dressing, it will be proper to have regard to the situation of the abscess, and as much as possible to make the patient
favour

favour the discharge by his ordinary posture: and to this end also, as what is of greater importance than the virtue of any ointment, the discharge must be assisted by compress and bandage, the compress may be made of rags or plaister; though the latter is sometimes preferable, as it remains immoveable on the part it is applied to. The frequency of dressing will depend on the quantity of discharge: once in twenty-four hours is ordinarily sufficient; but sometimes twice, or perhaps three times, is necessary. I have before mentioned, not to be too scrupulously nice in cleaning a wound; but it is worth remarking, that a sore should never be wiped by drawing a piece of tow or rag over it, but only by daubing it with fine lint, which is a much easier method for the patient: the parts about it may be wiped clean in a rougher manner, without any prejudice. I do not think the air has that ill effect on sores as is generally conceived; nor would the large abscesses on beasts, which are often exposed to the air the whole time of cure, do well, if it were so very pernicious as is represented: but as it tends to the making a scab, and in winter is a little painful to the new flesh, it will be right to finish the dressing as quick as may be, without hurrying. Another caution
 necessary

necessary in the treatment of abscesses is, that surgeons should not upon all occasions search into their cavities with the finger or probe, as it often tears them open and indisposes them for a cure.

CHAP. III.

Of ULCERS.

WHEN a wound or abscess degenerates into so bad a state as to resist the methods of cure I have hitherto laid down, and loses that complexion which belongs to a healing wound, it is called an *Ulcer*: and as the name is generally borrowed from the ill habit of the sore, it is a custom to apply it to all sores that have any degree of malignity, tho' they be immediately formed without any previous abscess or wound; such are the venereal ulcers of the tonsils, &c.

Ulcers are distinguished by their particular disorders, tho' it seldom happens that the affections are not complicated; and when we lay down rules for the management of one species of ulcer, it is generally requisite to apply them to almost all others. However, the characters of most eminence are, the callous ulcer, the sinuous ulcer, and the ulcer with caries of the adjacent bone; tho'

tho' there be abundance more known to surgeons, such as the putrid, the corrosive, the varicous, &c. But as they have all acquired their names from some particular affection, I shall speak of the treatment of them under the general head of ulcers.

It will be often in vain to pursue the best means of cure by topical application, unless we are assisted by internal remedies: for as many ulcers are the effects of a particular indisposition of body, it will be difficult to bring them into order, while the cause of them remains with any violence; tho' they are sometimes in a great degree the discharge of the indisposition itself, as in the plague, small-pox, &c. But we see it generally necessary in the pox, the scurvy, obstructions of the menses, dropfies, and many other distempers, to give internals of great efficacy; and indeed there are hardly any constitutions where ulcers are not assisted by some physical regimen. Those that are cancerous and scrophulous seem to gain the least advantage from physic: for if in their beginnings they have sometimes been very much relieved, or cured by salivation, or any other evacuation, they are also often irritated, and made worse by them; so that there is nothing very certain in the effects of violent medicines in these distempers.

distempers. I have seen also great quantities of alteratives tried on a variety of subjects; but I cannot say with extraordinary success. Upon the whole, I think, in both these cases, the milk-diet, and gentle purging with manna, and the waters, seem to be most efficacious: tho' brisk methods may be used with more safety in the evil than in the cancer; and sometimes, particularly in young subjects, the decoction of the woods is extremely beneficial for scrophulous ulcers: but it has lately been attested by men of great skill and veracity, that sea-water is more powerful than any other remedy hithertoknown, both for scrophulous ulcers, and scrophulous tumours.

When an ulcer becomes foul, and discharges a nasty thin ichor, the edges of it in process of time tuck in, and, growing skinned and hard, give it the name of a callous ulcer; which, so long as the edges continue in that state, must necessarily be prevented from healing. But we are not immediately to destroy the lips of it, in expectation of a sudden cure; for while the malignity of the ulcer remains, which was the occasion of the callosity, so long will the new lips be subject to a relapse of the same kind, however often the external surface of them be destroyed; so that, when we have

to deal with this circumstance, we are to endeavour to bring the body of the ulcer into a disposition to recover by other methods. It sometimes happens to poor laborious people, who have not been able to afford themselves rest, that lying a-bed will in a short time give a diversion to the humours of the part, and the callous edges softening, will without any great assistance shoot out a cicatrix, when the ulcer is grown clean and filled with good flesh. The effect of a salivation is generally the same; and even an issue does sometimes dispose a neighbouring ulcer to heal. But tho' callosities be frequently softened by these means, yet when the surface of the ulcer begins to yield thick matter, and little granulations of red flesh shoot up, it will be proper to quicken nature by destroying the edges of it, if they remain hard. The manner of doing this is by touching them a few days with the lunar caustic, or *lapis infernalis*; and some choose to cut them off with a knife: but this last method is very painful, and not, as I can perceive, more efficacious; tho', when the lips do not tuck down close to the ulcer, but hang loose over it, as in some venereal buboes, where the matter lies a great way under the edges of the skin, the easiest method is cutting them off with the scissars.

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To digest the ulcer, or to procure good matter from it when in a putrid state, there are an infinity of ointments invented; but the *basilicon flavum* alone, or softened down sometimes with turpentine, and sometimes mixt up with different proportions of red precipitate, seems to serve the purposes of bringing an ulcer on to cicatrification as well as any of the others. When the ulcer is incarnated, the cure may be finished as in other wounds; or if it do not cicatrise kindly, it may be washed with *aq. calcis*, or *aq. phag.* or dressed with a pledgit dipt in *tinct. myrrhæ*: and if excoriations are spread round the ulcer, they may be anointed with *sperm. cet.* ointment, or *unguent. nutritum.*

The *red precipitate* has of late years acquired the credit it deserves for the cure of ulcers; but by falling into general use, is often very unskilfully applied. When mixed with the *basilicon*, or, what is neater, a cerate of wax and oil, it is most certainly a digestive; since it hardly ever fails to make the ulcer yield a thick matter in twenty-four hours, which discharged a thin one before the application of it. As greater proportions of it are added to the cerate, it approaches to an escharotic; but while it is mixed with any ointment, it is much less painful and corrosive than when sprinkled

on a sore in powder; tho' in this form it is almost universally employed, but I think injudiciously; for as it is a strong escharotic, much of it can never be used without making a slough; and therefore continually repeating it day after day will be making a succession of sloughs; or if it be sprinkled on a slough already formed in order to quicken the separation of it, so much of the powder as lies on the dead surface will be of no force, and the rest that lies at the bottom and about it will produce other sloughs there, by keeping under and destroying the little granulations of flesh which in their growth would elevate and push off the first slough, so that it cannot be a proper remedy in this case. If it be answered, that daily practice should convince us that *precipitate* has not this ill effect, since we see sloughs continually separating, notwithstanding the use of it; the same sort of argument may be used in favour of any bad practice, since nature often surmounts the greatest obstacles to a cure: but whoever will attend carefully, without any prejudice from this reasoning, to the two methods of promoting the separation of an eschar, will find it not only more easily, but also more readily effected by soft digestives, or the *precipitate* medicine, than by a great quantity of the powder.

If the ulcer should be of such a nature

as to produce a spongy flesh, sprouting very high above the surface, it will be necessary to destroy it by some of the escharotics; or the knife. This *fungus* differs very much from that belonging to healing wounds, being more eminent and lax, and generally in one mass; whereas the other is in little distinct protuberances. It approaches often towards a cancerous complexion; and when it rises upon some glands does actually degenerate sometimes into a cancer, as has happened in buboes of the groin. When these excrescences have arisen in venereal ulcers, I have pared them with a knife; but the flux of blood is ordinarily so great, that I do not recommend the method, and rather prefer the escharotics. Those in use are the *vitriol*, the *lunar caustic*, the *lapis infernalis*, and more generally the red *precipitate* powder: but even in this case, I do not think that powder the best remedy; for tho' I have said it is always an escharotic, yet the *pulv. angel.* which is a composition of the *precipitate* powder and burnt alum, eats deeper, and I think it preferable to the *precipitate* alone.

It is but seldom that these inveterate *funguses* appear on an ulcer; but it is very usual for those of a milder kind to rise, which may often be made to subside with
pressure

applications; but the cases where either of these methods are practicable, occur very rarely. As to the treatment of incurable cancerous ulcerations, after much trial, surgeons have at last discovered, that what gives the most ease to the sore is the most suitable application; and therefore the use of escharotics is not to be admitted on any pretence whatsoever; nor in those parts of a cancer that are corroded into cavities, must the *precipitate* be made use of to procure digestion, or promote the separation of the sloughs. The best way, therefore, is to be guided by the patient, what medicine to continue, after having tried three or four, if the first or second do not agree with him. Those usually prescribed are preparations from lead: but what I have found most beneficial, have been sometimes dry lint alone, when it does not stick to the cancer; at other times, lint doffils spread with *basilicon* or *cerat. de lapid. calam.* and oftener than either with a *cerate* made of oil and wax or the *sperma ceti* ointment, and over all a pledget of tow spread with the same. Embrocating the neighbouring skin and edges of it with milk, is of service; but the chief good is to be acquired by diet, which should be altogether of milk and things made of milk, tho' herbage may be admitted

admitted also. Issues in the shoulders or thighs do also alleviate the symptoms, and manna with the purging waters, once or perhaps twice a-week, will serve to keep the body cool. All methods more violent generally exasperate cancers, and are to be rejected in favour of this, which is sometimes amazing in its effects, not only procuring ease, but lengthening life.

When ulcers or abscesses are accompanied with inflammation and pain, they are to be assisted with fomentations made of some of the dry herbs, such as Roman wormwood, bay-leaves, and rosemary; and when they are very putrid and corrosive, which circumstances give them the name of foul phagædenic ulcers, some spirits of wine should be added to the fomentation, and the bandage be also dipt in brandy or spirits of wine, observing in those cases where there is much pain always to apply gentle medicines till it be removed.

As to the frequency of dressing and fomenting, I think it may be laid down for a rule in all sores, that where the discharge is sanious and corrosive, twice a-day is not too much: if the matter be not very putrid and thin, once will suffice. When the pain and inflammation are excessive, bleeding and other evacuations will often be service-

able; and above all things, rest and a horizontal position: which last circumstance is of so great importance to the cure of ulcers of the legs, that unless the patient will conform to it strictly, the skill of the surgeon will often avail nothing; for as the indisposition of those sores is in some measure owing to the gravitation of the humours downwards, it will be much more beneficial to lie along than sit upright, tho' the leg be laid on a chair, since even in this posture they will descend with more force than if the body was reclined.

In ulcers of the legs accompanied with varices or dilatations of the veins, the method of treatment will depend upon the other circumstances of the sore; for the varix can only be assisted by the application of bandage, which must be continued a considerable time after the cure. The neatest bandage is the strait stocking, which is particularly serviceable in this case; though also, if the legs be œdematous, or if after the healing of the ulcers they swell when the patient quits his bed, it may be worn with safety and advantage. There are instances of one vein only being varicous; which when it happens, may be destroyed by tying it above and below the dilatation, as in an aneurism; but this operation should

should only be practised where the varix is large and painful.

Ulcers of many years standing are very difficult of cure; and in old people the cure is often dangerous, frequently exciting an asthma, a diarrhœa, or a fever, which destroys the patient unless the sore break out again: so that it is not altogether adviseable to attempt the absolute cure in such cases, but only the reduction of them into better order and less compass; which, if they be not malignant, is generally done with rest and proper care. The cure of those in young people may be undertaken with more safety; but we often find it necessary to raise a salivation to effect it, though when completed it does not always last: so that the prospect of cure in stubborn old ulcers, at any time of life, is but indifferent. In all these cases, however, it is proper to purge once or twice a-week with *calomel*, if the patient can bear it, and to make an issue when the sore is almost healed; in order to continue a discharge the constitution has been so long habituated to, and prevent its falling upon the cicatrix and bursting out again in that place.

When an ulcer or abscess has any sinuses or channels opening and discharging themselves into the sore, they are called si-

nuous ulcers. These sinufes, if they continue to drain a great while, grow hard in the surface of their cavity, and then are termed *fistulæ*, and the ulcer a *fistulous ulcer*; also if matter be discharged from any cavity, as those of the joints, the abdomen, &c. the opening is called a *sinuous ulcer* or a *fistula*.

The treatment of these ulcers depends on a variety of circumstances. If the matter of the sinus be thick, strict bandage and compress will sometimes bring the opposite sides of the sinus to a re-union. If the sinus grow turgid in any part, and the skin thinner, showing a disposition to break, the matter must be made to push more against that part, by plugging it up with a tent: and then a counter-opening must be made, which proves often sufficient for the whole abscess, if it be not afterwards too much tented, which locks up the matter and prevents the healing; or too little, which will have the same effect: for dressing quite superficially does sometimes prove as mischievous as tents, and for nearly the same reason; since suffering the external wound to contract into a narrow orifice, before the internal one be incarned, does almost as effectually lock up the matter as a tent. To preserve then a medium in these cases,

cases, a hollow tent of lead or silver may be kept in the orifice, which, at the same time that it keeps it open; gives vent to the matter. The abscesses where the counter-openings are made most frequently, are those of compound fractures, and of the breast; but the latter do oftener well without dilatation than the former, tho' it must be performed in both, if practicable, the whole length of the abscess. When after some trial the matter does not lessen in quantity, and the sides of it grow thinner, and if the sinuses be fistulous, there is no expectation of cure without dilatation. There are also a great many scrophulous abscesses of the neck, that sometimes communicate by sinuses running under large indurations, in which instances, counter-openings are adviseable, and generally answer without the necessity of dilating the whole length; and indeed there are few abscesses in this distemper, which should be opened beyond the thinness of the skin. When abscesses of the joints discharge themselves, there is no other method of treating the fistula but by keeping it open, with the cautions already laid down, till the cartilages of the extremities of the bones being corroded, the two bones shoot into one another, and form

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an anchylosis of the joint, which is the most usual cure of ulcers in that part.

Gun-shot wounds often become sinuous ulcers, and then are to be considered in the same light as those already described; tho' surgeons have been always inclined to conceive there is something more mysterious in these wounds than any others: but their terribleness is owing to the violent contusion and laceration of the parts, and often to the admission of extraneous bodies into them, as the bullet, splinters, cloaths, &c. and were any other force to do the same thing, the effect would be exactly the same as when done by fire-arms. The treatment of these wounds consists in removing the extraneous body as soon as possible; to which end the patient must be put into the same posture as when he received the wound. If it cannot be extracted by cutting upon it, which should always be practised when the situation of the blood-vessels, &c. does not forbid, it must be left to nature to work out, and the wound dressed superficially: for we must not expect, that if it be kept open with tents, the bullet, &c. will return that way; and there is hardly any case where tents are more pernicious than here, because of the violent tension and disposition to gangrene which presently ensue. To
guard

guard against mortification in this and all other violently contused wounds, it will be proper to bleed the patient immediately, and soon after give a clyster; the part should be dressed with soft digestives, and the compress and roller applied very loose, being first dipt in brandy or spirits of wine: the next time the wound is opened, if it be dangerous, the spirituous fomentation may be employed, and after that continued till the danger is over. If a mortification comes on, the applications for that disorder must be used: in gun-shot wounds, it seldom happens that there is any effusion of blood unless a large vessel be torn; but the bullet makes an eschar, which usually separates in a few days, and is followed with a plentiful discharge: but when the wound is come to this period, it is manageable by the rules already laid down.

When an ulcer with loose rotten flesh discharges more than the size of it should yield, and the discharge is oily and stinking, in all probability the bone is carious: which may easily be distinguished by running the probe through the flesh; and if so, it is called a *carious ulcer*. The cure of these ulcers depends principally upon the removal of the rotten part of the bone, without which it will be impossible to heal,

as we see sometimes even in little fores of the lower jaw, which, taking their rise from a rotten tooth, will not admit of cure till the tooth be drawn. Those caries which happen from the matter of abscesses lying too long upon the bone, are most likely to recover: those of the pox very often do well, because that distemper fixes ordinarily upon the middle and outside of the densest bones, which admit of exfoliation: but those produced by the evil, where the whole extremities or spongy parts of the bone are affected, are exceedingly dangerous, tho' all enlarged bones be not necessarily carious; and there are ulcers sometimes on the skin that covers them, which do not communicate with the bone, and consequently do well without exfoliation: nay, it sometimes happens, tho' the case be rare, that, in young subjects particularly, the bones will be carious to such a degree, as to admit a probe almost through the whole substance of them, and yet afterwards admit of a cure, without any notable exfoliation.

The method of treating an ulcer with a caries is by applying a caustic of the size of the scale of the bone that is to be exfoliated; and, after having laid it bare, to wait 'till such time as the carious part can, without violence, be separated, and then heal
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the wound. I caution against violence, because the little jagged bits of bone that would be left, if we attempted exfoliation before the piece were quite loose and disengaged from the sound bone, would form little ulcerations, and very much retard the cure. In order to quicken the exfoliation, there have been several applications devised; but that which has been most used in all ages, is the actual cautery, with which surgeons burn the naked bone every day, or every other day, to dry up, as they say, the moisture, and by that means procure the separation. But as this practice is never of great service, and always cruel and painful, it is now pretty much exploded. Indeed, from considering the appearance of a wound when a scale of bone is taken out of it, there is hardly any question to be made, but that burning retards rather than hastens the separation: for as every scale of a carious bone is flung off by new flesh generated between it and the sound bone, whatever would prevent the growth of these granulations would also in a degree prevent the exfoliation; which must certainly be the effect of a red-hot iron, applied so close to it: though the circumstances of carious bones and their disposition to separate are so different from one another, that it is hardly to be gathered

gathered from experience, whether they will sooner exfoliate with or without the assistance of fire: for sometimes, in both methods, an exfoliation is not procured in a twelve-month, and at other times it happens in three weeks or a month; nay, I have, upon cutting out the eschar made by the caustic; taken away at the same time a large exfoliation: however, if it be only uncertain whether the actual cautery be beneficial or not, the cruelty that attends the use of it should entirely banish it out of practice. It is often likewise, in these cases, employed to keep down the fungous lips that spread upon the bone; but it is much more painful than the escharotic medicines: tho' there will be no need of either, if a regular compress be kept on the dressings; or at worst, if a flat piece of the prepared sponge, of the size of the ulcer, be rolled on with a tight bandage, it will swell on every side, and dilate the ulcer without any pain.

Some caries of the bones are so very shallow, that they crumble insensibly away, and the wound fills up; but when the bone will neither exfoliate, nor admit of granulations, it will be proper to scrape it with a rugine, or perforate it in many points with a convenient instrument down to the quick. In the evil, the bones of the *carpus* and *tarsus* are

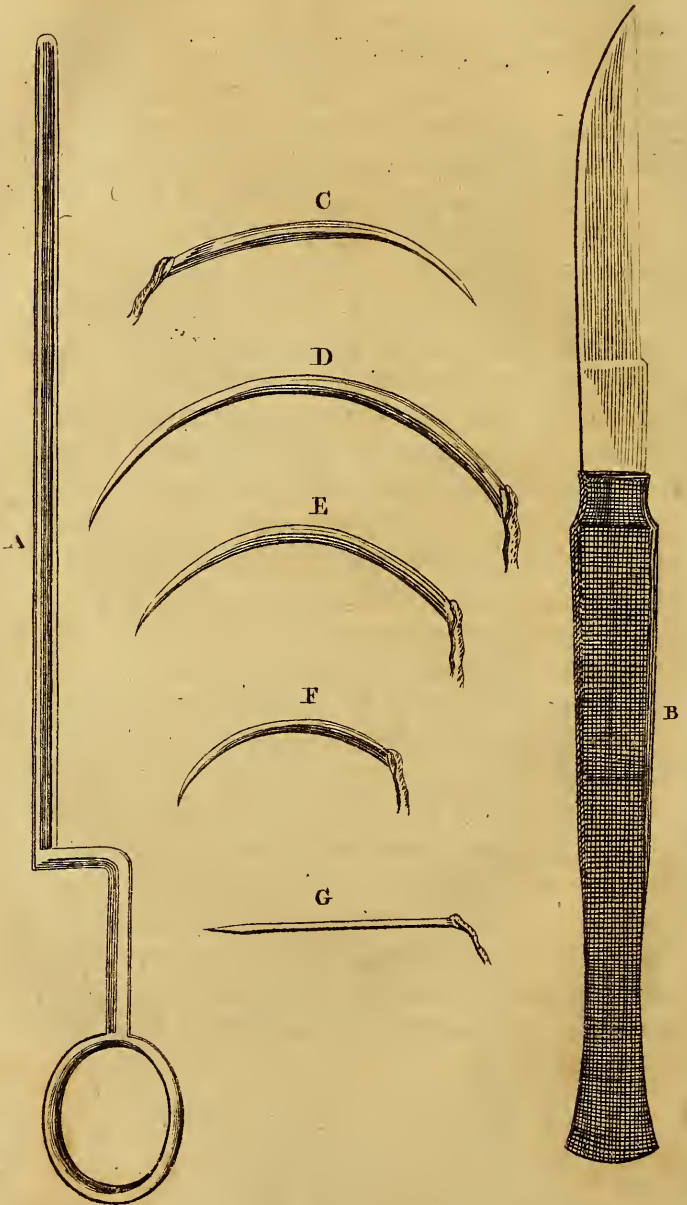
are often affected; but their sponginess is the reason that they are seldom cured. So that, when these, or indeed the extremities of any of the bones, are carious through their substance, it is adviseable to amputate: though there are instances in the evil, but more especially in critical abscesses, where, after long dressing down, the splinters, and sometimes the whole substance of the small bones, have worked away, and a healthy habit of body coming on, the ulcer has healed; but these are so rare, that no great dependence is to be laid on such an event. The dressings of carious bones, if they are stinking, may be dress'd in the tincture of myrrh; otherwise those of dry lint are easiest, and keep down the edges of the ulcer better than any other gentle applications.

Burns are generally esteemed a distinct kind of ulcers, and have been treated with a greater variety of applications than any other species of sore, every author having invented some new medicine to fetch out the fire, as they imagine. And indeed the conceit of a quantity of fire remaining in the part burnt, has occasioned the trial of very whimsical and painful remedies: tho' people who talk thus seriously of fire in wounds, do not think of any remaining in

a stick that is half burnt and ceases to burn any farther; notwithstanding the reasoning be the same in burns of the flesh, and burns of a piece of wood.

When burns are very superficial, not raising suddenly any vesication, spirits of wine are said to be the quickest relief; but whether they be more serviceable than embrocations with linseed-oil, I am not certain, though they are used very much by some persons whose trade subjects them often to this misfortune. If the burn excoriates, I think it is easiest to roll the part up gently with bandages dipt in sweet oil, or a mixture of *unguent. flor. sambuc.* with the oil: when the excoriations are very tender, dropping warm milk upon them every dressing is very comfortable; or if the patient can bear to have flannels wrung out of it, applied hot, it may be still better. If the burn have formed eschars, they may be dressed with *basilicon*, though generally oil alone is easier; and in these sores, whatever is the easiest medicine will be the best digestive. I have sometimes found it necessary to apply different ointments to burns, where the aspect has been nearly the same; and upon changing them, the patient has complained of great pain: so that we are obliged sometimes to determine what is proper,





proper, from trial. The most likely things to succeed at first, are, Oil, *Ungt. flor. samb.* *Ungt. basilicon*, and a Cerate of wax and oil, and afterwards the *Cerate de lapid. calam.* *Ungt. rub. desiccata.* *Ungt. sperm. cet.* the *Nutritum* with but little vinegar in it, or perhaps, when the *fungus* rises, dry lint. There is great care necessary to keep down the *fungus* of burns and heal the wound smooth: to which end, the edges should be dressed with lint dipt in *aqua vitriol.* and dried afterwards; or they may be touched with the vitriol-stone, and the dressings be repeated twice a-day. There is also greater danger of contractions from burns after the cure, than from other wounds; to obviate which, embrocations of neats-foot oil, and bandage with paste-boards to keep the part extended, are absolutely necessary, where they can be applied.

The EXPLANATION.

A. A director by which to guide the knife in the opening of abscesses that are burst of themselves, or first punctured with a lancet. This instrument should be made either of steel, silver, or iron; but so tempered, that it may be bent and accommodated to the direction of the cavity. It is usu-

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1 INTRODUCTION.

ally made quite straight; but that form prevents the operator from holding it firmly while he is cutting, upon which account I have given mine the shape here represented. The manner of using it is, by passing the thumb through the ring, and supporting it with the fore-finger, while the straight-edged knife is to slide along the groove with its edge upwards, towards the extremity of the abscess.

B. The straight-edged knife, proper for opening abscesses with the assistance of a director; but which, in few other respects, is preferable to the round-edged knife.

C. A crooked needle, with its convex and concave sides sharp: this is used only in the future of the tendon, and is made thin, that but few of the fibres of so slender a body as a tendon may be injured in the passing of it. This needle is large enough for stitching the *tendo Achillis*.

D. The largest crooked needle necessary for the tying of any vessels, and should be used with a ligature of the size of that I have threaded it with in taking up the spermatic vessels in castration, or the femoral and humoral arteries in amputation. This needle may also be used in sewing up deep wounds.

E. A crooked needle and ligature of the most useful size, being not much too little
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for the largest vessels, nor a great deal too big for the smallest; and therefore, in the taking up of the greatest number of vessels in an amputation, is the proper needle to be employed. This needle also is of a convenient size for sewing up most wounds.

F. A small crooked needle and ligature for taking up the lesser arteries, such as those of the scalp, and those of the skin that are wounded in opening abscesses.

Great care should be taken by the makers of these needles, to give them a due temper: for if they are too soft, the force sometimes exerted to carry them through the flesh, will bend them; if they are too brittle, they snap; both which accidents may happen to be terrible inconveniences, if the surgeon be not provided with a sufficient number of them. It is of great importance also to give them the form of part of a circle; which makes them pass much more readily round any vessel, than if they were made partly of a circle and partly of a straight line; and in taking up vessels at the bottom of a deep wound is absolutely necessary, it being impracticable to turn the needle with a straight handle, and bring it round the vessel when in that situation.

The convex surface of the needle is flat, and its two edges are sharp. Its concave side is composed of two surfaces, rising from

the edges of the needle, and meeting in a ridge or eminence, so that the needle has three sides. This eminence of the substance of the needle on its inside strengthens it very much; but it is not continued the whole length of the needle, which is flat towards the eye: some are made round in this part; but they cannot be held steady between the finger and thumb, and are therefore unfit for use. There have been needles made with the eminence on the convex side, and a flat surface on the concave side; but I do not see any particular advantage in that structure. The best materials for making ligatures are the flaxen thread that shoemakers use; which is sufficiently strong when four, six, or eight of the threads are twisted together and waxed, and is not so apt to cut the vessels as threads that are more finely spun; though the prevention of this accident will depend in a great measure on the dexterity of the operator, who is carefully to avoid the tying them with too great a force.

G. A straight needle, such as glovers use, with a three-edged point; useful in the uninterrupted suture, in the suture of tendons, where the crooked one C is not preferred, and in sewing up dead bodies, and is rather more handy for taking up the vessels of the scalp.

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O P E R A T I O N S O F S U R G E R Y .

C H A P . I .

Of S U T U R E S .

WHEN a wound is recent, and the parts of it are divided by a sharp instrument, without any farther violence, and in such a manner that they may be made to approach each other, by being returned with the hands, they will, if held in close contact for some time, reunite by inosculation, and cement like one branch of a tree ingrafted on another. To maintain them in this situation, several sorts of futures have been invented, and formerly practised, but the number of them has of late been very much reduced. Those now chiefly described are, the interrupted, the glover's, the quilled, the twisted, and the dry futures; but the interrupted and

twisted, are almost the only useful ones. For the quilled future is never preferable to the interrupted: the dry future is ridiculous in terms, since it is only a piece of plaster applied in many different ways to re-unite the lips of a wound: and the glover's, or uninterrupted stitch, which is advised in superficial wounds to prevent the deformity of a scar, does rather by the frequency of the stitches occasion it, and is therefore to be rejected in favour of a compress and sticking plaster; the only instance where I would recommend it, is in a wound of the intestine: the manner of making this future I shall describe in the chapter of *Gastroraphy*.

From the description I have given of the state of a wound proper to be sewed up, it may be readily conceived, that wounds are not fit subjects for future, when there is either a contusion, laceration, loss of substance, great inflamamation, difficulty of bringing the lips into apposition, or some extraneous body insinuated into them; tho' sometimes a lacerated wound may be assisted with one or two stitches. It has for merly been forbidden to sew up wounds of the head: but this precaution is very little regarded by the moderns; though the ill effects I have frequently seen from matter pent up under the scalp, and the great convenience there is of using bandage on the head, have

convinced me, that much less harm would be done if futures were used in this part with more caution.

If we stich up a wound that has none of these obstacles, we always employ the interrupted future, passing the needle two, three, or four times, in proportion to the length of it, though there can seldom be more than three stiches required.

The method of doing it is this: The wound being emptied of the grumous blood, and your assistant having brought the lips of it together that they may lie quite even; you carefully carry your needle from without, inwards to the bottom, and so on from within outwards; using the caution of making the puncture far enough from the edge of the wound, which will not only facilitate the passing the ligature, but will also prevent it from eating through the skin and flesh; this distance may be three or four tenths of an inch: as many more stiches as you shall make, will be only repetitions of the same process. The threads being all passed, you begin tying them in the middle of the wound; though if the lips are held carefully together all the while, as they should be, it will be of no great consequence which is done first. The most useful kind of knot in large wounds, is a single one first: over this, a little linen compress; on which is to

be made another single knot, and then a slip-knot, which may be loosened upon any inflammation: but in small wounds, there is no danger from the double knot alone, without any compress to tie it upon; and this is most generally practised. If a violent inflammation should succeed, loosening the ligature only will not suffice; it must be cut through and drawn away, and the wound be treated afterwards without any future. When the wound is small, the less it is disturbed by dressing, the better: but in large ones, there will sometimes be a considerable discharge; and if the threads be not cautiously carried through the bottom of it, abscesses will frequently ensue from the matter being pent up underneath, and not finding issue. If no accident happen, you must, after the lips are firmly agglutinated, take away the ligatures, and dress the orifices which they leave.

It must be remembered, that during the cure the future must be always assisted by the application of bandage if possible, which is frequently of the greatest importance; and that sort of bandage with two heads, and a slit in the middle, which is by much the best, will in most cases be found practicable.

The twisted future being principally employed in the *Hare-lip*, I shall reserve its description for the chapter on that head.

C H A P. II.

Of the SUTURE of TENDONS.

WOUNDS of the tendons are not only known to heal again, but even to admit of sewing up like those of the fleshy parts, tho' they do not re-unite altogether in so short a time. When a tendon is partly divided, it is generally attended with an excessive pain, inflammation, &c. in consequence of the remaining fibres being stretched and forced by the action of the muscle, which necessarily will contract more when some of its resistance is taken away. To obviate this mischief, it has been hitherto an indisputable maxim in Surgery, to cut the tendon quite through, and immediately afterwards perform the suture. But I do not think this practice adviseable; for though the division of the tendon afford present ease, yet the mere flexion of the joint will have the same effect, if, for example, it be a wound of a flexor tendon. Besides, in order to sew up the extremities of the tendon when divided, we are obliged to put the limb in such a situation that they may be brought into contact, and even to sustain it in that posture to the finishing of the cure. If, then, the posture will lay the tendon in this position, we can likewise keep it so without using the suture, and more
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sure of its not slipping away, which sometimes happens from any careless motion of the joint, when the stitches have almost worn through the lips of the wound; on which account, I would by all means advise, in this case, to forbear the future, and only to favour the situation of the extremities of the tendon by placing the limb properly.

If it should be suggested, that, for want of a farther separation, there will not be inflammation enough to produce an adhesion of the several parts of the wound, which is particularly mentioned as the property of this sort of cicatrix, though it be likewise of all others; I say that the inflammation will be in proportion to the wound, and a small wound is certainly more likely to recover than a large one. If it should be objected, that keeping the limb in one posture the whole time of the cure will bring on a contraction of the joint, the objection is as strong against the future. And now I am upon this subject, I would advise surgeons to be less apprehensive of contractions after inflammations of the tendons than practice shows they are: for perhaps there is hardly any one rule has done more mischief than that of guarding against this consequence; and I would lay it down as a method to be pursued at all times, to favour the joint in these disorders, and keep it in that posture we find most easy for the patient.

patient. The risk of an immoveable contraction in six weeks, is very little; but the endeavour to avoid it has been the loss of many a limb in half the time.

But when the tendon is quite separated, and the ends are withdrawn from one another, having brought them together with your fingers, you may sew them with a straight triangular pointed needle, passing it from without inwards, and from within outwards; in small tendons, about three tenths of an inch from their extremities; and in the *tendo Achillis*, half an inch. I have sometimes employed two threads in sewing up the *tendo Achillis*; and I believe it is generally adviseable to do so, rather than to trust to a single future.

Some surgeons, for fear the muscle should contract a little notwithstanding all our care, advise not to bring the ends of the tendon into an exact apposition, but to lay one a little over the other; which, allowing for the contraction that always ensues in some degree, the tendon will become a straight line, and not be shortened in its length. As the wound of the skin will be nearly transverse, I would not have it raised to expose more of the tendon, but rather sewed up with it, which will conduce to the strength of the future. The knot of the ligature is to be made as in other wounds, and the dressings are to be the same: there is a sort of thin crooked needle that cuts

on its concave and convex sides, which is very handy in the future of large tendons, and to be preferred to the straight one. During the cure, the dressings must be superficial, and the parts kept steady with pasteboard and bandage: the small tendons re-unite in three weeks; but the *tendo Achillis* requires six at least, and by violent exercise I have known it torn open at the end of ten weeks; though in the instance I allude to, I brought the lacerated tendons to a perfect re-union without a future.

C H A P. III.

Of the GASTRORAPHY.

THE account of this operation has engaged the attention of many surgical writers, and occasioned much debate about the proper rules for performing it; and yet what makes the greatest part of the description can hardly ever happen in practice, and the rest but very seldom. I have been told that *Du Verney*, who was the most eminent surgeon in the *French* army a great many years, during the wars and fashion of duelling, declared he never had once an opportunity of practising the gastroraphy, as that operation is generally described; for though the word, in strictness of etymology, signifies no more than sewing up

up any wound of the belly, yet in common acceptation it implies that the wound of the belly is complicated with another of the intestine. Now the symptoms laid down for distinguishing when the intestine is wounded, do not with any certainty determine it to be wounded only in one place; which want of information, makes it absurd to open the *abdomen* in order to come at it. If so, the operation of stitching the bowels can only take place where they fall out of the *abdomen*, and when we can see where the wound is, or how many wounds there are. If it happens that the intestines fall out unwounded, the business of the surgeon is to return them immediately, without waiting for spirituous or emollient fomentations: and in case they puff up so as to prevent their reduction by the same orifice, you may, with a knife or probe-scissars, sufficiently dilate it for that purpose, or even prick them to let out the wind; laying it down for a rule in this, and all operations where the *omentum* protrudes, to treat it in the method I shall describe in the chapter on the *Bubonocèle*.

Upon the supposition of the intestine being wounded in such a manner as to require the operation (for in small punctures it is not necessary), the method of doing it may be this: Taking a straight needle with a small thread, you lay hold of the bowel with your left hand, and sew up the wound by the glover's stitch; that

that is, by passing thro' the lips of the wound, from within outwards all the way, so as to leave a length of thread at both ends, which are to hang out of the incision of the *abdomen*: then carefully making the interrupted future of the external wound, you pull the bowel by the small threads into contact with the *peritonæum* in order to procure an adhesion, and tie them upon a small bolster of linen; tho' I think it would be more secure to pass the threads with the straight needle through the lower edges of the wound of the *abdomen*, which would more certainly hold the intestine in that situation. In about six days, it is said, the ligature of the intestine will be loose enough to be cut and drawn away, which must be done without great force; in the interim the wound is to be treated with superficial dressings, and the patient to be kept very still and low.

C H A P. IV.

Of the BUBONOCELE.

WHEN the intestine or *omentum* falls out of the *abdomen* into any part, the tumour in general is known by the name of *hernia*, which is farther specified either from the difference of situation or the nature of its contents. When the intestine or *omentum* falls through

through the navel, it is called a *hernia umbilicalis*, or *exomphalos*; when thro' the rings of the abdominal muscles into the groin, *hernia inguinalis*; or if into the *scrotum*, *scrotalis*: these two last, tho' the first only is properly so called, are known by the name of *bubonocoele*. When they fall under the *ligamentum Fallopii*, thro' the same passage that the *iliac* vessels creep into the thigh, it is called *hernia femoralis*. The *bubonocoele* is also sometimes accompanied with a descent of the bladder: however, the case is very rare; but when it occurs, it is known by the patient's inability to urine till the *hernia* of the bladder is reduced within the *pelvis*. With regard to the contents characterising the swelling, it is thus distinguished: if the intestine only is fallen, it becomes an *enterocoele*; if the *omentum* (*epiploon*), *epiplocele*; and if both, *entero-epiplocele*. There is, besides these, another kind of *hernia* mentioned and described by the moderns, when the intestine or *omentum* is insinuated between the interstices of the muscles in different parts of the belly. This *hernia* has derived its name from the place affected, and is called the *hernia ventralis*; and lastly, there have been a few instances, where the intestines or *omentum* have fallen through the great *foramen* of the *ischium* into the internal part of the thigh, between and under the two anterior heads of the *triceps* muscle.

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All the kinds of *hernias* of the intestines and *omentum* are owing to a preternatural dilatation of the particular orifices through which they pass, and not to a laceration of them; which last opinion (together with a supposed laceration of the *peritonæum*) has however prevailed so much, as, by way of eminence, to give name to the disorder which is known more by that of *rupture* than any of those I have mentioned; on which account I shall beg leave to make use of it myself.

The rupture of the groin, or *scrotum*, is the most common species of *hernia*, and in young children is very frequent; but it rarely happens in infancy that any mischiefs arise from it. For the most part, the intestine returns of itself into the cavity of the *abdomen* whenever the person lies down, at least a small degree of compression will make it. To secure the intestine when returned into its proper place, there are steel-trusses now so artfully made, that, by being accommodated exactly to the part, they perform the office of a bolster, without galling or even sitting uneasy on the patient. These instruments are of so great service, that, were people who are subject to ruptures always to wear them, I believe very few would die of this distemper; since it often appears, upon inquiry, when we perform the operation for the *bubonocèle*, that the
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necessity of the operation is owing to the neglect of wearing a truss.

In the application of a truss to these kinds of swellings a great deal of judgment is sometimes necessary; and for want of it, we daily see trusses put even on *buboes*, indurated testicles, *hydroceles*, &c. But for the *hernias* I have described, I shall endeavour to lay down two or three rules, in order to guide more positively to the propriety of applying or forbearing them.

If there is a rupture of the intestine only, it is easily, when returned into the *abdomen*, supported by an instrument: but if of the *omentum*, notwithstanding it may be returned, yet I have seldom found the reduction to be of much relief, unless there is only a small quantity of it; for the *omentum* will lie uneasy in a lump at the bottom of the belly, and, upon removal of the instrument, drop down again immediately; upon which account, seeing the little danger and pain there is in this kind of *hernia*, I never recommend any thing but a bag-truss, to suspend the *scrotum*, and prevent possibly by that means the increase of the tumour. The difference of these tumours will be distinguished by the feel; that of the *omentum* feeling flaccid and rumpled; the other more even, flatulent, and springy.

Sometimes in a rupture of both the intestine and *omentum*, the gut may be reduced; but

the *omentum* will still remain in the *scrotum*: and, when thus circumstanced, most surgeons advise a bag-truss only; upon a supposition that the pressure of a steel one, by stopping the circulation of the blood in the vessels of the *omentum*, would bring on a mortification. But I have learnt, from a multitude of those cases, that if the instrument be nicely fitted to the part, it will be a compress sufficient to sustain the bowel, and at the same time not hard enough to injure the *omentum*; so that, when a great quantity of intestine falls down, tho' it be complicated with the descent of the *omentum*, the rupture will conveniently and safely admit of this remedy.

There are some surgeons, who, to prevent the trouble of wearing a truss when the intestine is reduced, destroy the skin over the rings of the abdominal muscles with a caustic of the size of a half-crown piece, and keep their patients in bed till the cure of the wound is finished; proposing, by the stricture of the cicatrix, to support it in the *abdomen* for the future. But by what I have seen, the event, tho' often successful, is not answerable to the pain and confinement; for if, after this operation, the intestine should again fall down, which sometimes happens, there might possibly be more danger of a strangulation than before the scar was made. This practice seems to be more adviseable on women than on men; because,

in men, the danger of injuring the spermatic cord sometimes intimidates us from using a caustic of sufficient strength to do the proper office.

I have hitherto considered the rupture as moveable: but it happens frequently, that the intestine, after it has passed the rings of the muscles, is presently inflamed, which, enlarging the tumour, prevents the return of it into the *abdomen*, and, becoming every moment more and more strangled, it soon tends to a mortification, unless we dilate the passages thro' which it is fallen, with some instrument, to make room for its return; which dilatation is the operation for the *bubonocele*.

It rarely happens that patients submit to this incision before the gut is mortified, and it is too late to do service: not but that there are instances of people surviving small gangrenes, and even perfectly recovering afterwards. I myself have been an eye-witness of the cure of two patients, who, some time after the operation, when the eschar separated, discharged their fæces thro' the wound, and continued to do so for a few weeks in small quantities; when at length the intestine adhered to the external wound, and then was fairly healed.

In mortifications of the bowels when fallen out of the *abdomen* into the navel, it is not very uncommon for the whole gangrened in-

testine to separate from the sound one, so that the excrement must necessarily ever after be discharged at that orifice. There are likewise a few instances, where the rupture of the *scrotum* has mortified, and become the *anus*, the patient doing well in every other respect: nay, I have had one instance of this nature under my care, in which the excrements were voided totally by the *scrotum* for three weeks or a month; yet by degrees, as the wound healed, they passed off chiefly in their natural course, and at last almost wholly so. These cases, however, are only mentioned to furnish surgeons with the knowledge of the possibility of such events; and not to mislead them so far as to make favourable inferences with regard to gangrenes of the bowels, which generally are mortal.

Before the performance of the operation for the *bubonocèle*, which is only to be done in the extremity of danger, the milder methods are to be tried. These are such as will conduce to soothe the inflammation: for as to the other intent of softening the excrements, I believe it is much to be questioned whether there can be any of that degree of hardness as to form the obstruction; and, in fact, those operators who have unluckily wounded the intestine, have proved, by the thin discharge of fæces which has followed upon the incision, that the induration we feel is the tension of the

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the parts, and not the hardened lumps of excrement.

Perhaps, except the pleurisy, no disorder is more immediately relieved by plentiful bleeding than this. Clysters repeated, one after another, three or four times, if the first or second are either retained too long, or immediately returned, prove very efficacious: these are serviceable, not only as they empty the great intestines of their excrements and flatulencies, which last are very dangerous; but they likewise prove a comfortable fomentation, by passing through the colon all round the *abdomen*. The *scrotum* and groin must, during the stay of the clyster, be bathed with warm stoups wrung out of a fomentation; and, after the part has been well fomented, you must attempt to reduce the rupture. For this purpose, let your patient be laid on his back, so that his buttocks may be considerably above his head; the bowels will then retire towards the diaphragm, and give way to those which are to be pushed in. If, after endeavouring two or three minutes, you do not find success, you may still repeat the trial: I have sometimes at the end of a quarter of an hour returned such as I thought desperate, and which did not seem to give way in the least till the moment they went up. However, this must be practised with caution, for too much rough handling will be pernicious.

If, notwithstanding these means, the patient continues in very great torture, tho' not so bad as to threaten an immediate mortification, we must apply some sort of poultice to the *scrotum*: that which I use in this case, is, equal parts of oil and vinegar made into a proper consistence with oatmeal. After some few hours, the fomentation is to be repeated, and the other directions put in practice; and if these do not succeed, I am inclined to think it adviseable to prick the intestine in five or six places with a needle, as recommended by *Peter Lowe*, an old *English* writer, who says, he has often experienced the good effects of this method in the inguinal *hernia*, when all other means have failed.

After all, should the pain and tenseness of the part continue, and hiccoughs and vomitings of the excrement succeed, the operation must take place; for if you wait till a languid pulse, cold sweats, subsiding of the tumour, and emphysematous feel, come on, it will be most likely too late, as they are pretty sure symptoms of a mortification.

To conceive rightly of the occurrences in this operation, it must be remembered, that in every species of rupture, a portion of the *peritonæum* generally falls down with whatever makes the *hernia*; which, from the circumstance of containing immediately the contents of the tumour, is called the *sac* of the *hernia*.

Now

Now the portion of the *peritonæum*, which usually yields to the impulsion of the descending *viscera*, is that which corresponds with the inmost opening of the abdominal muscles, just where the *membrana cellularis peritonæi* begins to form the *tunica vaginalis* of the spermatic cord; so that the *sac* with the *viscera* insinuate themselves into the *tunica vaginalis* of the spermatic cord, and lie upon the *tunica vaginalis* of the testicle. Nevertheless, upon examination, I have also frequently found the contents of the *hernia* in contact with the testicle itself, that is to say, within the *tunica vaginalis* of the testicle; which I confess has surprised me, as one would imagine that it could not have been affected, but by bursting through the *peritonæum*. But a late discovery has offered an easy solution of this appearance; which is now established as a fact, though esteemed a few years since as incredible. It appears by this discovery, that for some months during gestation the *testes* of the *fætus* remain in the *abdomen*, and when they descend into the *tunica vaginalis* there is an immediate communication betwixt the cavity of the *abdomen* and the cavity of the *tunica vaginalis*, which in process of time becomes obliterated by the coalition of the *tunic* with the cord; but if it happen, before the coalition be effected, that the intestine or the *omentum* fall into the *scrotum*, they will necessarily remain in

contact with the *testis*: and in this manner, what we esteemed so extraordinary a phenomenon is readily accounted for.

From this description of the descent of the *viscera*, it is evident, that the *herniary sac* is contained within the *tunica vaginalis*, and ought to give the idea of one bag inclosing another. But in the operation, this distinction of coats does not always appear; for the *herniary sac* sometimes adheres so firmly to the *tunica vaginalis*, that together they make but one thick coat. This adhesion may possibly result from the present inflammation of the parts, which has rendered the operation necessary: but I am inclined to believe, that the *herniary sac* adheres in all *bubonocetes* which are not very recent; and that when we restore the *hernia* into the *abdomen*, and support it by a truss, it is only the *viscera*, and not the *herniary sac* which is reduced; at least I have found this to be the case in several that I have dissected.

The best way of laying your patient will be on a table about three feet four inches high, letting his legs hang down; then, properly securing him, you begin your incision above the rings of the muscles, beyond the extremity of the tumour, and bring it down about half the length of the *scrotum*, through the *membrana adiposa*, which will require very little trouble to separate from the *tunica vaginalis*,
and

and consequently will expose the rupture for the further processes of the operation. But I cannot help once more recommending it as a thing of great consequence, to begin the external incision high enough above the rings, since there is no danger in that part of the wound; and for want of the room this incision allows, the most expert operators are sometimes tedious in making the dilatation. If a large vessel is opened by the incision, it must be taken up before you proceed farther.

When the *tunica vaginalis* is laid bare, you must cut carefully through it and the *peritonæum*, in order to avoid pricking the intestines: though, to say the truth, there is not quite so much danger of this accident as is represented; for sometimes the quantity of water separated in the *sac* of the *peritonæum*, raises it from the intestine, and prevents any such mischief.

It has been considered by some as an improvement in the operation, where the disorder is recent, to forbear wounding the *peritonæum*, and to return the *sac* entire into the *abdomen*; thinking, by this means, to make a firmer cicatrix, and more surely to prevent a relapse for the future. But, besides that it is often impracticable by reason of its adhesion, the seeming necessity there is of letting out the waters that are frequently fetid, of taking away any part of the *omentum* that may possibly

possibly be mortified, and which we cannot come at without the incision, and lastly of leaving an opening for the issue of the excrements out of the wound, in case an eschar should drop from the intestine, (all which accidents happen sometimes very early), put out of dispute, in my opinion, the impropriety of this method.

The *peritonæum* being cut through, we arrive to its contents, the nature of which will determine the next process. For if it is intestine only, it must directly be reduced. But if there is any mortified *omentum*, it must be cut off; in order to which it is advised to make a ligature above the part wounded, to prevent an hæmorrhage; but it is quite needless, and in some measure pernicious, as it puckers up the intestine, and disorders its situation, if made close to it. For my part, I am very jealous that wounds of the *omentum* are dangerous; on which account I cannot pass over this process of the operation, without cautioning against cutting any of it away, unless it is certainly gangrened: and when that happens, I think it adviseable to cut off the mortified part with a pair of scissars, near to the sound part, leaving a small portion of it to separate in the *abdomen*; which may be done with as much safety, as to leave the same quantity below a ligature.

When the *omentum* is removed, we next dilate
the

the wound; to do which with safety, an infinite number of instruments have been invented: but, in my opinion, there is none we can use in this case with so good management as a knife; and I have found my finger in the operation a much better defence against pricking the bowels, than a director which I intended to employ. The knife must be a little crooked, and blunt at its extremity, like the end of a probe. Some surgeons perhaps may not be steady enough to cut dexterously with a knife, and may therefore perform the incision with probe-scissars, carefully introducing one blade between the intestine and circumference of the rings, and dilating upwards and a little obliquely outwards. When the finger and knife only are employed, the manner of doing the operation will be by pressing the gut down with the fore-finger, and carrying the knife between it and the muscles, so as to dilate upwards about an inch, which will be a wound generally large enough: but if upon examination it shall appear that the intestine is strangulated within the *abdomen*, which may possibly happen from a contraction of the *peritonæum* near the entrance into the *sac*, in that case the incision must be continued through the length of the contracted channel, or the consequence will be fatal, notwithstanding the intestine be restored into the *scrotum*. On this account, the operator should pass
his

his finger on the *sac* into the *abdomen*, after the reduction of the gut, in order to discover whether it be safely returned into its proper place.

The opening being made, the intestine is gradually to be pushed into the *abdomen*, and the wound to be stitched up. For this purpose, some advise the quilled, and others the interrupted suture, to be passed through the skin and muscles: but as there is not so much danger of the bowels falling out when a dressing and bandage are applied, and the patient all the while kept upon his back, but that it may be prevented by one or two slight stitches through the skin only, I think it by all means adviseable to follow this method, since the stricture of a ligature in these tendinous parts may be dangerous.

Hitherto, in the description of the *bubonocoele*, I have supposed the contents to be loose, or separate in the *sac*: but it happens sometimes in an operation, that we find not only an adhesion of the outside of the *peritoneum* to the *tunica vaginalis* and spermatic vessels, but likewise of some part of the intestines to its internal surface; and in this case there is so much confusion, that the operator is often obliged to extirpate the testicle, in order to dissect away and disentangle the gut; though if it can be done without castration, it ought. I believe, however, this accident happens rarely,

rarely, except in those ruptures that have been a long time in the *scrotum* without returning; in which case the difficulty and hazard of the operation are so great, that, unless urged by the symptoms of an inflamed intestine, I would not have it undertaken. I have known two instances of persons so uneasy under the circumstance of such a load in their *scrotum*, though not otherwise in pain, as to desire the operation; but the event in both proved fatal: which, I think, should make us cautious how we expose a life for the sake of a convenience only, and teach our patients to content themselves with a bag-truss when in this condition.

The dressing of the wound first of all may be with dry lint, and afterwards as directed in the introduction.

The operation of the *bubonocoele* in women so nearly resembles that performed on men, that it requires no particular description, only in them the rupture is formed by the intestine or *omentum* falling down through the passage of the *ligamentum rotundum* into the groin or one of the *labia pudendi*; where causing the same symptoms as when obstructed in the *scrotum*, it is to be returned by the dilatation of that passage.

CHAP. V.

Of the EPIPLOCELE.

There have been a few instances where so great a quantity of the *omentum* has fallen into the *scrotum*, that by drawing the stomach and bowels downwards, it has excited vomitings, inflammation, and the same train of symptoms as happen in a *bubonocèle*; in which case, the operation of opening the *scrotum* is necessary. The incision must be made in the manner of that for the rupture of the intestine, and the same rules observed with regard to the *omentum* that are laid down in the last chapter. It is necessary also the rings of the muscles should be dilated; or otherwise, though you have taken away some of the mortified part of the *omentum*, the rest that is out of its place, and strangled in the perforation, will gangrene also. The wound is to be treated in the same manner as that after the operation of the *bubonocèle*. What I have here described as an inducement to the operation, should, by the experience I have had, be the only one. There are a great many people who are so uneasy with ruptures, tho' they are not painful, that a little encouragement from surgeons of character will make them submit to any means of cure; but as I
have

have seen two or three patients, who were in every respect hale and strong, die a few days after the operation, the event, though very surprizing, should be a lesson, never to recommend this method of treating an *epiplocele*, unless it is attended with inflammation, &c.

C H A P. VI.

Of the HERNIA FEMORALIS.

THIS species of rupture is the same in both sexes, and formed by the falling of the *omentum*, or intestine, or both of them, into the inside of the thigh, thro' the arch made by the *os pubis* and *ligamentum Fallopii* where the iliac vessels and tendons of the *psosas* and *iliacus internus* muscles pass from the *abdomen*. It is very necessary surgeons should be aware of the frequency of this disorder, which creates the same symptoms as other ruptures, and must first of all be treated by the same methods. The manner of operating in the reduction is here, too, exactly the same, with the difference of dilating the ligament instead of the rings of the muscles; so that it would be a mere repetition of the operation for the *bubonocèle* to give any description of it: only it may be observed, that the spermatic cord, as it enters into the *abdomen*, lies nearly transverse

verse to the incision, and close in contact with the ligament; so that, unless you make the dilatation obliquely outwards, instead of perpendicularly upwards, you will probably divide those vessels.

C H A P. VII.

Of the EXOMPHALOS.

THIS rupture is owing to a protrusion of the intestine, or *omentum*, or both of them, at the navel, and rarely happens to be the subject of an operation. For though the case is common, yet most of them are gradually formed from very small beginnings: and if they do not return into the *abdomen* upon lying down, in all probability they adhere, without any great inconvenience to the patient, till some time or other an inflammation falls upon the intestines, which soon brings on a mortification, and death; unless, by great chance, the mortified part separates from the sound one, leaving its extremity to perform the office of an *anus*. In this emergency, however, I think it adviseable to attempt the reduction, if called in at the beginning; tho' the universal adhesion of the *sac* and its contents is a great obstacle to the success. The instance in which it is most likely to answer, is, when the rupture is owing to any strain

or sudden jerk, and is attended with those disorders which follow upon the strangulation of a gut.

In this case, having tried all other means in vain, the operation is absolutely necessary; which may be thus performed: Make the incision somewhat above the tumour, on the left side of the navel, through the *membrana adiposa*; and then emptying the *sac* of its water, or mortified *omentum*, dilate the ring with the same crooked knife, conducted on your finger, as in the operation for the *bubonocoele*; after this return the intestines and *omentum* into the *abdomen*, and dress the wound without making any ligature but of the skin only.

C H A P. VIII.

Of the HERNIA VENTRALIS.

THE *hernia ventralis* which sometimes appears between the *recti* muscles is very large; but that tumour which requires the operation is seldom bigger than a walnut, and is a disease not so common as to have been observed by many; but there are cases enough known, to put a surgeon upon inquiry after it, when the patient is suddenly taken with all the symptoms of a rupture, without any appearance of one in the navel, scrotum,

or thigh. I have before defined this *hernia* to be a strangulation of the gut in some of the interstices of the muscles of the *abdomen*: the manner of dilating it will be the same as that above directed in the other *hernias*. After the operation in this and all *hernias* where the intestines have been reduced, it will be convenient to wear a truss, since the cicatrix is not always firm enough in any of them to prevent a relapse.

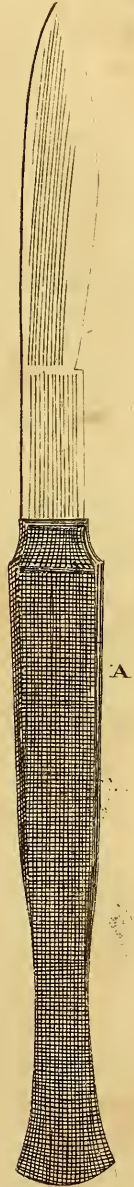
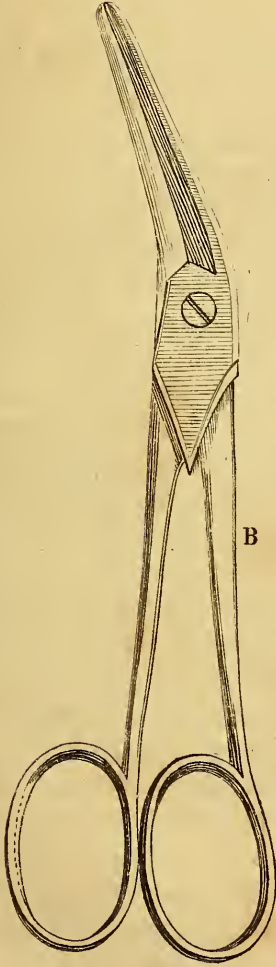
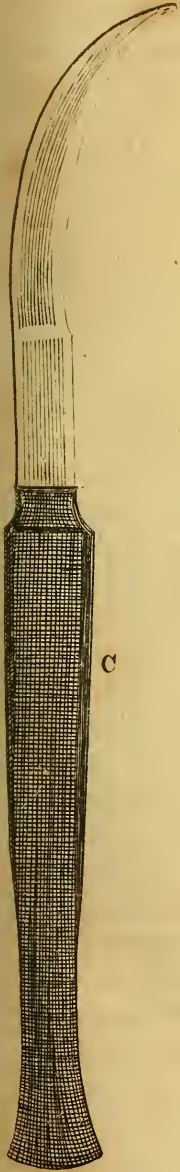
PLATE II.

The EXPLANATION.

A. The round-edged knife of a convenient size for almost all operations where a knife is used: the make of it will be better understood by the figure than any other description; only it may be remarked, that the handle is made of a light wood, as indeed the handles of all instruments should be, that the resistance to the blades may be better felt by the surgeon.

B. A pair of probe-scissars, which require nothing very particular in their form but that the lower blade should be made as small as possible, so that it is strong and has a good edge; because being chiefly used in fistulas *in ano*, the introduction of a thick blade into the sinus, which is generally narrow, would be very painful to the patient.

C. The



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C. The crooked knife with the point blunted, used in the operation of the *bubonocoele*.

C H A P. IX.

Of the HYDROCELE.

THE *hydrocele*, called also *hernia aquosa*, *hydrops scroti*, and *hydrops testis*, is a watery tumour of the *scrotum*: which, notwithstanding the multiplicity of distinctions used by writers, is but of two kinds; the one when the water is contained in the *tunica vaginalis*, and the other when in the *membrana cellularis scroti*. This last is almost always complicated with an *anasarca*; which species of dropsy is an extravasation of water lodged in the cells of the *membrana adiposa*, and when thus circumstanced will not be difficult to be distinguished: besides that it is sufficiently characterised by the shining and softness of the skin, which gives way to the least impression, and remains pitted for some time, the *penis* is likewise sometimes enormously enlarged, by the insinuation of the fluids into the *membrana cellularis*; all which symptoms are absolutely wanting in the dropsy of the *tunica vaginalis*.

In the dropsy of the *membrana cellularis scroti*, the puncture with the trocar is recommended by some; and little orifices made

here and there with the point of a lancet, by others; or a small skane of silk passed by a needle through the skin, and out again at the distance of two or three inches, to be kept in the manner of a seton till the waters are quite drained: but the two first methods avail very little, as they open but few cells; and the last cannot be so efficacious in that respect as incisions, and will be much more apt to become troublesome, and even to gangrene.

Indeed it is not often proper to perform any operation at all upon this part, since the *membrana cellularis scroti*, being a continuation of the *membrana adiposa*, scarifications made through the skin in the small of the legs, will effectually empty the *scrotum*, as I have many times experienced; and this place ought rather to be pitched upon than the other, as being more likely to answer the purpose, by reason of its dependency. However it sometimes happens that the waters fall in so great quantities into the *scrotum*, as, by distending it, to occasion great pain, and threaten a mortification: the prepuce of the *penis* also becomes very often excessively dilated, and so twisted that the patient cannot void his urine. In these two instances, I would propose an incision of three inches long to be made on each side of the *scrotum*, quite through the skin into the cells containing the water, and two or three

three, of half an inch long, in any part of the *penis*, with a lancet or knife; all which may be done with great safety, and sometimes with the success of carrying off the disease of the whole body. This I can positively say, that though I have done it upon persons in a very languid condition, yet, by making the wound with a sharp instrument, and treating it afterwards with fomentations and soft digestives, I have rarely seen any instance of a gangrene, which is generally so much apprehended in this case.

The dropfy of the *tunica vaginalis*, is owing to a preternatural discharge of that water which is continually separating in a small quantity on the internal surface of the tunica for the moistening or lubricating the testicle, and which, collecting too fast, accumulates, and forms in time a swelling of great magnitude. This is what I take to be the other species of *hydrocele*, and the only one besides: though from the time of *Celsus*, down to our own days, the writers on this subject make two kinds; one on the inside of the *tunica vaginalis*, and another between the *scrotum* and outside of it. And among the causes assigned for this distemper, the principal one is the derivation of water from the *ascites*; which opinion though universally received, is absurd in anatomy: For besides that people afflicted with a *hydrocele* are very sel-

dom otherwise dropfical, and on the contrary those with an ascite have no *hydrocele*, the *tunica vaginalis* is like a purse totally shut up on the outside of the *abdomen*, so that no water from any part can insinuate into it. And with respect to the notion of water falling from the *abdomen* into the *tunica vaginalis* and *scrotum*, it is equally impossible. For though, in the *hernia intestinalis*, the gut falls into this part, yet in that case the *peritonæum* (which would hinder the egress of the water) falls down too, which the ancients did not know, and the moderns have omitted to reflect on in relation to this subject. It is true, that where the *ascites* is complicated with a *hernia intestinalis*; or where there has been a previous *hernia* of the *scrotum*, and the *sac* of the *peritonæum* remains within the *scrotum*; the water of the *ascites*, in that case, may fall into the *sac* of the *peritonæum*, and in that manner form a tumour of the *scrotum*: but this is not properly a dropfy of the *tunica vaginalis*. It must be here understood, that when I say there is no communication between the cavity of the *abdomen*, and the cavity of the *tunica vaginalis*, I speak of adults: For in the *fœtus*, and even in an infant state, there is a communication; and in those few instances where the communication is preserved to adulthood, the water of an *ascites* may fall into the *tunica vaginalis*; but this happens so rarely, that it should

should not be considered as an impeachment of the preceding doctrine.

The *hydrocele* of the *unica vaginalis* is very easily to be distinguished from the *hydrocele* of the *membrana cellularis*, by the preceding description of that species of dropsy: I shall now explain how it differs from the other tumours of the *scrotum*, viz. the *bubonocoele*, *epiplocele*, and enlarged testicle. In the first place, it is seldom or never attended with pain in the beginning, and is very rarely to be imputed to any accident, as the *hernias* of the *omentum* and intestine are: for the time it first makes its appearance, it very seldom is known to disappear or diminish, but generally continues to increase, though in some much faster than in others; in one person, growing to a very painful distension in a few months; whilst, in another, it shall not be troublesome in many years; nay, shall cease to swell at a certain period, and ever after continue in that state without any notable disadvantage; tho' this last case very rarely happens. In proportion as it enlarges it becomes more tense, and then is said to be transparent. Indeed the transparency is made the chief criterion of the distemper; it being constantly advised to hold a candle on one side of the *scrotum*, which it is said will shine through to the other if there be water. But this experiment does not always answer, be-

caufe sometimes the *tunica vaginalis* is very much thickened, and sometimes the water itself is not transparaent: so that to judge positively if there be a fluid, we must be guided by feeling a fluctuation; and tho' we do not perhaps evidently perceive it, yet we may be persuaded there is a fluid of some kind, if we are once assured that the distension of the *tunica vaginalis* makes the tumour, which is to be distinguished in the following manner.

If the intestine, or *omentum*, form the swelling, they will be soft and pliable (unless inflamed), uneven in their surface, particularly the *omentum*, and both of them extend themselves up from the *scrotum* quite into the very *abdomen*; whereas, in the *hydrocele*, the tumour is tense and smooth, and ceases before or at its arrival to the rings of the abdominal muscles; because the upper extremity of the *tunica vaginalis* terminates at some distance from the surface of the belly.

When the testicle is increased in its size, the tumour is rounder; and if not attended with an enlargement of the spermatic vessels, the cord may be easily distinguished between the swelling and *abdomen*: but without this rule of distinction, either the pain, or the very great hardness, will discover it to be a disease of the testicle.

As to the cure of this distemper by external

nal applications, or internal means: After having tried upon a great variety of subjects most of the medicines invented to that end, I have found but very little satisfaction in the event: for if by chance any one has mended under a physical regimen, it must be confessed too, that there are some instances of people recovering, who have so absolutely neglected themselves as not even to wear a bag-truss; on which account, I should judge it adviseable to wait with patience till the tumour becomes troublesome, and then to tap it with a lancet or trocar. In opening with a lancet, it may possibly happen, the orifice of the skin shall slip away from that of the tunic, and prevent the egress of the water: to obviate which inconvenience, you may introduce a probe, and by that means secure the exact situation of the wound; but if the coats are much thickened, it will be adviseable to use the trocar, rather than the lancet. It is spoken of as an easy thing, to hold the testicle with the left hand, while we make the puncture with the right; but when the *tunica vaginalis* is very tense, it cannot well be distinguished. However, I think there is no danger of wounding it if you make the puncture in the inferior part of the *scrotum*. During the evacuation, the *scrotum* must be regularly pressed; and after the operation, a
little

little piece of dry lint and sticking-plaster are sufficient.

This method of tapping is called *the palliative cure*; not but that it does now and then prove an absolute one. To prevent the relapse of this disease, surgeons prescribe the making a large wound, either by incision or caustic, that, upon healing it afterwards, the firmness and contraction of the cicatrix may bind up the relaxed lymphatic vessels, and obstruct the farther preternatural effusion of their contents: But by what I have seen of this practice, it is generally attended with so much trouble, that notwithstanding its success in the end, I believe whoever reads the following cases will be apt to discard the method, and abide rather by the palliative cure.

C A S E I.

A. B. aged 44, a strong man, never in his life having been subject to any other infirmity, put himself under my care for the relief of a *hydrocele* on the left side of the *scrotum*.

December 3, 1733. I discharged the water, by making an incision thro' the teguments about four inches long. Towards night he grew feverish, got no rest; the *scrotum* and testicle on that side beginning to inflame, and the capillary arteries (dilating) to bleed freely. He was seized too with a violent pain
in

in his back; which was in a great measure removed by the suspending the *scrotum* with a bag-truss.

From the 3d to the 7th, continued in a most dangerous condition; when the fever tended to a crisis, by the suppuration of both wound and testicle.

From the 7th to the 24th, he daily acquired strength; but the discharge from the testicle increasing, and the sinus now penetrating very deep towards the *septum scroti*, I opened the body of the testicle the whole length of the abscess.

From the 24th, the discharge lessened surprisingly: so that in six days, the surface of the greatest part of the testicle united with the *scrotum*; and there remained only a superficial wound, which was entirely cicatrised on Jan. 10. 1733-4.

March 31. 1737, he continued in perfect health.

C A S E II.

In the year 1733, I made an incision thro' the *scrotum* and *tunica vaginalis* of a boy about eight years of age, who narrowly escaped with his life: but the symptomatic fever terminating at last in an abscess of the *scrotum*, it proved his cure, tho' with some trouble, in a few weeks.

C A S E

C A S E III.

A. C. aged 37, of a very hale habit of body, had complained of a tumour on one side of the *scrotum*; which continuing to enlarge for six years, he applied to a surgeon, who laid a small caustic on the upper part of it, and, opening the eschar, emptied near three pints of water; but he relapsing soon after this, I undertook the absolute cure.

December 15th 1736, I laid on the anterior and upper part of the *scrotum* a caustic about six inches long and one broad.

December 16th, by a small puncture thro' the eschar, I emptied above a quart of water.

From the 17th to the 24th, he continued in a great deal of pain, not only in the part, but in his back and loins, and had very little rest; the *scrotum* on that side became exceedingly inflamed and thickened, the symptomatic fever running very high, without any signs of the digestion of the wound.

On the 24th at night he grew a little easier, and continued so till the 29th, when the slough separated; but the wound retained still a bad aspect, no granulations appearing on its surface.

From *December 29*, to *Jan. 5*. he remained in the same state.

From the 5th to the 13th, the swelling and pain rather increased; and that night he was seized

feized with an ague-fit, which returned every other day twice more.

From the 17th to the 26th, the ague being stopt, he began to alter much for the better, two imposthumations on the *scrotum* being in this interim opened.

By *Feb. 2.* the pain was quite gone, the tumour very much sunk, and the induration softened.

In a very few days after, the wound cicatrised; and on *Feb. 24.* I left him in perfect health, and free from any complaint.

Having in the preceding cases been seemingly threatened with the death of the patients; I tried the following experiment, upon the reputation of its having been done with success by others.

C A S E IV.

A. D. aged forty-two, had for near four years been troubled with a *hydrocele* on one side, for which had tapped him about twelve times, taking away near a pint of clear water each operation.

Jan. 3. 1736-7, after having emptied the *tunica vaginalis*, I injected an ounce of spirit of wine. In the instant, he complained of great pain, which continued to increase, and the next day the teguments were very much augmented in their bulk and thickness.

Jan. 7th, the tension became violently painful;

painful; and perceiving a fluctuation, I made a puncture, by which he voided about half a pint of water very deeply tinged with blood, but without any flavour of the spirits to be distinguished by the smell. This gave him some ease: but the inflammation and thickness continued a whole month, and then terminated in two abscesses on the fore-part of the *scrotum*, which I opened the 7th of *February* following; and on their discharge, the whole tumour subsided, leaving a firm cicatrix and absolute cure of that disorder.

Something similar to the circumstance of *A. D.*'s bloody water, is the case of another person who was under my care. He had at considerable intervals of time been often tapped, discharging that sort of serous water the *tunica vaginalis* for the most part yields: at last, it became tinged with blood, and every time grew more bloody than the other. The fourth discharge of this kind was attended with a remarkable hæmorrhage, and terminated in an absolute cure; no signs of a relapse appearing some months after, as I had an opportunity to inform myself:

To the cases above recited, I could add still more that have fallen within my knowledge, since the time I made these observations: particularly two, attended with inflammation and abscess, from the mere puncture of the lancet; both of which terminated in an absolute

folute cure. It may be remarked however of these two, that one was attended with a thickened tunic, and the water bloody; and in the other, the coat was thickened, and the *epididymis* enlarged and indurated from a former gonorrhœa.

I would not, however, be understood, from this catalogue of misfortunes, that the operation is never performed without much trouble: some examples I have known in its favour; but by no means enough to warrant the recommendation of it, unless to such patients who are inconsolable under the distemper, and are willing to sustain any thing for a cure.

It is worth observing, that, upon examination of the several *hydroceles*, it appeared evidently their cure was wrought by an universal adhesion of the testicle to the *tunica vaginalis*, and again of that coat to the parts enveloping it; from which observation it will not be difficult to conceive how it happens that discharges of bloody water work a cure, since inflammations of membranes almost perpetually produce adhesions of the neighbouring parts, and these discharges are no other than a mixture of blood with the water from the ruptured vessels of the inflamed tunic.

It has been suggested, that probably the exposing the *tunica vaginalis* to the air might occasion

occasion the above mentioned disorders. But besides that the case of the injected *sp. vin.* the case of the caustic, and the two punctures, are sufficient answers to that opinion, the instances I have seen of the whole *scrotum* separating in a gangrene from the *tunica vaginalis*, and leaving it naked a great many days without any ill effect, put it out of dispute, that it is the mere inflammation of the tunic produces the danger. I have castrated several men, whose scirrhus testicles were accompanied with a *hydrocele*; but the whole *tunica vaginalis* being carried off by the operation, they all recovered without any bad symptoms. I have here proposed an incision only thro' the *tunica vaginalis* as the means to effect a radical cure; but it has been said, that to cut off a large portion of it, is a more effectual and a less dangerous operation. This fact I have lately taken under consideration; but have not yet had sufficient experience to form a positive opinion on the subject.

I shall finish this chapter with a farther remark on the supposed variety of *hydroceles*. Besides the imaginary one already specified between the *scrotum* and inferior membranes; there is mention made of a species of dropsy between the *cremaster muscle* and *tunica vaginalis*: but I judge it more likely to be within side the *tunica vaginalis* of the cord, which adhering in different places to the spermatic vessels,

vessels, may form a cyst or two between the adhesions, of which an instance has fallen under my own examination. Indeed, if we reflect on the cause of a dropfy of this part, we must necessarily confine it to the inside of the membrane, where only is that order of vessels which are the subject of the disease. The dropfy of the *testis* itself, is the last supposed species: but it is what I have never seen; and from the analogy of the *testis* to the structure of other glands that are not pretended to become dropfical, I am suspicious there is no such distemper.

C H A P. X.

Of C A S T R A T I O N.

THIS is one of the most melancholy operations in the practice of Surgery, since it seldom takes place but in disorders into which the patient is very apt to relapse, *viz.* those of a scirrhus, or cancer: for under most of the symptoms described as rendering it necessary, it is absolutely improper; such as a *hydrocele*, abscess of the *testis*, an increasing mortification, or what is sometimes understood by a *sarcocele*; of which last it may not be amiss to say a word. In the utmost latitude of the meaning of this term, it is received as a fleshy swelling of the testicle itself,

called likewise *hernia carnosæ*; or in some enlargements, such as in a clap, more frequently *hernia humoralis*; but, generally speaking, is considered as a fleshy excrescence formed on the body of the *testis*, which, becoming exceedingly hard and tumefied, for the most is supposed to demand extirpation, either by cutting or burning away the induration, or amputating the testicle: but this maxim, too precipitately received, has, I apprehend, very much misguided the practitioners of Surgery.

In order to conceive better of the distinction I am going to make, it must be remembered, that what is called the testicle, is really composed of two different parts; one glandular, which is the body of the *testis* itself; and one vascular or membranous, known by the name of *epididymis*, which is the beginning of the *vas deferens*, or the collection of the excretory ducts of the gland.

Now it sometimes happens that this part is tumefied, independent of the testicle; and, feeling like a large adventitious excrescence, answers very well to the idea most surgeons form of a *sarcocele*: but, not being aware of the different nature and texture of the *epididymis*, they have frequently confounded its disorders with those of the testicle itself, and equally recommended extirpation in the induration of one and the other. But without tiring the reader with particular histories of cases

cases relating to this subject, I shall only say; that, from diligent inquiry, I have collected, that all indurations of the glandular part of the testicle not tending to inflammation and abscess, generally, if not always, lead on to scirrhus and cancer; whereas those of the *epididymis* seldom or never do. It is true, in spite of internal or external means, these last often retain their hardness, and sometimes suppurate; but, however, without much danger in either case.

It will not be hard to account for this difference of consequences, from tumours of seemingly one and the same body, when we reflect how much it is the nature of cancerous poisons to fix upon glands, and how different the *epididymis* is from a gland, tho' so nearly in the neighbourhood of one.

I would not have it supposed from what I have said, that the *epididymis* never becomes cancerous; I confess it may, so may every part of the human body: but I advance, that it rarely or never is so, but from an affection of the glandular part of the testicle first, which indeed seldom fails to taint, and by degrees to confound it in such a manner, as to make one mass of the two.

Before we castrate, it is laid down as a rule to inquire whether the patient has any pain in his back; and in that case to reject the operation, upon the reasonable presumption of

the spermatic vessels being likewise diseased: but we are not to be too hasty in this determination; for the mere weight of the tumour stretching the cord, will sometimes create the complaint. To learn the cause, then, of this pain in the back, when the spermatic cord is not thickened, let your patient be kept in bed, and suspend his *scrotum* in a bag-truss, which will relieve him, if disordered by the weight only; but if the spermatic cord is not thickened or indurated, which disease, when attended with a dilatation of the vessels of the *scrotum*, is known by the *Greek* appellations *circocoele* and *varicocoele*, the case is desperate, and not to be undertaken.

But supposing no obstacle in the way to the operation, the method of doing it may be this: Lay your patient on a square table of about three feet four inches high, letting his legs hang down, which, as well as the rest of his body, must be held firm by the assistants. Then with a knife begin your wound above the rings of the *abdominal* muscles, that you may have room afterwards to tie the vessels; since for want of this caution operators will necessarily be embarrassed in making the ligature: then carrying it thro' the *membrana adiposa*, it must be continued downward, the length of it being in proportion to the size of the testicle. If it is very small, it may be dissected away without taking any part of the *scrotum*;

scrotum; but I am not very fond of this method, because so much loose flabby skin is apt to form abscesses afterwards, and very frequently grow callous. If the testicle, for instance, weighs twenty ounces; having made one incision about five inches long a little circularly, begin a second in the same point as the first, bringing it with an opposite sweep, to meet the other in the inferior part, in such a manner as to cut out the shape of an oval, whose smallest diameter shall be two inches: After this, dissect away the body of the tumour with the piece of skin on it from the *scrotum*, first taking up some of the blood-vessels if the hæmorrhage is dangerous. Then pass a ligature round the cord, pretty near the *abdomen*; and, if you have space between the ligature and testicle, a second about half an inch lower, to make the stoppage of blood still more secure. The ligatures may be tied with what is called the *surgeon's knot*, where the thread is passed thro' the ring twice. This done, cut off the testicle a little underneath the second ligature, and pass a needle from the skin at the lower part of the wound thro' the skin at the upper part, in such manner as to envelope in some degree the found testicle, which will greatly facilitate and quicken the cure; or if one stitch will not answer the purpose, you may repeat it in such part of the

wound where the skin on each side lies most loose.

The method I have here described is what I have most frequently practised: but I think I have of late years performed the operation with more dexterity, where I have divided the testicle from the cord, before I had dissected away the skin from the body of the testicle; for having had by this means an opportunity of laying hold of its upper part, I could separate it from the *scrotum* with much more ease than without that advantage.

I once castrated a man whose testicle weighed above three pounds, where some of the vessels were so exceedingly varicous and dilated, as nearly to equal the size of the humeral artery: however, I took up two or three of the most considerable, and pursued the operation, cutting away near three fourths of the skin; by which means I avoided a dangerous effusion, as by dividing the vessels before they were much ramified I had fewer ligatures to make. The success answered the design, and the patient survived the operation and healing of the wound; but the cancerous humour falling on his liver sometime after, destroyed him. In large tumours, such as the last I have mentioned, it is adviseable to cut away great part of the skin: for besides that the hæmorrhage will be much less in this case, and the operation greatly shortened; the skin, by the great
distension

distension having been rendered very thin, will great part of it, if not taken away, sphacelate, and the rest be more prone to degenerate into a cancerous ulcer.

It may be observed, I do not, in order to avoid wounding the spermatic vessels, recommend pinching up the skin before the incision, and afterwards thrusting the fingers between the *membrana cellularis* and the testicle, to tear the one from the other: the first is not dextrous, and the other is painful; and both of them, in my opinion, are calculated to prevent what there is little or no danger of.

C H A P X I.

Of the P H Y M O S I S.

THE *phymosis* signifies no more than such a straitness of the prepuce, that the glans cannot be denuded; which if it becomes troublesome so as to prevent the egress of the urine, or conceal under it chancres or foul ulcers quite out of the reach of application, is to be cut open. It sometimes appears, that children are born imperforate; in which case, a small puncture, dressed afterwards with a tent, effects a cure. But this operation is chiefly practised in venereal cases, in order to expose chancres, either on the glans or within the prepuce itself. And here, if the pre-

puce is not very callous and thick, a mere incision will answer; which may be made either with the scissars, or by slipping a knife between the skin and glands to the very extremity, and cutting it up. The last method is more easy than that of the scissars: but it is safer to make the wound on one side the prepuce than upon the upper part; for I have sometimes seen the great vessels on the *dorsum penis* afford a terrible hæmorrhage, which may be avoided by following this rule; tho' the prepuce remains better shaped after an incision made in the upper part, and therefore is to be preferred by those who understand how to take up the vessels. In children it sometimes happens that the prepuce becomes very much contracted; and in that case it is accidentally subject to slight inflammations, which bring on some symptoms of the stone: but the disorder is always removed by the cure of the *phymosis*.

If the prepuce be very large and indurated, the opening alone will not suffice; and it is more adviseable to take away the callosity by circumcision, which must be performed with a knife; and if the artery bleed much, it must be taken up with a small needle and ligature. It may be worth remarking here, that in certain *phymoses* the prepuce becomes so thickened, and at the same time so elongated, that it resembles the body of the *penis*,
and

and has led some into the mistake of supposing they had cut off a portion of the *penis* itself, when it was only a monstrous *phymosis*.

C H A P XII.

Of the PARAPHYMOSIS.

THE *paraphymosis* is a disease of the *penis*, where the prepuce is fallen back from the glans, and cannot be brought forwards to cover it. There are many whose *penis* is naturally thus formed, but without any inconvenience; so that since the time of the *Romans* (some of whom thought it indecent to have the glans bare) it has not been usual, as I can find, to perform any operation upon that account; but we read the several processes of it described very particularly by *Celsus*, who does not speak of it as an uncommon thing. Most of the instances of this distemper are owing to a venereal cause: but there are some, where the prepuce is naturally very tight, which take their rise from a sudden retraction of it, and immediate enlargement of the glans preventing its return. Sometimes it happens that the surgeon succeeds in the reduction immediately, by compressing the the extremity of the *penis*, at the time he is endeavouring to advance the prepuce. If he does not, let him keep it suspended, and attempt

tempt again, after having fomented, and used some emollient applications : but if, from the contraction below the *corona glandis*, there is so great a stricture as to threaten a gangrene, or even if the *penis* is much enlarged by water in the *membrana reticularis* forming tumours called *crystallines*, three or four small incisions must be made with the point of a lancet into the stricture and *crystallines*, according to the direction of the *penis* ; which in the first case will set free the obstruction, and in the other evacuate the water. The manner of dressing afterwards must be with fomentations, digestives, and the *theriaca Londinensis* over the pledgets.

C H A P. XIII.

Of the PARACENTESIS.

THIS operation is an opening made into the *abdomen*, in order to empty any quantity of extravasated water collected in that species of dropfy called the *ascites* ; but as there is much more difficulty in learning when to perform than how to perform it, and indeed in some instances requires the nicest judgement, I shall endeavour to specify the distinctions which render the undertaking more or less proper.

There are but two kinds of dropfy ; the *anasarca*,

anasarca, called also *leucophlegmacy*, when the extravasated water swims in the cells of the *membrana adiposa*; and the *ascites*, when the water possesses the cavity of the *abdomen*: in the first kind, the water is clear and limpid; but in the second, a little grosser, very gelatinous and corrupted, and sometimes even mixed with fleshy concretions. I do not mention the *tympany*, or flatulent dropsy of the *abdomen*: nor have I in the chapter of *Hernias* spoken of the *hernia ventosa*, it being certain that the *ascites* and *bubonocèle* have generally been mistaken for those diseases; tho' there are some few instances where an enormous tumour of the *abdomen* arises from excessive flatulencies and distensions of the intestines.

It is of no great consequence in the practice of Physic or Surgery, whether the water is discharged by a rupture of the lymphatics, or a transudation thro' the pores of their relaxed coats, since the fact is established, that they have a power sometimes of absorbing the fluid lying thus loose, and conveying it into the course of the circulation; after which, it is often totally carried off by some emunctory of the body. The great disposition there is in nature to fix upon the kidneys and glands of the intestines for this end, has put physicians upon promoting it by cathartics and diuretics, which sometimes entirely carry off the distemper. If one any should doubt of
the

the possibility of a cure when the water is extravasated, let him inject, thro' a small opening into the *thorax* or *abdomen* of a dog, a pint of warm water; and, upon dissection some few hours after, he shall not find one drop left there: which puts out of dispute this power of absorption. But indeed, tho' we do not much attend to it, it is by this very act the circulation is carried on regularly with respect to some if not all the secretions, which would overload their receptacles if they were not thus taken up again. The example serving for illustration, may be the circulation of the aqueous humour of the eye, which no one questions is an extravasated fluid.

The operation of tapping is seldom the cure of the distemper. But dropfies, which are the consequence of a mere impoverishment of the blood, are less likely to return than those which are owing to any previous disorder of the liver: and it is not uncommon for dropfies that follow agues, hæmorrhages, and diarrhœas, to do well; whereas in such as are complicated with a scirrhus liver, there is hardly an example of a cure.

The water floating in the belly is, by its fluctuation, to determine whether the operation be adviseable. For if, by laying one hand on any part of the *abdomen*, you cannot feel an undulation from striking on an opposite part with the other, it is to be presumed there

there will be some obstacle to the evacuation. It sometimes happens, that a great quantity, or almost all the water, is contained in little bladders, adhering to the liver and the surface of the *peritonæum*, known by the name of *hydatids*; and the rest of it in different sized ones, from the degree of a *hydatid* to the size of a globe holding half a pint or a pint of water. This is called the *encysted* dropfy; and, from the smallness of its cysts, makes the operation useless; but is not difficult to be distinguished, because there is not a fluctuation of the water, unless it is complicated with an extravasation.

When the fluctuation is hardly perceptible (except the teguments of the *abdomen* are very much thickened by an *anasarca*), in all probability the fluid is gelatinous: I have had instances where it was too viscid to pass thro' a common trocar; on which account it is proper to be furnished with a couple, of the size described in the copperplate. I once tapped a person, when the fluid would not pass even thro' the large one; so, to ease him from the distention he laboured under, I dilated the orifice with a large sponge-tent, and afterwards extracted a prodigious quantity of distinct concreted *hydatids*, differing in nothing, as I could discover, from the nature of a *polypus* formed in the nose.

There is another kind of dropfy, which for
the

the most part forbids the operation, and is peculiar to women, being seated in the body of one or both ovaries. There is, I believe, no example of this species but what may be known by the hardness and irregularity of the tumour of the *abdomen*, which is nearly uniform in the other cases.

When the ovary is dropsical, the water is generally deposited in a great number of cells formed in the body of it; which circumstance makes the fluctuation insensible, and the perforation useless: tho' sometimes there are only one or two cells; in which case, if the ovary is greatly magnified, the undulation will be readily felt, and the operation be adviseable. I once tapped a gentlewoman in this circumstance, whose ovary, upon the puncture, yielded but half a pint of water; but being still persuaded, by the feel, that there was a large cyst, I tapped her in another part, and drew away near a gallon. I had an opportunity, after her death, to be convinced of this fact, by examining the body.

When the *ascites* and *anasarca* are complicated, it is seldom proper to perform the operation, since the water may be much more effectually evacuated by scarifications in the legs than by tapping.

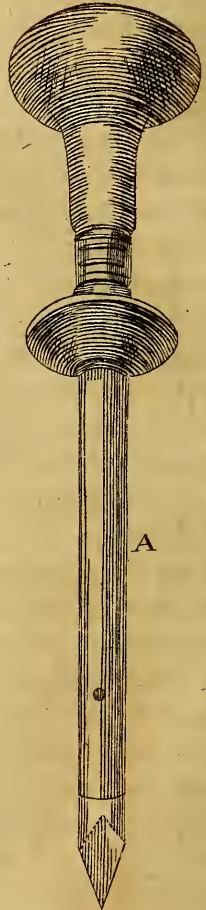
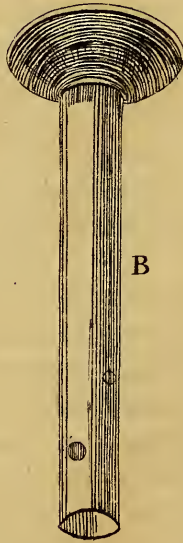
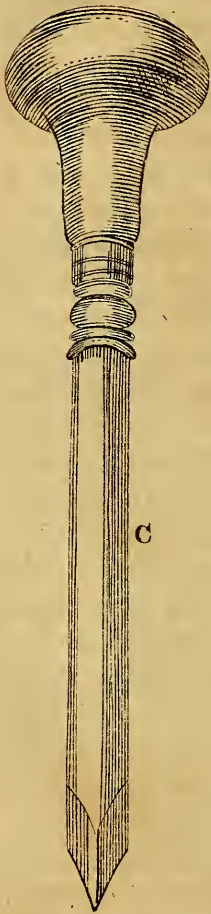
Upon the supposition nothing forbids the extraction of the water, the manner of operating is this: Having placed the patient in a
chair

chair of a convenient height, let him join his hands so as to press upon his stomach: then dipping the trocar in oil, you stab it suddenly through the teguments, and, withdrawing the perforator, leave the waters to empty by the canula. The *abdomen* being, when filled, in the circumstance of a bladder distended with a fluid, would make it indifferent where to wound; but the apprehension of hurting the liver, if it be much enlarged, has induced operators rather to choose the left side, and generally in that part which is about three inches obliquely below the navel. If the navel protuberates, you may make a small puncture with a lancet through the skin; and the waters will be readily voided by that orifice, without any danger of a *hernia* succeeding, as is apprehended by many writers: though it should be carefully attended to, whether the protuberance is formed by the water or an *exomphalos*; in which latter case the intestine would be wounded, and not without the greatest danger. The surgeon, neither in opening with the lancet, nor perforating with the trocar, need fear injuring the intestines, unless there is but little water in the *abdomen*, since they are too much confined by the mesentery to come within the reach of danger from these instruments; but it sometimes happens, that when the water is almost all emptied, it is suddenly stopped by the intestine or *omentum* pressing

pressing against the end of the canula ; in which case you may push them away with a probe. During the evacuation, your assistants must keep pressing on each side of the *abdomen*, with a force equal to that of the waters before contained there : for by neglecting this rule, the patient will be apt to fall into faintings, from the weight on the great vessels of the *abdomen* being taken off, and the sinking of the diaphragm succeeding ; in consequence of which, more blood flowing into the inferior vessels than usual, leaves the superior ones of a sudden too empty, and thus interrupts the regular progress of the circulation. To obviate this inconvenience, the compression must not only be made with the hands during the operation, but afterwards continued, by swathing the *abdomen* with a roller of flannel about eight yards long and five inches broad, beginning at the bottom of the belly, so that the intestines may be borne up against the diaphragm. You may change the roller every day, till the third or fourth day, by which time, the several parts will have acquired their due tone. For the dressing, a piece of dry lint and plaster will suffice ; but between the skin and roller it may be proper to lay a double flannel a foot square, dipt in brandy or spirits of wine.

This operations though it does not often
absolutely





absolutely cure, yet it sometimes preserves life a great many years, and even a pleasant one, especially if the waters have been long collecting. I have known several instances of people being tapped once a month, for many years, who felt no disorder in the intervals, till towards the time of the operation, when the distention grew painful; and there are instances, where the patient has not relapsed after it. Upon the whole, there is so little pain or danger in the operation, that, in consideration of the great benefits sometimes received from it, I cannot but recommend it as exceedingly useful.

P L A T E III.

The EXPLANATION.

A. A trocar of the most convenient size for emptying the *abdomen*, when the water is not gelatinous. It is here represented with the perforator in the canula, just as it is placed when we perform the operation.

B. The canula of a large trocar, which I have recommended in cases where the water is gelatinous.

C. The perforator of the large trocar.

The handle of the trocar is generally made of wood, the canula of silver, and the perforator of steel; great care should be taken by the makers of this instrument, that the

perforator should exactly fill up the cavity of the canula; for unless the extremity of the canula lies quite close and smooth on the perforator, the introduction of it into the *abdomen* will be very painful. To make it slip in more easily, the edge of the extremity of the canula should be thin and sharp: and I would recommend, that the canula be steel; for the silver one, being of too soft a metal, becomes jagged or bruised at its extremity with very little use. After the operation, the canula must be wiped clean and dry, by drawing a slip or two of flannel thro' it; otherwise when the perforator is put into it, they will both grow rusty.

C H A P. XIV.

Of the FISTULA IN ANO.

THE *fistula in ano*, without any regard to the strict definition of the word, is generally understood to be an abscess running upon or into the *intestinum rectum*; though an abscess in this part, when once ruptured, does generally, if neglected, grow callous in its cavity and edges, and becomes at last what is properly called a *fistula*.

That the *anus* is so often exposed to this malady, in any crisis of the constitution, is chiefly ascribed to the depending situation of the part: but what very much conduce to it likewise,

likewise, are the great quantities of fat surrounding the *rectum*, and the pressure the hæmorrhoidal vessels are liable to, which, being sustained upon very loose membranes, will be less able to resist any effort that nature shall exert to sling off a surcharge; and from one step to another, that is, from inflammation to suppuration, lead on to the distemper we are treating of. That the fat is the proper subject of abscesses, may be learned from an inflammation of the skin affecting the *membrana adiposa*, and producing matter there; in which case, a suppuration frequently runs from cell to cell, and in a few days lays bare a great quantity of flesh underneath, without affecting the flesh itself: Nay, I think it may be doubted, whether, in those abscesses which are esteemed suppurations of the muscles, the inflammation and matter are not absolutely first formed in this membrane, where it is insinuated in the interstices of their fibres.

The piles, which are little tumours formed about the verge of the *anus*, immediately within the *membrana interna* of the *rectum*, do sometimes suppurate, and become the forerunners of a large abscess; also external injuries here, as in every other part of the body, may produce it: but from whatever cause the abscess arise, the manner of operating upon it will be according to the nature and direction of its cavity. If

If the surgeon have the first management of the abscess, and there appear an external inflammation upon one side of the buttock only; after having waited for the proper maturity, let him with a knife make an incision the whole length of it; and in all probability, even though the bladder be affected, the largeness of the wound, and the proper application of doffils lightly pressed in, will prevent the putrefaction of the intestine, and make the cavity fill up like imposthumations of other parts.

If the *sinus* be continued to the other buttock, almost surrounding the intestine, the whole course of it must be dilated in like manner; since in such spongy cavities a generation of flesh cannot be procured but by large openings; whence also, if the skin is very thin, lying loose and flabby over the *sinus*, it is absolutely necessary to cut it quite away, or the patient will be apt to sink under the discharge, which in the circumstance here described is sometimes excessive. By this method, which cannot be too much recommended, it is amazing how happy the event is likely to be; whereas from neglecting it, and trusting only to a narrow opening, if the discharge do not destroy the patient, at least the matter, by being confined, corrupts the gut, and, insinuating itself about it, forms many other channels, which, running in various directions, often baffle an operator, and have been the cause of

of a fistula being so generally esteemed very difficult of cure.

Here I have considered the imposthuma-
tion as possessing a great part of the buttock;
but it more frequently happens, that the mat-
ter points with a small extent of inflamma-
tion on the skin, and the direction of the
sinus is even with the gut. In this case, ha-
ving made a puncture, you may with a probe
learn if it has penetrated into the intestine, by
passing your finger up it, and feeling the
probe introduced through the wound into its
cavity; though, for the most part, it may be
known by a discharge of matter from the
anus. When this is the state of the fistula,
there is no hesitation to be made; but imme-
diately putting one blade of the scissars up the
gut, and the other up the wound, snip the
whole length of it. This process is as ad-
visable when the intestine is not perforated,
if the *sinus* is narrow, and runs upon or very
near it: for if the abscess be tented, which
is the only way of dressing it while the ex-
ternal orifice is small, as I have here supposed,
it will almost certainly grow callous; so that
the surest means of cure will be opening the
gut, that proper applications may be laid to
the bottom of the wound. However, it should
be well attended to, that some *sinuses* pretty
near the intestine neither run into nor upon it;
in which case they must be opened, according

to the course of their penetration. There are abundance of instances, where the intestine is so much ulcerated, as to give free issue to the matter of the abscess by the *anus*. But I believe there are none where there is not by the thinness and discolouration of the skin, or an induration to be perceived thro' the skin, some mark of its direction; which, if discovered, may be opened into with a lancet, and then it becomes the same case as if the matter had fairly pointed.

If the *sinuses* into and about the gut are not complicated with an induration, and you can follow their course, the mere opening with scissars, or a knife guided on a director, will sometimes suffice: but it is generally safer to cut the piece of flesh, surrounded by these incisions, quite away; and, when it is callous, absolutely necessary, or the callosities must be wasted afterwards by escharotic medicines, which is a tedious and cruel method of cure.

When the fistula is of long standing, and we have choice of time for opening it, a dose of rhubarb the day before the operation will be very convenient, as it not only will empty the bowels, but also prove an astringent for a while, and prevent the mischief of removing the dressings in order to go to stool.

It sometimes happens that the orifices are so small, as not to admit the entrance of the
scissars

scissars; in which case, sponge-tents must be employed for their dilatation.

In performing these operations on the *anus*, I do not think in general any instrument so handy as the knife and scissars; almost all the others which have been invented to facilitate the work, are not only difficult to manage, but more painful to the patient. However, in those instances where the fistula is very narrow, and opens into the intestines, just within the verge of the *anus*, the furingotomy may be used with advantage; but where the opening into the gut is high, it cannot be employed without giving great pain. I do not caution against cutting the whole length of the sphincter, experience having shown it may be done with little danger of an incontinence of excrement; and in fact the muscle is so short, that it must generally be cut through in dilatations of the intestine.

The worst species of fistula is that communicating with the *urethra*, and sometimes (thro' the prostate gland) with the bladder itself. This generally takes its rise from a former gonorrhœa; and appears externally first in *perinæo*, and afterwards increasing more towards the *anus*, and even sometimes into the groin, bursts out in various orifices, thro' the skin, which soon becomes callous and rotten; and the urine, passing partly through these orifices, will often excite as much pain,

and of the same kind, as a stone in the bladder.

This species of fistula, taking its rise from strictures of the urethra, is only manageable by the bougie. For so long as the *urethra* is obstructed, the cure of the fistula will be imperfect: but if the canal be opened by this application, it is amazing what obstinate indurations and foul *sinuses* will in consequence disappear; tho' there are some so callous and rotten, as to demand the knife and skilful dressings, notwithstanding the *urethra* should be dilated by the use of bougies.

C H A P. XV.

Of the Puncture of the PERINÆUM.

THIS operation is performed when the bladder is under such a suppression of urine as cannot be relieved by any gentler methods, nor, by reason of the obstruction in its neck, or the *urethra*, will admit of the introduction of the catheter. The manner of doing it, as described by most writers, is by pushing a common trocar, from the place where the external wound in the old way of cutting is made, into the cavity of the bladder, and so procuring the issue of the water through the canula; but others, refining upon this practice, have ordered an incision to be

be carried on from the same part into the bladder, and then to insinuate the canula. But, in my opinion, both the methods are to be rejected, in favour of an opening a little above the *os pubis*: for besides that it is not easy to guide the instrument thro' the prostate gland into the bladder, the necessity of continuing it, in a part already very much inflamed and thickened, seldom fails to do mischief, and even to produce a mortification.

Some time since, a Gentlewoman complained of a difficulty in making water, which she voided by drops with excessive pain; and soon after, the urinary passage became totally obstructed. Having in vain attempted to pass the smallest catheter I could get, I introduced my finger into the *vagina*, and felt a very hard tumour about the neck of the bladder. The patient had not voided any water for five days; and being in the utmost agony, and as we judged within a few hours of dying, I put in practice the incision above the *os pubis*, making the wound of the skin about two inches long, and that of the bladder about half an inch. Having emptied, by this means, a prodigious quantity of water, I kept the orifice open with a hollow tent, till such time as the tumour subsided, which, with proper medicines, it did by degrees; and in about six weeks all her water came the right way, and some time after she recovered perfectly.

fect health. I have lately practised a method still more easy both to the patient and the operator; which consists only in emptying the bladder with a common trocar, and stopping the canula with a little cork, which is afterwards to be taken out as often as the patient has occasion to urinate. The canula is to be continued in the bladder, till such time as the person finds he can void his urine by the natural passage.

In this operation the *abdomen* ought to be perforated above two inches above the *os pubis*; and if the patient be fat, the trocar should penetrate two inches, otherwise an inch and a half will be sufficient. This precaution is of great importance; for I have seen an example, where the trocar being introduced nearer to the *os pubis*, the extremity of it pressed upon the lower portion of the bladder, and in a few days made a passage into the *rectum*.

C H A P. XVI.

Of the STONE.

STONY concretions are a disease incident to several parts of the body; but I shall treat only of those formed in the kidneys and bladder. Hitherto there never has been given any satisfactory account of the causes of this
concreting

concreting disposition in the fluids; and tho' there may be some propriety in considering the sand of urine in the same light as the tartar of wine, from their similitude in several experiments, yet we cannot infer from thence, what does immediately produce it. At least, it is not with any certainty to be imputed to a particular diet or climate, which however are the causes commonly assigned; since we see that in all countries, and amongst all ranks of people, as much among the sober as the luxurious, the stone is a frequent distemper: and though the great numbers cut at the hospitals of *Paris*, where the water of the *Seine* is so remarkable for its quantity of stone, seems to favour the opinion of its being generated by particular fluids received into the blood; yet I believe, upon inquiry, this famous instance will not appear conclusive; since most of those patients come from the provinces, or distant villages, where the water is not drunk; and as to the inhabitants of *Paris* itself, by what I was able to learn of the surgeons there, the number of those afflicted with the stone amongst them is pretty nearly in the same proportion as in *London*. From which considerations, and the circumstance of so many more children having the stone than men, one would be inclined to think, the disposition is much oftener born with us, than acquired by any external means. I once saw a stone in the
kidney

kidney of a fœtus at the term of seven months growth, which, had it lived, was two months before it would have been born.

It is certain the urine generally abounds with matter proper to compose a stone; and perhaps, if it could grow cold in the bladder, it would always deposit the matter there, as it does on the sides of the chamber-pot, tho' the coats of the bladder being covered with a mucilage makes them more unfit than the sides of the pot to attract the stony particles: but we see, when once a hard body is insinuated into the bladder, it seldom fails to become the nucleus of a stone, whether it be a large piece of gravel, a needle, a bullet, or any other firm extraneous substance, even grumous blood.

From the monstrous increase of some stones in a small time, and the cessation of growth, for many years, of others, we may be persuaded that the constitution varies exceedingly at different times with regard to these stony separations: and, from the appearances of most stones when artfully sawed through, we may gather, that this variation of constitution does not show itself only in the quantity of gravel added to the stone, but the quality of it also: so that a red uniform stone of an inch diameter, may perhaps, at half that size, have been a smooth white one; at a quarter, a brown mulberry one; and so on, at different times,

times, altering in its species. Hence (from the apposition of differently coloured gravel) arises for the most part the laminated appearance of a stone; though sometimes the *laminæ* are very nearly of the same colour and composition: and in this case their formation seems to be owing to the want of accretion in the stone, for a certain time, during which its surface, by rubbing against the coats of the bladder, and its attrition from the stream of urine, becomes smooth and compact; so that, when more fresh loose gravel adheres to it, its different density in that part will necessarily make the streaks we see in a section of the stone, which are only the external surfaces of each *lamina*.

That the ceasing to grow gives them this laminated form, and not any particular disposition in sand to shoot into such a shape, is probable from the examination of some other stones, in which a great quantity of gravel is first collected without any nucleus, into a spongy uniform mass, and, after that, is covered with several *laminæ*.

It is no wonder that stones so generally form in the kidneys, since the disposition of the urine will naturally show itself as soon as it is separated into the *pelvis*: that is, the stony particles having as strong an endeavour to unite with one another in the kidneys as the bladder, will consequently, from meeting first there,

there, generally produce gravel and stone in that part; nay, I have found, by opening the kidneys of calculous people, that stone is formed even earlier than I have here suggested, for in them the *tubuli Belliniani* were full of gravel.

Small stones and gravel, are frequently voided without pain: but sometimes they collect and become very large in the kidneys; in which case a fit of the stone in that part is the cure, from the inflammation and pain occasioning convulsive twitches which at last expel them. But, in this disease, the patient is very much relieved by several kinds of remedies, such as the mucilaginous, the saponaceous, &c. some of which lubricate, and others both lubricate and stimulate. The sand, in passing through the *ureters*, is very much forwarded by the force of the urine; which is so considerable, that I have seen a stone that was obstructed in the *ureter* in its first formation, perforated quite through its whole length, and form a large channel for the stream of urine. The *ureters* being very narrow as they run over the *psoas* muscle, and also at their entrance into the bladder, make the movement of the stone very painful and difficult in those parts: but there is seldom so much trouble after the first fit; for when once they have been dilated, they generally continue so. I have often seen them as big as a man's finger, but they have been found much larger.

When

When once a stone has acquired a moderate size in the bladder, it usually occasions the following complaints: Frequent inclination to make water, excessive pain in voiding it drop by drop, and sometimes a sudden stoppage of it if discharged in a stream; after urining, great torture in the *glans penis*, which lasts one, two, or three minutes; and in most constitutions, the violent straining makes the *rectum* contract and expel its excrements; or if it be empty, occasions a *tenesmus*, which is sometimes accompanied with a *prolapsus ani*. The urine is often tingured with blood from a rupture of the vessels, and sometimes pure blood itself is discharged; sometimes the urine is very clear; but frequently there are great quantities of slimy sediment deposited at the bottom of it, which is no other than a preternatural separation of the mucilage of the bladder, but has been often mistaken for *pus*; whence has arisen an opinion, that ulcers of the bladder are common, tho' in fact the distemper is very rare.

These are the symptoms of the stone in the bladder: yet by no means are they infallible; since a stone in the *ureter* or kidneys, or an inflammation of the bladder from any other cause, will sometimes produce the same effects. But if the patient cannot urine except in a certain posture, it is almost a sure sign the orifice is obstructed by a stone: if he finds
ease

ease by pressing against the *peritonæum* with his fingers, or sitting with that part upon a hard body, there is little doubt to be made that the ease is procured by taking off the weight of the stone: or lastly, if, with most of these complaints, he thinks he can feel it roll in his bladder, it is hardly possible to be mistaken. However, the only sure judgment to be formed, is from searching.

That we should not readily distinguish the complaints of the stone from many other affections of the bladder, is not very surprising, when we reflect that a fit of the stone is nothing but an inflammation of its coats, which, tho' it be excited by the stone, requires a disposition in the blood to produce it: for if the complaints in a fit were owing to the immediate irritation of the bladder, it should follow, that, the stone being always the same, the fit would be continual; but besides that all patients have considerable intervals of ease (often of many months) except in those cases where the stone is either very large or pointed, there are instances of some few happy constitutions, where they have no pain, even after having for a certain time suffered very much.

To prevent the violence and frequent returns of the fits of the stone, bleeding and gentle purging with manna are beneficial; abstaining also from malt-liquors, and excess

cess of eating and drinking is very serviceable; but the milk-diet and honey are the greatest preventatives, not only of inflammation, but perhaps sometimes too of the farther accretion of the stone.

From considering the disorders of the stone in this light, and the frequent intervals of ease which happen without the assistance of medicine, we cannot wonder that so many patients have believed the stone dissolved, when they have been under any particular regimen; and that in all ages there have been many people deceived for a length of time, by a supposed dissolvent, tho' we have not hitherto known any safe one, till lately that lime and soap have been discovered to have sometimes that effect.

C H A P. XVII.

Of SEARCHING.

THE patient being laid on a horizontal table, with his thighs elevated and a little extended, pass the sound with the concave part towards you, till it meets with some resistance *in perinæo*, a little above the *anus*: then turning it without much force, push it gently on into the bladder; and if it meets with an obstruction at the neck, raise its extremity upwards, by inclining the handle

dle of it towards you; or if it does not then slip in, withdraw it a quarter of an inch, and, introducing your fore-finger into the *rectum*, lift it up, and it will seldom fail to enter. There is some art in turning the sound in the proper place of the *urethra*, which surgeons not versed in this operation cannot so well execute; therefore they may pass the instrument with the concave side always towards the *abdomen* of the patient, observing the same rule at the entrance into the bladder as in the other method. The cause of this obstacle, besides the *rugæ* of the *urethra*, and the resistance of the *verumontanum*, is sometimes a small projection of the orifice of the bladder in the *urethra*, like that of the *os tinæ* in the *vagina*, which occasions the end of the sound to slip a little beyond it.

It is not to be supposed, that, by searching, one can possibly judge of the size and form of a stone; and indeed the frequency of the fits, and violence of the symptoms, are a better rule to go by: though whoever shall think himself capable of distinguishing absolutely the difference of stones, even by these circumstances, will sometimes be mistaken; since the frequency and violence of the pain depend not always merely upon their magnitude or shape, and there are some instances where a stone of six grains weight has for several months given more pain in one person than

a much larger has in another: however, *cæteris paribus*, a large or rough stone is worse than a small or a smooth one.

Though, upon searching, we are assured of a stone in the bladder, we are not, without farther inquiry, to operate immediately; since there are sometimes obstacles which forbid the operation, either absolutely, or only for a certain time. Among these, that of greatest consequence, is the gravel or stone in the kidneys; which is known by the pain in the loins, vomitings, contractions of the testicles, numbness of the thighs, and often by matter which the inflammation produces in the kidneys. The objections of less weight, and which frequently are removed, are a fit of the stone, a cough, a hectic, and being emaciated by long pain; excessive hot or cold weather, are likewise hindrances: but, in extremity of danger, these last considerations may be disregarded; tho' no doubt very hot weather is more inconvenient and dangerous than cold, as lying-abed is then more troublesome, and the urine much falter.

Difference of age makes an extreme difference in danger, infants and young people almost always recovering; but still the operation is advisable on those advanced in years, tho' it is not attended with near the same success. This operation is performed four several ways, all which I shall describe with their

particular inconveniences, that we may the more easily pitch upon that which has the least.

Before we perform any of them, it will be proper to prepare the patient with a gentle purge the preceding day, and a clyster early in the morning, which will be of great service in cooling the body, and making some of the operations less dangerous where the *rectum* is liable to be wounded when full.

C H A P. XVIII.

Of the LESSER APPARATUS, or cutting on the GRIPE.

THE most ancient way of cutting for the stone, is that described by *Celsus*, and known by the name of *cutting on the gripe*; though, since the time of *Johannes de Romanis*, it is also called *cutting with the lesser apparatus*, to distinguish it from his new method, which, on account of the many instruments employed in it, is called *cutting with the greater apparatus*. The manner of doing the operation is this: You first introduce the fore-finger and middle-finger of the left hand, dipt in oil, up the *anus*, and, pressing softly with your right hand above the *os pubis*, endeavour to bring the stone towards the neck of the bladder; then
making

making an incision, on the left side of the *perinæum*, above the *anus*, directly upon the stone, you turn it out through the wound, either with your fingers or a scoop.

This way of cutting was attended with many difficulties, for want of proper instruments to direct the incision and extract the stone when it lay beyond the reach of the fingers, which in a large bladder was frequently the case: so that it is strange *Celsus* confined the operation to the age between nine and fourteen, since it is much easier to be performed in infancy than at those years; and it plainly appears from his account of it, that many died from the violence done to the bladder in endeavouring to bring the stone forwards, though the operators failed in their attempt, and the patients were not cut.

The wound of the bladder in this operation is made in the same place as is now practised in the lateral method; but its impracticability on some subjects, and uncertainty on all others, have made it universally exploded: so that nobody now makes an incision without the direction of a staff, unless a stone entirely prevents the introduction of it, by pressing against and stopping up the neck of the bladder; and in this case, when we cut directly upon the stone, it is much safer to push it back farther into the bladder, and lay hold of it with the forceps, than to endeavour with

the scoop or fingers to force it outwards, which circumstance alone makes it different from *Celsus's* method. It must be distinguished, however, when I speak of pushing the stone back, that I suppose it in the neck of the bladder: for it frequently happens that it lies at the extremity of the *urethra*, on the outside of the bladder; in which case the wound of the *urethra* may be made large enough to turn it out with the fingers, or the end of some slender instrument.

C H A P. XIX.

Of the GREATER APPARATUS, or the Old Way.

THIS method of cutting, invented by *Johannes de Romanis*, and published by his scholar *Marianus* in the year 1524, has at different times, and with different people, varied considerably in some of its processes, and particularly with regard to the use of certain instruments. What I shall describe, will be the manner in which it is now practised with all its improvements.

Having laid the patient on a square horizontal table three feet four inches high, with a pillow under his head, let his legs and thighs be bent, and his heels made to approach his

his buttocks, by tying his hands to the bottom of his feet with a couple of strong ligatures about two yards long; and to secure him more effectually from struggling, pass a double ligature round one of his hams, and carry the four strings round his neck to the other ham; then passing the loop underneath it, make a knot by threading one of the single ends through the loop: after this, the thighs being widened from each other, and firmly supported by proper persons, you introduce the staff, having first dipt it in oil, which must be held by your assistant, a little leaning on the left side of the seam *in perinæo*; and beginning the external wound just below the *scrotum* (which must be held out of the way), you continue it downwards to within two fingers breadth of the *anus*: then leaving that direction, you slip the knife forwards in the groove, pretty far into the bulbous part of the *urethra*; or, as there is some danger of wounding the *rectum*, in the continuation of the incision you may turn the knife with the back towards it, and make this part of the incision from within outwards. Should a very large vessel be cut, it will be advisable to tie it before you proceed any farther in the operation. When the wound is made, slide the gorget along the groove of the staff into the bladder: and to do it with more safety, when the beak of it is received in the groove,

it will be proper to take the staff yourself in your left hand; for if the assistant should unwarily either incline the handle of it too much towards you, or not resist enough to the force of the gorget, it is very apt to slip out of the groove, between the *rectum* and the bladder; which accident is not only inconvenient to the operator for the present, but is attended for the most part with very bad consequences. The gorget being passèd, dilate the *urethra* and neck of the bladder with your fore-finger, and introduce the forceps into the bladder, keeping them shut till you touch the stone, when you must grasp it with a moderate force, and extract it by pulling downwards towards the *rectum*. Should you find a difficulty in laying hold of the stone, be careful to keep your forceps in such a position, that they may open upwards and downwards, (not laterally), which will very much facilitate the embracing of the stone in case it should happen to be thin and flat.

C H A P. XX.

Of the HIGH OPERATION.

THIS method of cutting for the stone was first published in the year 1561, by *Pierre Franco*, who, in his treatise of *Hernias*, says he once performed it on a child with very good

good success, but discourages the farther practice of it. After him *Roffetus* recommended it with great zeal, in his book intitled *Partus Cæfareus*, printed in 1591; but he never performed the operation himself. Monsieur *Tolet* makes mention of its having been tried in the *Hotel Dieu*; but without entering into the particular causes of its discontinuance, says only that it was found inconvenient. About the year 1719, it was first done in *England* by Mr *Douglas*, and after him practised by others. The manner of performing it, with the improvements made since *Franco's* operation, is this.

The patient being laid on a square table, with his legs hanging off, and fastened to the sides of it by a ligature passed above the knee, his head and body lifted up a little by pillows so as to relax the abdominal muscles, and his hands held steady by some assistants; inject through a catheter into the bladder as much barley-water as he can bear, which, in a man, is often about eight ounces, and sometimes twelve: for the more easily doing this, an ox's *ureter* may be tied to the extremity of the syringe and handle of the catheter, which being pliable will prevent any painful motion of the instrument in the bladder.

The bladder being filled, an assistant, in order to prevent the reflux of the water, must grasp the *penis* the moment the catheter is withdrawn

withdrawn, holding it on one side in such a manner as not to stretch the skin of the *abdomen*; then with a round-edged knife make an incision four inches long, between the *recti* and pyramidal muscles, through the *membrana adiposa*, as deep as the bladder, bringing its extremity almost down to the *penis*: after this, taking a crooked knife, continue the incision into the bladder, carrying it a little under the *os pubis*; and immediately upon the water's flowing out, introduce the fore-finger of your left hand, which will direct the forceps to the stone.

The method was at first received with great applause in *London*; but, after some trial was rejected, for the following inconveniences:

It sometimes happens that the bladder, notwithstanding the injection, still continues so deep under the *os pubis*, that the *peritonæum* being necessarily wounded first, the intestines push out immediately at the orifice, and the urine afterwards empties into the *abdomen*; in which case, hardly any recover. The injection itself is exceedingly painful; and however slowly the fluid be injected, it distends the bladder so much more suddenly than the urine from the kidneys does, and so much faster than it can well bear, that it not only is seldom dilated enough to make the operation absolutely secure, but is sometimes even burst,

burst, or at least its tone destroyed, by the hasty dilatation. What adds to the danger here, is the possibility of meeting with a contracted indurated bladder; which is a circumstance sometimes attending on the stone, and indeed an exceedingly dangerous one in all the other methods, but would be frightful in this, by reason not only of the necessity of wounding the *peritonæum*, but of the difficulty of coming at the stone. If the stone be very small, it is hard to lay hold of it with the forceps, and in a fat man the fingers are not long enough for that purpose. If there are many little stones, it will scarce happen that more than nine at a time can be extracted; and if the stone breaks, it not only is impracticable to take it all away in the operation, but also, from the supine posture of the patient, it will generally remain in the bladder; whereas, in the other methods, for the most part, it works itself out with the urine. But even supposing that the operation itself is prosperous, the consequences generally are very troublesome: for the urine, issuing out at an orifice where there is no descent, spreads itself upon the *abdomen*, and makes very painful excoriations; though, what is still worse, it sometimes insinuates itself into the cells between the bladder and *abdominal* muscles, and together with the inflammation excited by the operation brings on a suppuration there, which
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is always difficult to manage, and frequently mortal.

C H A P. XXI.

Of the LATERAL OPERATION.

THIS method was invented by an ecclesiastic, who called himself *Frere Jaques*. He came to *Paris* in the year 1697, bringing with him an abundance of certificates of his dexterity in operating; and making his history known to the court, and magistrates of the city, he got an order to cut at the *Hotel Dieu* and the *Charité*, where he performed this operation on about fifty persons. His success did not answer the promises he had made; and from that time his reputation seems to have declined in the world, if we may give credit to *Dionis*, who has furnished us with these particulars.

He was treated by the surgeons of those times as ignorant and barbarous: and tho', upon inquiry into the parts which suffer in this method, it was once the opinion of some of the most eminent amongst them, that it might be made a most useful operation if a few imperfections in the execution of it were removed; yet, after having given this judgment, they suddenly dropt the pursuit, for no other reason, to all appearance, but that

that they would not be obliged to any one but a regular surgeon for a discovery of so great consequence. The principal defect in this manner of cutting was the want of a groove in his staff, which made it difficult to carry the knife exactly into the bladder: nor did he take any care of his patients after the operation; so that, for want of proper dressings, some of the wounds proved fistulous, and other ill consequences ensued. But I am inclined to think he succeeded better, and knew more at last, than is generally imagined; for I remember to have seen, when I was in *France*, a small pamphlet, published by him in the year 1702, in which his method of operating appeared so much improved, that it differed in nothing, or but very little, from the present practice. He had by this time learnt the necessity of dressing the wound after the operation; and had profited so much from the criticisms of Messieurs *Mery*, *Fagon*, *Felix*, and *Hunauld*, that he then used a staff with a groove; and, what is more extraordinary, had cut thirty-eight patients successively at *Versailles*, without losing one, as appeared by a certificate annexed to the piece.

Amongst many that saw *Frere Jaques* operate, was the famous professor *Rau*, who carried his method into *Holland*, and practised it with amazing success. He never published
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any account of it himself, though he admitted several to his operations: but since his death, his successor *Albinus*, professor of Anatomy and Surgery at *Leyden*, has given the world a very circumstantial detail of the several processes of it; and mentions as an improvement upon *Frere Jaques's* manner, that he made his incision thro' the bladder beyond the prostate: but whoever will try the experiment of making a wound in that place; without touching the prostate, on a staff such as *Albinus* has delineated, which is of an ordinary length, will find it almost impracticable; for if, by inclining the staff a little towards the *abdomen* and right groin, you endeavour to raise that part of the bladder towards the wound, it slips out all but the very end of it into the *urethra*, and leaves no direction for the knife. Besides, that he cut the prostate, may be gathered from the event of some cases which *Mr Cheselden* published, when he first undertook the lateral operation. He considered it as almost impossible to make the incision in this place, unless the bladder were distended: to which purpose he injected as much barley-water as the patient could suffer, which made it protuberate forwards, and lie in the way of the external wound; so that, leaving the staff in, he cut very easily upon it. The operations were exceedingly dexterous: but the wound of the bladder re-

tiring

tiring back when it was empty, did not leave a ready issue for the urine; which, insinuating itself amongst the neighbouring muscles and cellular membranes, destroyed four of the ten which he practised this method upon, and some of the others narrowly escaped.

If, therefore, this was the consequence of a wound of the bladder beyond the prostate in so many instances, and we find by experience that it is exceedingly difficult in some men to carry the incision even so far as the prostate, sure it is possible that *Albinus* may be mistaken in his description, or even that *Rau* himself, if he was of that opinion, might be deceived in the parts he wounded; since we know it was generally thought, till within these few years, that the bladder itself was cut in the old way.

After this unsuccessful trial, Mr *Chefelden* made use of the following method, which is now the practice of most *English* operators.

The patient being laid on a table, with his hands and feet tied, and the staff passed as in the old way, let your assistant hold it a little slanting on one side, so that the direction of it may run exactly thro' the middle of the left *erector penis* and *accelerator urinæ* muscles; then make your incision through the skin and fat, very large, beginning on one side of the seam in *perinæo*, a little above the place wounded in the old way, and finishing a little below the

the *anus*, between it and the tuberosity of the *ischium*: this wound must be carried on deeper between the muscles, till the prostate can be felt; when searching for the staff, and fixing it properly if it has slipt, you must turn the edge of the knife upwards, and cut the whole length of that gland from within outwards, at the same time pushing down the *rectum* with a finger or two of the left-hand, by which precautions the gut will always escape wounding; after which the operation finishes nearly in the same manner as with the greater apparatus.

If, upon introducing the forceps, you do not perceive the stone readily, you must lift up their handle, and feel almost perpendicularly for it; since for the most part, when it is hard to come at, it lies in one of the *sinuses* sometimes formed on each side of the neck of the bladder, which project forward in such a manner, that, if the stone lie there, the forceps pass beyond it the moment they are through the wound; so that it would be impossible to lay hold of it, or even to feel it, if not aware of this circumstance.

When the stone breaks, it is much safer to take away the fragments with the forceps, than to leave them to be discharged with the urine: and if the pieces are very small, like sand, a scoop is the best instrument; though some prefer the injecting barley-water into
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the bladder, which suddenly returning brings away the broken particles of the stone.

As there are hardly any instances of more stones than one, when the stone taken away is rough; so, when it is smooth and polished in any part of it, it is almost a certain sign of others behind: on which account, an operator should be careful, in that case, to examine not only with his fingers, but some convenient instrument, for the remaining ones: tho' indeed, in all cases, it may be proper to examine the bladder after the extraction of a stone; because it is possible there may be a second stone, notwithstanding the first be rough.

The great inconvenience of the lateral operation is the hæmorrhage which sometimes ensues in men; for in children the danger of it is not worth mentioning: this, however, is the principal objection which has prevented it being universally practised. But in all likelihood it will be more general when the merits of the method are better known, and it is once discovered that the ill consequence of most of these hæmorrhages is owing more to an error in operating, than to the nature of the operation; for I think I can positively say, that all those branches of the hypogastric artery which lie on this side of the prostate may be taken up with the needle, if the wound be made large enough to turn it about
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freely at the bottom. Yet this is a circumstance that many surgeons have been deficient in; and, instead of making it three or four inches long in a man, they have sometimes made it not above an inch; in which case, it is not only impossible to tie the vessels between the skin and bladder, but it also prevents the proper application of lint or styptics to the artery creeping on the prostate: so that it is not surprising the operation should be discountenanced, when the practice of it is attended with this difficulty.

I have here mentioned lint or styptics as a proper application to stop the hæmorrhage from the artery of the prostate; but if they should not prove effectual, I would advise the introduction of a silver canula through the wound into the bladder, which should be three or four inches long, according to the depth of the wound, and almost as thick as a man's little finger. It must be covered with rag or lint (that it may lie soft), and continue in the bladder two or three days, before it is taken away.

If in the operation any very large vessel of the external wound should be divided, it is advisable to tie it before the extraction of the stone; but the necessity of doing this, does not occur once in twenty times. It rarely happens that the vessels of the prostate burst open any considerable time after the operation,
if

if they did not bleed during the performance of it: but as it is the nature of the symptomatic fever to dilate the vessels and quicken the motion of the blood, it is proper to be upon our guard, especially in plethoric people, and endeavour to obviate the accident by taking away ten or twelve ounces of blood from the arm, and giving an opiate immediately.

There is but one object more of any consequence, which is, the danger of wounding the *rectum*; and this, I confess, is a very troublesome accident: but if the operator observes the rule I have laid down with regard to that article, I should hope it might always be avoided.

In this description, I believe I have been so far from disguising the inconveniences of the lateral operation, that before I speak of its advantages I should once again repeat, that these effusions of blood are but very rare, and seldom or never mortal when properly managed; of which the world needs no better proof than the late extraordinary success we have cut with in our hospitals, which I believe has never been equalled in any time or country.

In this method the remarkable parts wounded by the knife are, the *musculus transversalis penis*, *levator ani*, and *prostate gland*: in the old way, the *urethra* only is wounded, about two inches on this side the prostate, and the

instruments are forced thro' the rest of the passage, which is composed of the bulbous part of the *urethra*, the membranous part of the *urethra*, the neck of the bladder, and *prostate gland*. This channel is so very narrow, that, till it be torn to pieces, the management of the forceps is exceedingly difficult: and it happens frequently, that, from the tender texture of the membranous parts, the forceps are unwarily pushed thro' it between the *os pubis* and bladder; besides that, in introducing the gorget upon the staff, it is apt to slip downwards between the *rectum* and bladder; both which inconveniences are avoided in the lateral operation. It is true, the wound made in the lateral method, will not admit of the extraction of a large stone without laceration, as well as in the old way: but in the one case, the laceration is small, and made after a preparation for it by an incision; and in the other, all the parts I have mentioned are torn without any previous opening, and which are so very tight, that the pain of the distension must necessarily be excessive. It is pity, the operators do not in the old way always slide the knife along the groove of the staff, till they have quite wounded through the length of the prostate, since they are convinced, that, by the extraction of the stone, it is opened in a ruder and more dangerous manner than by incision, and without any advantages

advantages from it; because this opening is made by the finishing of the operation; whereas for want of it, before the extraction, we can hardly widen the forceps enough to receive a large stone; and when we do, the resistance is so very great, as often to break it, notwithstanding all our care. However, in both these operations, the surgeon must not grasp the stone with violence; and, even in extracting, must, with both hands to the branches of his forceps, resist their shutting so tight, as the compression from the lips of such a narrow wound would otherwise make them. Here I speak of the difficulty of laying hold of a stone in any part of the bladder; but if it happens to lie in one of the *sinuses* before mentioned, the forceps are so confined that it becomes still harder. The extraction of very large stones, is much more impracticable with the greater apparatus than by this method, because of the smallness of the angle of the bones in that part where the wound is made; so that indeed it is necessary in almost all extractions to pull the stone downward towards the *rectum*, which cannot be done without great violence to the membranous parts, and even the separation of one from another; whence follow abscesses and floughs about the wound, which is a circumstance not known in the lateral operation. *Ecchymoses* followed by suppuration and gangrene

sometimes spread themselves upon the *scrotum*; and, in short, all the inconveniences and ill symptoms which attend upon the lateral operation, except the hæmorrhage, are in a more violent degree incident to the old way.

An incontinence of urine is not common after the lateral operation, and a fistula seldom or never the consequence of it. But the prevention of a fistula seems to depend very much upon the skill of dressing the wound afterwards: and perhaps it would not so often happen, if the dressing were rightly managed in the old way; though certainly this method is much more liable to them, as the wound is made among membranes, is more contused, and in many, from an incontinence of urine, is continually kept open. I have seen some instances, indeed, in the lateral operation, where, through neglect, the bladder has remained fistulous; but the wound being in a fleshy part, I have, without great difficulty, got little granulations to shoot up, and healed it externally: so that, at present, I think a fistula can hardly be accounted one of the inconveniences of cutting for the stone in the lateral way.

The manner of treating the patient after the operation, is pretty nearly this: If it happens that the vessels of the prostate bleed, dry lint, or lint dipped in some styptic water, such as *aqua vitrioli*, must be applied to the
part,

part, and held there with a considerable degree of pressure for a few hours; or, as I have before mentioned, a silver canula of three or four inches long, covered with fine rag, may be introduced into the bladder, and left there two or three days, which seldom fails to stop the hæmorrhage. The patient may also take an opiate. If the wound does not bleed, a little dry lint, or a pledget of digestive, laid gently in it, is best. The place where the patient lies should be moderately cool, as heat not only disposes the vessels to bleed afresh, but generally makes him low and faint. If, soon after the operation, he complains of a sickness at the stomach, or even a pain in that part of the *abdomen* near the bladder, it is not always a sign of a dangerous inflammation, but frequently goes off in half an hour: to assist, however, in its removal, a fomentation put into a hog's bladder, and applied pretty warm to the part in pain, will be of great service. If the pain increases, after two or three hours, the consequence is much to be feared; and in this case, bleeding, and emollient clysters by way of fomentation to the bowels, are immediately necessary.

The first good symptom, after the operation, is the urine coming freely away, as we then know the lips of the bladder and prostate gland are not much inflamed; for they often grow turgid, and shut up the orifice in

such a manner, as not only to prevent the issue of the water, but even the introduction of the finger or female catheter, so that sometimes we are forced to pass a catheter by the *penis*. From this symptom too we learn, that the kidneys are not so affected by the operation as to cease doing their office; which, tho' a very rare circumstance, may possibly occur. If the patient should become languid, and continue without any appetite, blisters prove beneficial; which may be applied with great safety and little pain, as there is seldom or never any strangury. About the third or fourth day a stool must be procured by a clyster, for it seldom comes naturally the first time; and this method must be continued as every man's discretion shall guide him. As soon as the patient comes to an appetite, he should be indulged in eating light food, with this caution, that he do not eat too much at a time. It sometimes happens, that, a fortnight or three weeks after the operation, one or both testicles indurate and inflame; which disorder may generally be removed by fomentations and discutient applications; or, if a suppuration ensue, which however is seldom the case, the abscess is not very difficult of cure.

If during the cure the buttocks should be excoriated by the urine, let them be anointed with *nutritum*. The dressing from first to last,

is seldom any other than a soft digestive, or dry lint; for the whole art of healing the wound consists in the force with which the doffel is applied. If it be crammed in hard, it becomes a tent, and prevents the growth of the little tender shoots of flesh, till in process of time, from the continual distension, and long drain of the urine, the whole cavity becomes callous, and forms itself into a fistula: on the other hand, if the wound be dressed quite superficially, the external parts of it being more prone to heal and contract than the internal, the consequence will be a degree of obstruction to the urine and matter, which lying about the wound of the bladder, for want of a discharge, will indurate that part, and likewise occasion a fistula. This method of dressing is not peculiar to wounds after cutting for the stone, but is as applicable to *fistulæ in ano*, and almost all abscesses whatsoever: so that the branch of Surgery, which regards the treatment of hollow wounds, depends much more on the proper observance of this rule than the application of particular medicines.

C H A P. XXII.

Of the STONE *in the* URETHRA.

IF a small stone be lodged in the *urethra* near the glans, it may often be pushed out
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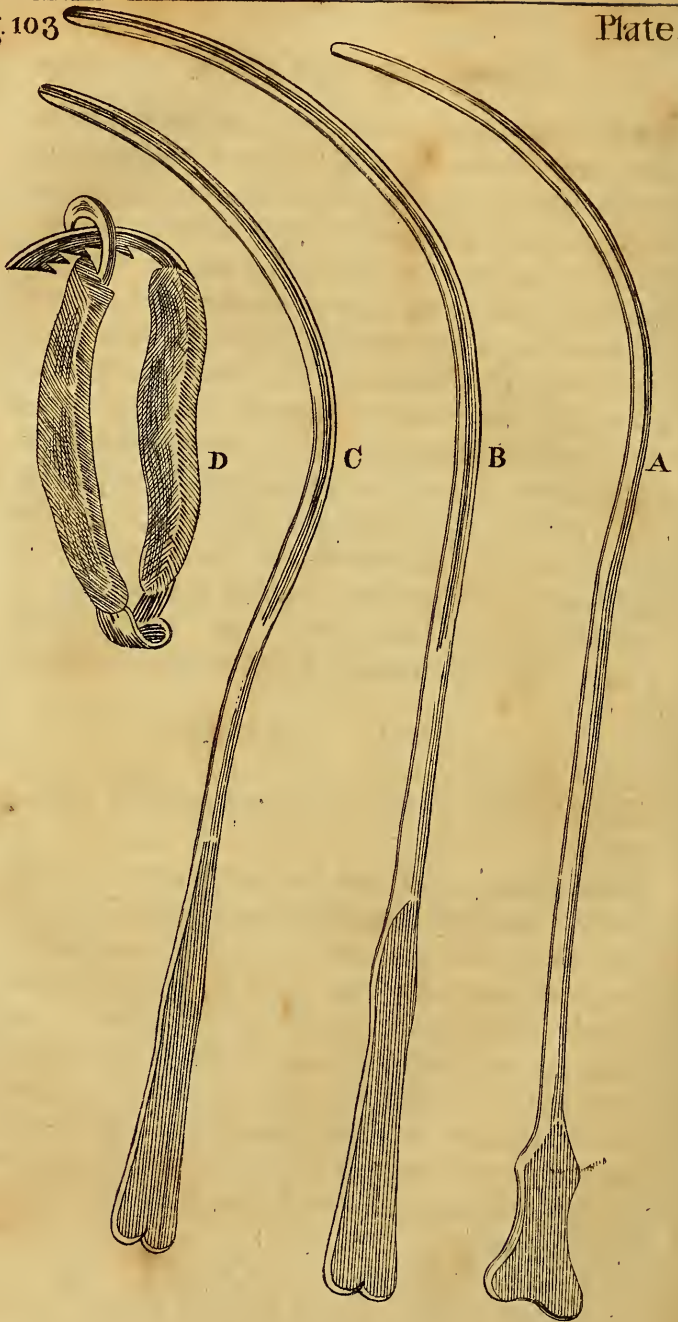
with the fingers, or picked away with some instrument; but if it stops in any other part of the channel, it may be cut upon without any inconvenience. The best way of doing it, is to pull the prepuce over the glans as far as you can; and then making an incision the length of the stone, through the teguments, it may be turned out with a little hook or the point of a probe: the wound of the skin slipping back afterward to its proper situation, and from the orifice of the *urethra*, prevents the issue of the urine through that orifice, and very often heals in twenty-four hours. This is a much less painful method of extracting stones from the *urethra*, than by any instruments that have been hitherto devised.

CHAP. XXIII.

Of the Extraction of the Stone in WOMEN.

THE extraction of the stone in women will easily be understood, since the whole operation consists in placing them in the same manner as men, and, without making any wound, introducing into the bladder a straight director, upon that a gorget, and afterwards the forceps to take hold of the stone; all which may be done without difficulty, by reason of the shortness of the *urethra*. If the stone proves very large, and in
extracting





extracting draws the bladder forwards, it is advisable to make an incision through the neck of it upon the stone, which not only will facilitate the extraction, but also be less dangerous than a laceration, which would necessarily follow. The dressings are fomentations and emollient ointments, which should be applied two or three times a-day, and the patient in other respects be treated like men who have undergone the operation for the stone.

PLATE IV.

The EXPLANATION.

A. A sound used in searching for the stone.

The size represented here is but a little too large for the youngest children, and may be used upon boys till they are thirteen or fourteen years of age; a larger should be employed between that age and adulthood, when one of about ten inches, in a right line from the handle to the extremity, is proper. This should be made of steel, and its extremity be round and smooth.

B. A staff fit for the operation on boys from eight to fourteen years of age. The staff for a man must be of the size of the sound I have already described.

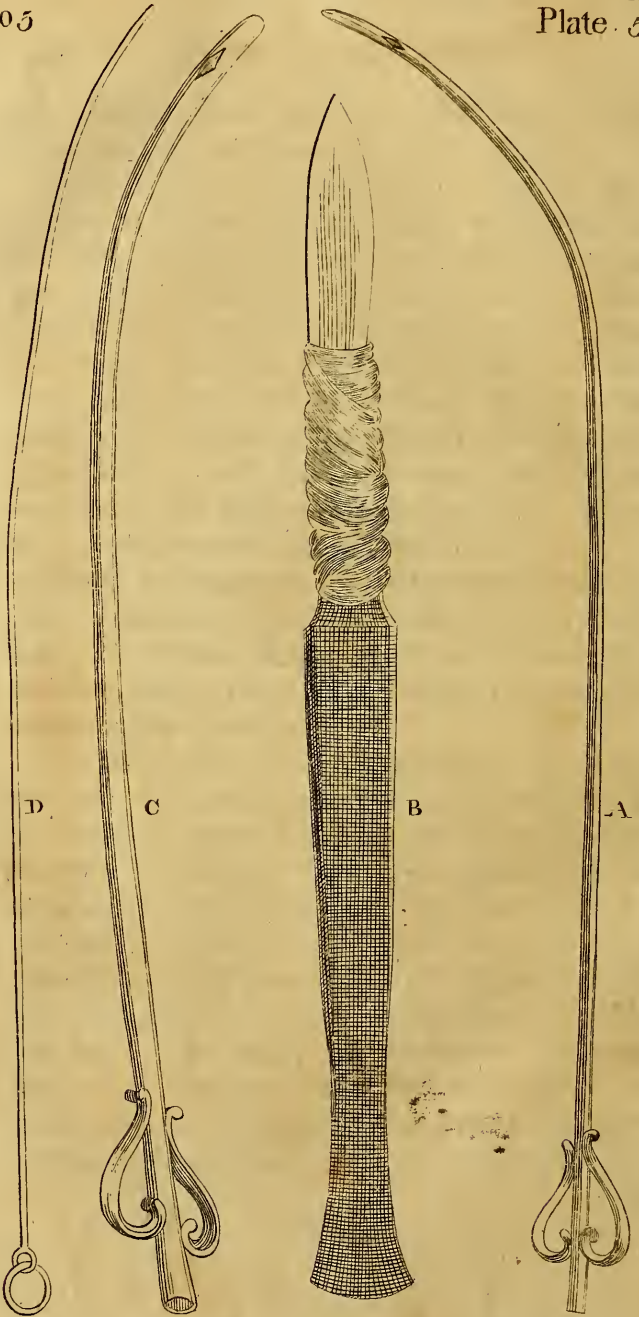
C. A staff something too big for the smallest
est

est children, but may be used upon boys from about four years of age to eight.

The staff has a groove on its convex side, which first serves as a direction where to cut, and afterwards receiving the beak of the gorget, guides it readily into the bladder. Care should be taken, in making the groove, that the edges of it be smoothed down, so that they cannot wound in passing through the *urethra*. The extremity should also be open, otherwise it will be sometimes difficult to withdraw the staff when the gorget is introduced and presses against the end of it.

These instruments are usually made with a greater bending than I have here represented; but I think this shape more like that of the *urethra*, and rather more advantageous for making the incision.

D. The yoke, an instrument to be worn by men with an incontinence of urine. It is made of iron, but for use must be covered with velvet. It moves upon a joint at one end, and is fastened at the other by catches at different distances placed on a spring, as will be easily understood by the annexed print. It must be accommodated to the size of the *penis*, and be taken off whenever the patient finds an inclination to make water. This instrument is exceedingly useful, because it always answers the purpose; and



and seldom galls the part after a few days wearing.

PLATE V.

The EXPLANATION.

A. A small catheter made of silver. This instrument is hollow, and serves to draw off the urine when under a suppression: It is also used in the high operation, to fill the bladder with water. Near its extremity are two orifices, through which the water passes into its cavity: care should be taken that the edges of these orifices are quite smooth.

B. The knife used in cutting for the stone: it is the same I have already described; but I thought it might not be improper to repeat the figure with the alteration of a quantity of tow twisted round it, which makes it easier to hold when we perform the lateral operation, and turn the edge upwards to wound the prostate gland.

C. A female catheter, different from the male catheter, it being almost straight and something larger.

D. A silver-wire to pass into either catheter, for the removing any grumous blood or matter that clogs them up.

P L A T E VI.

The EXPLANATION.

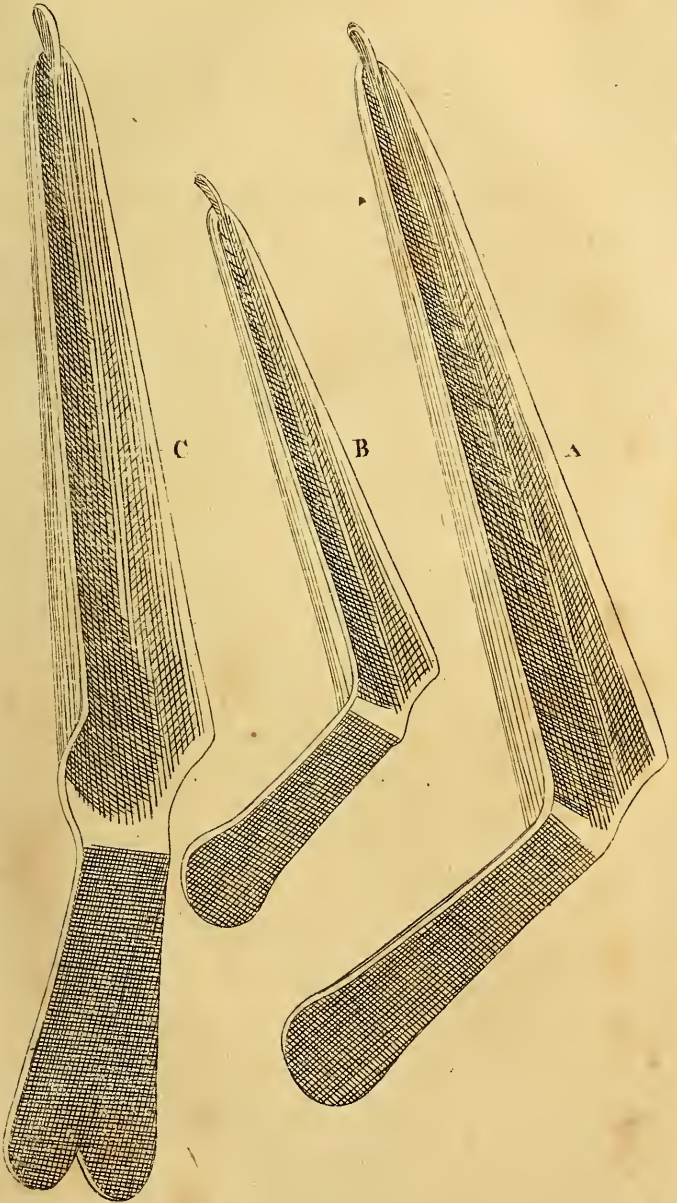
A. The gorget used upon men in the lateral operation.

B. The gorget used upon children under five years of age, in the lateral operation.

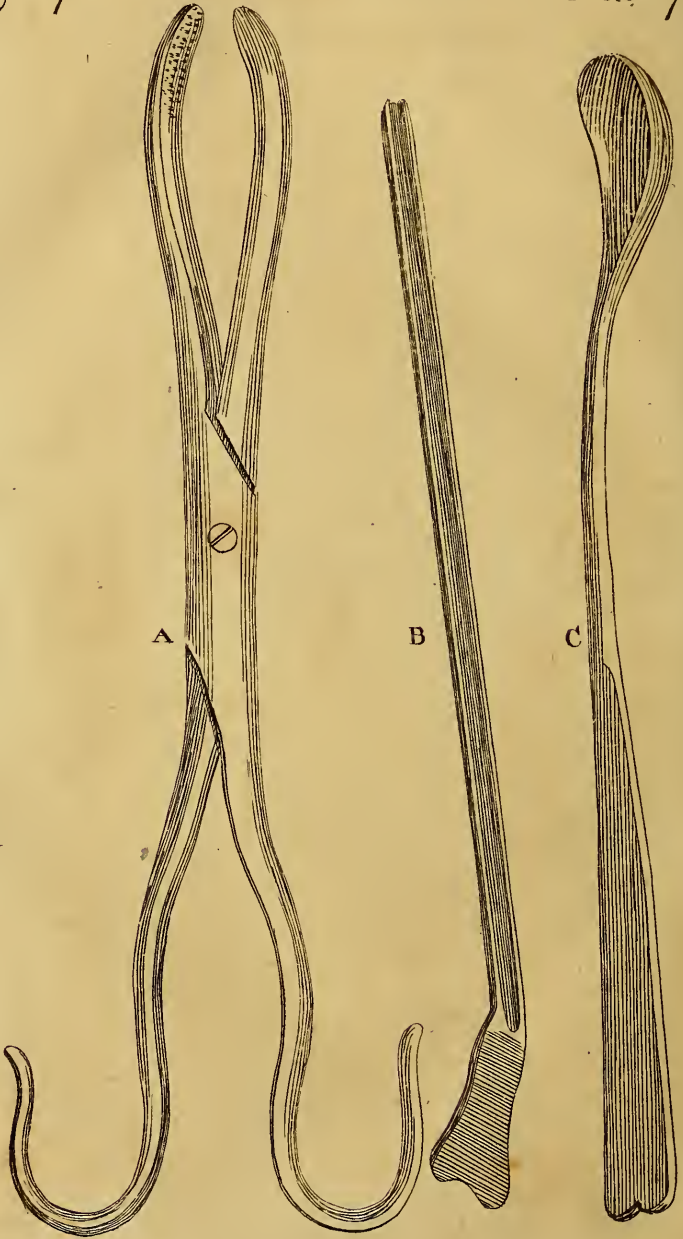
A gorget between the sizes of these two, will be fit for boys from five years of age to fifteen or sixteen.

These instruments are hollow for the passage of the forceps into the bladder; and their handles lie slanting, that they may the more readily be carried through the wound of the prostate, which is made obliquely on the left side of it. The beak at the extremity of the gorget must be smaller than the groove of the staff which is cut upon, because it is to be received in the groove. Care should be taken that the edges of the gorget near the beak are not sharp, lest, instead of dilating the wound as it ought, it should only cut on each side when introduced; in which case, it would be difficult to carry the forceps into the bladder.

C. A gorget, with its handle exactly in the middle; this shaped instrument is used in the old way. All the gorgets should be made of steel.







P L A T E VII.

The EXPLANATION.

A. The forceps for extracting the stone. These are represented a little open, that the teeth may be better seen within-side.

This instrument must be of different sizes for different ages and stones, from the length of that in the copper-plate, to one of near a foot long; but the forceps of about eight inches long will be found most generally useful. The number necessary to be furnished with, will be four or five.

Great care should be taken by the makers of this instrument, that it move easily upon the rivet, that the extremity of the chops do not meet when they are shut; and particularly that the teeth be not too large, lest in entering deep into the stone they should break it: it is of consequence also, that the teeth do not reach farther towards the joint than I have here represented, because a small stone, when received into that part, being held fast there, would dilate the forceps excessively, and make the extraction difficult; on which account, the inside of the blades near the joint should be smooth, that the stone may slip towards the teeth.

B. A director made of steel, used for the
direction

direction of the gorget in the extraction of the stone from women.

C. A scoop to take away the stone when it is broken into small pieces like sand. This instrument is made of steel.

C H A P. XXIV.

Of the EMPYEMA.

THE operation for the *empyema* generally implies an artificial opening made into the cavity of the *thorax*; by which we evacuate any fluid that lies there extravasated, and is become dangerous by its weight and quantity. The fluids described as necessary to be voided by this operation, are blood, matter, and water.

When blood is the fluid supposed to require evacuation by this method, it is always extravasated through some wound of the vessels of the lungs or *thorax*; and being discharged in great quantities on the diaphragm, it is said to oppress respiration till let out by some convenient opening, made in the most depending part of that cavity, which is the only kind of perforation into the *thorax* distinguished by the name of the *operation for the empyema*. But though this opening is universally recommended in the case here stated, yet we meet with few or no examples where

where it has been practised for a mere extravasation of blood; and I should think it can hardly ever be advisable on this account: for if we perform it immediately after the accident, and during the hæmorrhage, the opening made at the bottom of the *thorax* might probably make way for a dangerous effusion of blood, which perhaps would otherwise be choaked up and stopped for want of a ready issue; and if we wait till the hæmorrhage ceases, it becomes needless, because the blood not only for the most part finds some vent by the external wound if left open, but is constantly spit up the *trachea*; so that had we no farther proofs of this absorbent power in the lungs, we might from hence be persuaded of the probability of its being more safely carried off so, than by any artificial opening we can possibly contrive in the *thorax*.

Or if it be thought that the extravasated blood, being coagulated in the *thorax*, cannot be taken up by the vessels of the lungs; yet, even in that case, the operation usually practised will not answer the purpose: for besides the possibility of the lungs adhering to the *pleura* in the place of incision, which would absolutely prevent any advantage from it, the depth and narrowness of the orifice, and its height above the diaphragm, on which the

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congealed

congealed blood is supposed to lie, will make the success at best but very precarious.

To empty the *thorax*, in a rupture of any vessels which open into it, bleeding is very necessary: for it not only stops the hæmorrhage, by abating the force of the circulation; but likewise, by unloading the vessels of their contents, makes them more fit to receive the extravasated fluid by absorption. Gentle evacuations and pectorals are also very serviceable, and a low diet is absolutely necessary.

The rules laid down in some books for distinguishing if a wound penetrates, have led practitioners into mischievous methods, by advising them to examine these wounds with the probe, or, for more certainty, the finger; which, if rudely used, sometimes even tear into the *thorax*, always force or press the parts too much, and often separate the lungs from the *pleura* when they happen to adhere: all which violences will produce abscesses there, especially if the part be afterwards dressed with large tents, or filled with any active injection, both which were formerly applied with a view to deterge the cavity of the wound, but now seem to be exploded in favour of more superficial dressings; the advantages of which method, in my opinion, cannot be too much inculcated.

But what I have here advanced concerning the excellence of superficial applications, without

out dilating the wound to make way for the issue of the blood or succeeding matter, must be considered with regard to punctures or incisions by sharp instruments, not followed with a great discharge. For where the wound is made by fire-arms, the method of practice must be sometimes altered; because not only floughs and great suppurations ensue, but very often pieces of the shirt or coat are carried in with the bullet, which will perhaps require an enlargement of the wound in order to be freely discharged: though even upon this account there will be no occasion to make an opening at the bottom of the *thorax*, since the more dilatation of the wound will more readily give vent to the *pus* and extraneous bodies, than an orifice made lower; because the lungs, being inflamed by the wound, will generally adhere to the *pleura*, and break off the communication between the abscess and the cavity below it. In dressing the dilated wound, care must be taken to apply the dossils with such pressure only as shall be sufficient to keep open the external orifice; and not to crowd them into the *thorax*, so as to lock up that matter, which the very design of dilatation is to give a discharge to.

The second circumstance in which this operation takes place, is a rupture of matter from the *pleura*, *mediastinum*, or lungs, into the cavity of the *thorax*; where accumulating, it at

length proves fatal for want of a discharge. It is true, that the case occurs but very seldom where the operation is necessary; because, in most abscesses of the *thorax*, the matter is usually spit up as fast as it is generated, and in the dissection of such who have died of this species of consumption, we rarely find much extravasated *pus* in the cavity, tho' a great portion of the lungs be destroyed. However, as I have intimated, there are a few examples which require the operation; and they may be distinguished by the following symptoms. The patient is obliged to lie upon the diseased side, or, in case there is matter in both cavities of the *thorax*, on his back; because the *mediastinum* can seldom support the weight of the incumbent fluid, without suffering great pain; but this rule is not certain, it sometimes happening that the patient can lie with ease on that side where there is no fluid. Another symptom of extravasated matter, is an evident undulation of it, so that in certain motions it may be heard to quash. For the most part too, upon careful inquiry, an *oedema*, or at least a thickening of some portion of the intercostal muscles, will be discovered. And lastly, if there be much fluid, it will be attended with a preternatural expansion of that side of the chest where it lies. When therefore these signs appear after a previous *pleuritic* or *pulmonary* disorder, and the case has been
been

been attended with the symptoms of a suppuration, it is most probably owing to a collection of matter: though the patient will also labour under a continual low fever, and a particular anxiety from the load of *fluid*.

I have here described the abscess as breaking into the cavity of the *thorax*: but generally speaking, in an inflammation of the *pleura* or lungs, an adhesion of both ensues; in consequence of which, nature finds a discharge outwardly, it being most frequent for abscesses of the *pleura* and intercostal muscles, and not uncommon even for abscesses of the lungs, to break externally. In case of an adhesion, no farther operation is required than opening the tumour, when suppurated, with a lancet; and if the discharge be so great as to forbid the healing the external ulcer, it may be kept open with a hollow tent; by which manner of treatment many have lived a long time with a running fistula.

The last sort of fluid said to require issue from this operation, is water; which, however, very seldom collects in such manner as to become the proper subject of the operation. For if the dropsy of the *thorax* be complicated with an *anasarca*, or even *ascites*, it is certainly improper: and indeed it can hardly ever take place, but where the distemper is single, and takes its rise from the same sort of disorder in the lymphatics of the *pleura*, as the *hydro-*

cele does from those of the *tunica vaginalis*. The symptoms of this dropsy are, a small cough without spitting, a little slow fever from the disturbance of respiration; sometimes too the water, by a sudden jerk, may be heard to quash; and, generally speaking, its weight upon the *diaphragm* and *mediastinum* are so troublesome as to oblige the patient to stoop forward when in an erect posture, and to turn upon the affected side when he lies down, for the same reason that, when there is water in both cavities of the *thorax*, he is forced to lie on his back.

The manner of operating, whether it be for the discharge of matter or water, is to pitch upon the most depending part of the *thorax*, which some have supposed to be between the eighth and ninth ribs, and others between the ninth and tenth, at such a distance from the *vertebræ*, that the depth of the flesh may not be an impediment to the perforation. This distance is determined to be about a hand's breadth; and here, with a knife, scissars, or trocar, we are ordered to make the perforation. But in doing it, there are a great many difficulties. In fat persons, it is not easy to count the ribs; and the wound will be very deep, and troublesome to make: it is hardly possible to escape wounding the intercostal artery, which runs in this place between the ribs; or, if you avoid it, by
cutting

cutting close to one of the ribs, a caries of the bone will follow from the pressure of the tent employed afterwards. Again, the inflammation of the wound may possibly affect the diaphragm, which is supposed almost contiguous to it; and this may prove of very ill consequence. So that, upon the whole, without any farther recital of objections to the *empyema* thus performed, it cannot appear an advisable operation. But if the only advantage proposed by this situation of the wound be derived from its dependency, the purpose of discharging the fluid will be as well answered by an opening between the sixth and seventh ribs half way from the *sternum* towards the spine; which, by laying ourselves down, becomes in effect as depending an orifice, as the other in sitting up; and by an opening made in this manner, we avoid all the inconveniences in the other method: for, in this part of the *thorax*, there is very little depth of muscles; the artery lies concealed under the rib; and the diaphragm is at a great distance: so that none of those mischiefs can ensue I have supposed in the other method; which consequently will give it the preference. The opening is best made with a knife; and should be about an inch long thro' the skin, and half an inch thro' the subjacent muscles: tho' to make the incision with less risk of wounding the lungs, it may be advisable

to dilate it with the blunt-pointed knife (as is practised in the operation for the *bubonocèle*) after having made a small puncture with a common knife. If it should be objected, that the fluid cannot be discharged by this orifice while we are erect, whereas, by making it in the lower part of the *thorax*, it will be continually draining; I think it may be answered, that, after it is once emptied, it will hardly in twelve hours be generated in greater quantity than what will lie upon the diaphragm below the opening made even by that operation, and consequently cannot be more readily discharged by one orifice than the other. The treatment of the wound will be according to the nature of the discharge. If, after a few days, there appears no drain, you may let the orifice heal up; but if it continues, it may be kept open with a short silver *canula*, till such time as an alteration in that circumstance will give us leave to cicatrize with safety.

C H A P XXV.

Of Encysted TUMOURS.

THESE tumours borrow their names from a cyst, or bag, in which they are contained; and are farther distinguished by the nature of their contents: if the matter forming them

them resembles milk-curds, the tumour is called *athemora*; if it be like honey, *meliceris*; and if composed of fat, or a suety substance, *steatoma*. The two first are not readily distinguished from one another, but their difference from the *steatoma* is easily learnt by their softness and fluctuation. These tumours appear in every part of the body, and in places where there are no glands; which, with the circumstance of their composition continuing always the same from their first formation, agrees but little with an opinion some of the moderns are so fond of, that this kind of swelling is an obstructed gland, whose membrane forms the cyst, and whose fluids, when they burst out of their vessels after a long obstruction, make the matter contained.

The *steatoma* is never painful till by its weight it grows troublesome, nor is it a mark of general indisposition of body; so that the extirpation seldom fails of success. The size of some of them is very large, frequently weighing five or six pounds, and there have been instances of their weighing above forty.

When the *steatoma* is irregular in its surface, with eminencies and depressions, it is suety; whereas the fat one has for the most part an uniform smooth outside. The operation for a *steatoma* will be understood by the description of that for the scirrhus.

The *atheroma* is much more common than
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the *meliceris*, at least, if all encysted tumours with matter not curdled, may, in compliance with custom, be called so:—these are more frequent, and grow larger, than those where the matter is curdled, being often attendant on scrophulous indispositions, which makes them more difficult of cure.

The cysts of these tumours, with the skin covering them, after a certain period of growth, resisting any farther enlargement, do frequently inflame and break; but this opening is not so advantageous for the cure, as extirpation by the knife, which should be done in the infancy of the swelling. When the tumours are no bigger than a small golden pippen, they may be dissected away from under the skin, by making a straight incision only through it: but if they exceed this bulk, an oval piece of skin must be cut thro' first, to make room for the management of the knife and taking away the tumour; in which case, it will be advisable to take off the upper portion of the cyst with the skin, and then by the help of a hook to dissect away as much of the remainder of it as can be conveniently, which is a less painful and more secure method than destroying it afterwards with escharotics. This rule is to be observed, when the cyst runs so deep amongst the interstices of the muscles, as to make it impossible to remove the whole of it, where if
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we cut off a great quantity, the rest usually comes away in floughs and matter. I once opened a remarkable *atheroma* of this kind; it was about as big as the crown of a man's hat; and lay underneath the pectoral muscle, (as all I ever met with on the breast have done), extending itself towards the arm-pit, amongst the great vessels, and pressing against the clavicle. I cut away a large circular piece of the skin, pectoral muscle, and cyst; but did not dare to touch the lower part of it, which I could not remove without laying the ribs bare. However, it separated in the digestion of the wound, which for some time discharged excessively, and the whole cavity filled up, leaving him the use of his arm almost perfect: after this, two or three small splinters of the clavicle worked away through the skin, but without any great inconvenience.

The ganglion of the tendon is an encysted tumour of the *meliceris* kind, but its fluid is generally like the white of an egg. When it is small, it sometimes disperses of itself; pressure, and sudden blows, do also remove it: but for the most part, it continues, unless it be extirpated. It is no uncommon case to meet with this species of ganglion, running under the *ligamentum carpale*, and extending itself both up the wrist and down to the palm of the hand. The cure of this disorder cannot be effected but by an incision through its whole

whole length, and dividing the *ligamentum carpale*, which I have performed successfully several times.

The dressing in these cases does not at all differ from the general methods of treating wounds.

C H A P. XXVI.

Of the AMPUTATION of the Cancered and Scirrhus BREAST.

THE success of this operation is exceedingly precarious, from the great disposition there is in the constitution, after an amputation, to form a new cancer in the wound or some other part of the body. When a scirrhous has admitted of a long delay before the operation, the patient seems to have a better prospect of cure without danger of a relapse, than when it has increased very fast, and with acute pain. I cannot however be quite positive in this judgment; but, upon looking round amongst those I know who have recovered, find the observation so far well grounded. There are some surgeons so disheartened by the ill success of this operation, that they decry it in every case, and even recommend certain death to their patients rather than a trial, upon the supposition it never relieves: but the instances where

where life and health have been preserved by it, are sufficiently numerous to warrant the recommendation of it.

The scirrhus may be distinguished by its want of inflammation in the skin; its smoothness and slipperiness deep in the breast; and generally by its pricking pain, which, as it is more or less, increases the danger accordingly; though there are some few with little or none in the beginning. As the tumour degenerates into a cancer, which is the worst degree of scirrhus, it becomes unequal and livid; and, the vessels growing varicous, at last ulcerates.

In extirpating the scirrhus, if it be small, a longitudinal incision will dilate sufficiently for the operation: but, if too large to be dissected out in that manner, an oval piece of skin must be cut through first, the size of which is to be proportioned to that of the tumour; for example, if the swelling is five inches long and three broad, the oval piece of skin cut away must be nearly of the same length, and about an inch and a half in breadth. In taking off the whole breast, the skin may be very much preserved, by making the wound of it a great deal less than the basis of the breast, which must be carefully cleared away from the pectoral muscle. This is not difficult to do, because all these scirrhuses, being enlarged glands, are encom-
passed

passed with their proper membranes, which make them quite distinct from the neighbouring parts, and easily separable. At least this is the case when the tumour is moveable: for sometimes it adheres to the subjacent muscle, and that muscle to the ribs; in which circumstance the operation is impracticable. When it is attended with knots in the arm-pit, no service can be done by amputation, unless the knots be taken away; for there is no sort of dependence to be laid on their subsiding by the discharge of the wound of the breast.— The possibility of extirpating these knots without wounding the great vessels, is very much questioned by surgeons; but I have often done it, when they have been loose and distinct.

The bleeding of the great arteries is to be stopped by passing the needle twice through the flesh, almost round every vessel, and tying upon it, which will necessarily include it in the ligature. In order to discover the orifice of the vessels, the wound must be cleaned with a sponge wrung out of warm water.

The scirrhus tumours which appear about the lower jaw, are, generally speaking, scrophulous disorders, that distinguish themselves almost by the circumstance of fixing on the salivary glands. These are very stubborn of cure; but not so bad as the scirrhus, since they frequently suppurate, and heal afterwards. If they imposthume again after
heal-

healing, it is for want of a good bottom, which may sometimes be procured by destroying their bad surface with a caustic. Besides these, there is another species of scirrhus in the neck, that succeeds better after extirpation than either of the former kinds. This is an enlargement of the lymphatic glands, which run close up by the jugular vein; and is distinguishable from cancers of this part, by its moveableness, want of pain, the laxness of the skin covering it, the small degree of pressure it makes on the *œsophagus* and *trachea*; and lastly, the good habit of body, as it seldom affects the constitution, which cancers here do very early after their first appearance. This tumour, from its situation, requires great exactness in the cutting off: the last I took away of this kind, I separated from the jugular vein near the length of an inch and a half. They sometimes extend up to the chin towards the mouth, and occasion a division of the salivary duct in operating, which proves very troublesome to heal; but, when all other methods have failed, may be cured by a perforation into the mouth, through that part of the cheek where it is wounded, which by a tent or small seton may be made fistulous; then by properly dressing upon the outside, the oozing of the *saliva* that way will be prevented, and the external orifice healed without difficulty.

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The treatment of all these wounds may be with dry lint first, and afterwards as in the common incised wounds.

C H A P. XXVII.

Of the Operation of the TREPAN.

THE operation of the *trepán* is the making one or more orifices thro' the skull, to admit an instrument for raising any pieces of bone that by violence are beaten inwards upon the brain, or to give issue to blood or matter, lodged in any part within the *cranium*.

Fractures of the skull are at all times very dangerous, not in consequence of the injury done to the *cranium* itself, but as the brain becomes affected either from the pressure of the fractured bone, or that of the extravasated blood and matter. If then the symptoms excited by a fracture do sometimes follow from a mere extravasation of blood, as is the case when the *cranium* is not beaten inwards, it must likewise happen that a rupture of the vessels of this part without a fracture will also occasion the same disorders: for this reason, the operation may take place where the skull is not much offended, but only the vessels of the *dura mater*, the *pia mater*, or the brain.

The writers on this operation have described
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bed the different disorders in which it is useful, under a great variety of names; but those few general ones, which all surgeons are acquainted with, are quite sufficient for understanding the nature of every case that can happen.

When the *cranium* is beaten inward, without any fracture, it is called a *depression*; when very much broken, a *fracture*; or if broken and beaten in also, a *fracture with depression*; if it is only cracked, without depression, though properly a fracture, it is called a *fissure*; if none of these disorders appear, where there is a suspicion of them, the symptoms are imputed to a concussion of the brain. These are the four distinctions in use, and which fully comprehend all the others.

The depression of the *cranium* without a fracture can but seldom occur; and then it happens to children, whose bones are more pliable and soft than those of adults. I have met with one instance of this myself in a girl of seven years of age. When she first received the injury, she had the complaints of an oppressed brain, but they soon went off. The blow formed a large tumour on the parietal bone, for which she was put under my care some days after the accident. I opened immediately into it, by cutting away a circular piece of the scalp, and took out a great quantity of grumous blood lying underneath the

periosteum : -I then dressed the depression with dry lint; and finding no complaints come on, continued the same method, till in about six weeks she was perfectly cured.

In blows of the *cranium* requiring the use of the trepan, the marks of a fracture are generally very evident, since the scalp is often lacerated so much as to expose it to our sight: but if the wound of the scalp be so small as only to admit a probe, we must judge then by the feel of the surface of the bone; using the caution of not mistaking a future for a fracture, which *Hippocrates* confesses he himself did; though for his frank confession of an error, to prevent others being misled, he is as much recommended to posterity as for any of his other qualities.

If there be no wound of the scalp, you must press about the head with your fingers, till the patient complains of some particular part, which in all likelihood is the place affected, and, if the scalp there be separated from the *cranium*, is almost infallibly so. The symptoms of a fracture are, a bleeding at the ears and nose, a loss of sense, vomiting, drowsiness, delirium, incontinence of urine and excrement: but what is most to be depended upon is, a depression of the bone, or a roughness on its outside; for all the other complaints not only happen to concussions which do well without the application of a trepan, but
likewise

likewise there are fractures not attended with any of them, or at least in a slight degree; so that these symptoms alone, without examination of the part affected, are but an uncertain rule to go by.

In concussions without a fracture, that produce the symptoms here laid down, and do well afterwards, the vessels of the brain and membranes are only inflamed and dilated: or if they are ruptured, they absorb the extravasated blood again; on which account, nature should be assisted by plentiful bleedings, clysters, and other evacuations, and so in all fractures where the patient is not trepanned immediately. However, although people with concussions in the violent degree I have stated, do sometimes recover, it is so very seldom, that there can be no pretence, when they happen, for neglecting the trepan, but not being able to learn in what part the concussion is. The opportunities I have had of opening some people who have died under this circumstance, have sufficiently convinced me how little is to be trusted to any other method than an opening for the discharge of the abscess, which by confinement of matter becomes very large, spreading over a great quantity of the brain before it kills.

Writers dispute very much about the possibility of the *contra-fissure*, or a fissure occasioned on the part of the head opposite to that

on which the blow is given, or where the inner table is fractured, while the outer one remains entire: but there are histories of cafes, which, if fairly ftated, make it unquestionable; and this is moft certain, that, if the complaint be at a diftance from where the blow was received, there can be no danger in fcalping, and applying the trepan to that part where the pain is.

There are furgeons who fay that the veffels of the *diploë* do fometimes by a concuffion break; and that the matter making its way through the inner table of the fkull into the brain, requires a trepan: but I believe there is no very good authority for this affertion.

When we are affured of a fracture or depreffion, though the fymptoms in a great meafure go off, and notwithstanding there are a few histories in authors where we read that patients have furvived without the operation, it is, in my opinion, always advifeable to trepan as foon as poffible, in order to prevent the fpreading of the abfcels, which feldom fails to follow upon the rupture of the veffels of the brain and membranes, and for the moft part in a few days; though there are a great many instances of fractures not bringing on a fatal abfcels for a great length of time after the accident.

I once trepanned a young woman about a hundred days after fhe received the blow. The
lower

lower part of the parietal and upper part of the temporal bones were fractured and depressed: she bled at the nose and ears when she first received the injury; and had at times been drowsy, and in some little pain, till towards the ninetieth day, when the symptoms of a compressed brain came on stronger; and a small time after, she put herself under my care: which, with the many instances of the same kind to be met with in authors, shew how little safe it is to trust to any extravasation or depression on the brain doing well without the assistance of the trepan.

The manner of treating a fracture of the *cranium*, will be according to the nature of the fracture itself, and the injury of the scalp. If the wound of the head be torn into angles, perhaps cutting off the lacerated flaps will make room for the saw; if the bone be broken into several pieces, the pieces may be taken away with the forceps; or if some of the skull be also depressed, the removal of the pieces will, without perforating, make way for the elevator to raise the depressed part: but if the fracture be not complicated with a wound of the scalp, or the wound be too small to admit of the operation, which seldom fails to be the case, then the fracture must be laid bare, by taking away a large piece of the scalp. It is a fashion with some surgeons, to make a

crucial incision for this purpose, which they prefer to the other method, upon the supposition that the wound will more easily heal again after the operation, by turning down the flaps; and in case we find no fracture, which sometimes happens after scalping, that by making this species of wound an exfoliation of the bone and tediousness of cure will be avoided. But whoever has seen the practice of the crucial incision, must be sensible of the false reasoning used in its favour: for it seldom happens that we inquire for a fracture of the scull by scalping, but that the scalp itself is contused; which circumstance generally bringing on a plentiful suppuration, and the matter lodging between the *cranium* and skin, not only prevent their immediate healing, but occasion a caries of the bone, which is the accident meant to be shunned by it; and, frequently, at last the lips of the wound, growing callous, require cutting off, to procure a cicatrix. If then the objection be good to the crucial incision when no operation is performed, it becomes of so much more force when we are assured of using the trepan, that I think it is indisputably right at all times, to take off the scalp when we lay bare the *cranium* with a view to the operation, which seldom fails to granulate with flesh in a few days if dressed only with dry lint, and rarely grows carious, if not affected by a
great

great discharge of matter from the brain, and even in that case but superficially; or if, after it is thus exposed, new flesh should not generate upon its surface, the growth of it may be quickened by boring little orifices into the substance of the bone, or rasping it with the ruginé. The form of the piece taken away may be nearly circular; and to be better assured of the course of the fracture, it will be proper it should be of the whole length of it. I believe there are few will care to expose so much naked skull; but whoever knows the great advantage and the little danger of it, will not hesitate. When the scalp is removed, the *periosteum* must be raised, and the arteries immediately tied, which will make way for the operation to be directly performed; though the effusion of blood has been esteemed so troublesome in this part, as to have made it almost an universal practice to postpone the use of the trepan to the day after: but the apprehension is without foundation; for if two or three of the larger vessels are tied, the others may be easily stopped with a little dry lint, and the operation take place without any inconvenience, which I have always done myself, and would recommend to others, considering how urgent the nature of the distemper is, and that less than twenty-four hours is often the difference between life and death when the brain is much pressed by a fractured bone.

Before the application of the trepan, it is to be remembered there are certain places on the skull where it cannot be used with so much safety as on others. The whole length of the sagittal suture, down to the nose, is always mentioned as one where the perforation is dangerous, because of the spine of the *os frontis*, and the course of the superior longitudinal *sinus* under this part, which it is supposed would be necessarily wounded by the saw, and in consequence destroy the patient by the hæmorrhage. But though a perforation may, contrary to the general opinion, be made over the *sinus* without offending it, and, even if it was wounded, the effusion of blood would not in all probability be mortal (as I have seen in two instances), yet at best it would be very troublesome; and since we are not straitened in that part of the *cranium* for room, I think it is advisable to forbear operating in this place. The bony *sinuses* of the *os frontis* forbid the use of the trepan near the orbits of the eyes: therefore, if it should be depressed near those cavities, the surgeon must be careful to perforate either above or on one side of the fracture; for sawing below it, will only lead into the *sinus*, and answer no purpose in the design either of giving a discharge to the matter from the brain, or an opportunity to elevate the depression; nay,
perhaps

perhaps leave an incurable fistula, if the patient escapes with life.

The *os occipitis* being very uneven, both in its internal and external surface, makes trepanning there almost impracticable; besides, the great *sinuses* run about so much of it, as hardly to afford space to perforate without danger of wounding them. But then it is so defended from injuries by its situation and strength, that fractures do not happen to it so often as to the other bones of the *cranium*; and when they do, for the most part they become so soon mortal, by affecting the *cerebellum*, which it sustains, that the operation is seldom required in this case. Indeed the upper angle of this bone lies above the *cerebellum*; and, when fractured or depressed, is not attended with so immediate danger: but when this happens, the course of the longitudinal *sinus* down the middle of it, and the neighbourhood of the lateral *sinuses* beneath it, make it advisable to trepan at the lower part of the *os parietale*, or at least upon or just below the lambdoidal suture, so that the perforation of the *os occipitis* can hardly ever be proper.

It may be observed I have spoken of wounds of the *cerebellum* as proving inevitably mortal when affected by a fracture. How long a patient may continue with matter on its surface, I cannot take upon me to say: but I believe

believe there is no instance of a cure after an abscess; and as for wounds of it, they are generally almost instantaneous death; whereas sometimes great portions of the *cerebrum* have been carried off, or destroyed, without any notable inconvenience. From this great difference of danger in affections of the *cerebrum* and *cerebellum*, has arisen the opinion, that the first is the organ of animal motion only, and the other of vital.

The places, then, unfit to admit the saw, are the three I have described; that is, the sagittal suture, that part of the *os frontis* near the orbits of the eyes, and the *os occipitis*. But when a fracture happens in any other part above the ear, there is no objection to the operation. When there is only a small fissure without any depression or motion in the bone, the trepan may be applied on the fissure itself, which will more readily give vent to the blood or matter underneath than if made at a distance. If the fissure be large, and the bone weakened or depressed, the trepan must be applied on one side of it, but so as to make it a part of the circumference of the sawed piece: if the fracture run upwards, it will be eligible always to perforate near its bottom, because the dependency of the orifice will give better issue to the matter; though the ill-grounded apprehension of the brain falling out there, has made many eminent surgeons

geons contradict this rule in their practice. If, by making one orifice, you cannot raise all the depressed part, you must make a second and a third, and continue doing so till you have reduced the whole *cranium* even. There is frequently occasion to repeat it twice or thrice; and it has been done twelve times, nay oftener, with success; which I mention, to show the little danger there is, either in sawing the scull, or exposing the *dura mater* and brain, when the pressure is taken off. Indeed the mischief of laying the brain bare is so small, compared with a concussion of it, or an abscess from pent-up matter, that those fractures of the scull, where the bone is broken into splinters the whole extent of it, and can be taken away, much more readily do well, than a simple fissure only, where the abscess cannot discharge itself freely: for which reason, though the depressed fracture may be raised by the means of one orifice, yet if it is of a considerable length, it will be almost absolutely necessary to make one or two more openings, for the convenience of discharge; since, for want of this, we see abscesses increase daily in their quantity of matter, and at the end of a few weeks carry off the patient. Those who are conversant in the dissection of persons dying of this disorder, will be convinced of the force of this reasoning, since they not only constantly find

pus

pus lodged in the brain as far as the fissure extends, but all round about it, sometimes spreading over a quarter of its surface.

In concussions of the brain without a fracture of the *cranium*, if the trepan be applied, and vast discharges ensue, it will be also convenient to make more perforations into the abscess and the neighbourhood of the abscess, the situation of which will be easily guessed by the direction of the stream of matter. And here it is to be observed, that abscesses which ensue from a concussion are generally more extensive and dangerous than those which accompany a fracture with depression: for in a fracture, the yielding of the bone destroys, in a great degree, the force of the striking body, and prevents any violent commotion of the brain; so that what the brain suffers, results chiefly from the pressure of the incumbent bone, and the laceration of the vessels near the fracture; whereas, when the *cranium* resists the shock, all or great part of the *cerebrum* sustains the concussion, and is often imposthumated or inflamed almost in its whole dimension, as we find upon opening those who die of this disorder.

The manner of trepanning is this: Having fixed your patient's head steady, either on the bolster of a bed, or by placing him in a low chair, with the pin of your saw mark the centre of the piece of bone to be taken out;

out: then, with the perforating trepan, make an orifice deep enough to receive the pin; which being fixed in it, will prevent the saw from slipping: and thus you are to continue sawing, till the impression made will preserve the steadiness without the pin; when it is to be taken away, for fear of its wounding the brain before the saw has entered through the *cranium*, which it would do at last, because of its projection. In working through the bone, the teeth of the saw will begin to clog by that time you arrive to the *diploë*: wherefore a brush must be ready to clean it every now and then, and with a pointed probe you must clear away the dust in the circle of the trepanned bone; observing, if it be deeper on one side than the other, to lean afterwards on that side where the impression is least, that the whole thickness may be sawed thro' at the same time. To do all this with less interruption, it will be proper to have two saws of exactly the same diameter, that an assistant may be brushing one while you operate with the other. We are advised to saw boldly, till we come to the *diploë*; which, it is said, will always distinguish itself by the bloodiness. But however, this is not a certain mark to go by: for tho' where there is a *diploë*, it will manifest itself by its bloodiness, yet sometimes the scull is so very thin as not to admit of any; in which case, if an opera-
tor

tor should push on his instrument in expectation of meeting with this substance, he would unwarily wound the brain. This is not very often the case; but, however, often enough to put a man on his guard, and make him inquire whether the bone be loose after a little sawing, which is the only rule we go by when we have passed thro' the *diploë*, and may as well be attended to before coming at it, without any considerable loss of time. When it is quite sawed through and lies loose, it may be taken away with the forceps contrived for that use; and if the lower edges of the orifice next to the *dura mater* are splintered, they may be scraped smooth with a lenticular.

These are the chief processes of the operation of the trepan; the only thing remaining to be done, is with an elevator, introduced at the orifice, to raise the depression, or broken splinters if they cannot otherwise be laid hold of, and to draw out the grumous blood, or any other extraneous body. If the *dura mater* be not wounded or torn, an incision must be made through it, to give way to the blood or matter, which almost certainly lie underneath it, if the symptoms have been bad, and none has been discharged from between the *cranium* and *dura mater*: though it has been lately observed, that an abscess will sometimes be formed in the substance of the
brain;

brain; and therefore, if the puncture of the *dura mater* does not procure an evacuation of the matter, and the symptoms of a suppuration are still urgent, it will be advisable to make a small incision with a lancet into the brain itself.

I have used the word *trepān* all along, for the sake of being better understood; but the instrument I recommend is a *trepbine*, the advantages of which, as also that of a cylindrical saw, or one nearly cylindrical, are described in the explanation of the copper-plate.

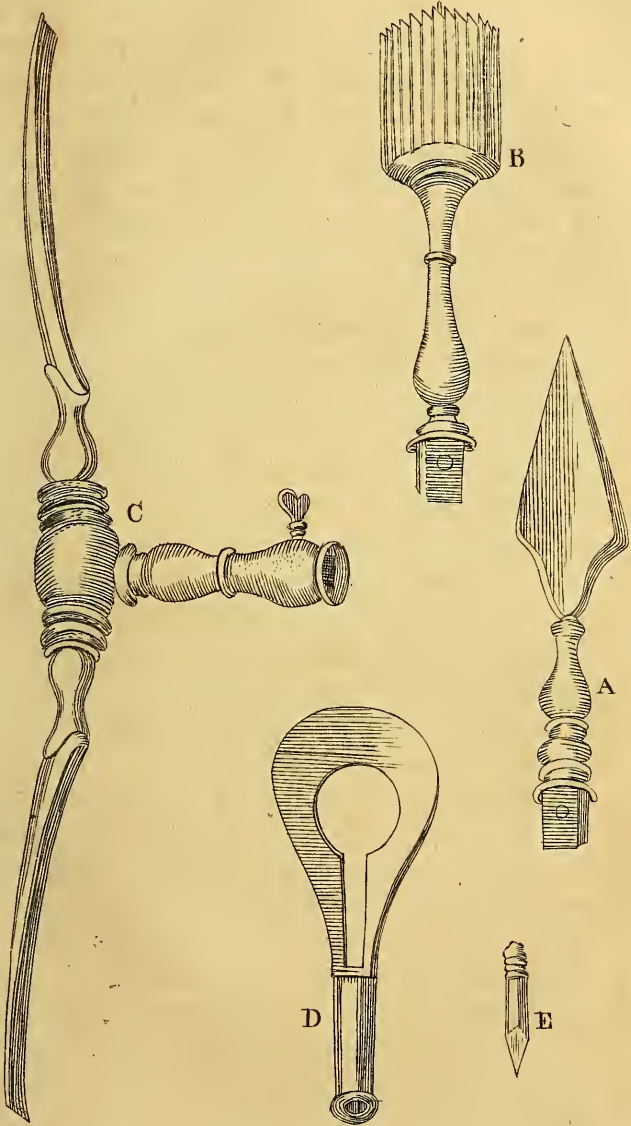
With regard to the dressings of these wounds, I think it is very certain, that as the greatest part of the evil proceeds from the quantity and pressure of the matter, whatever approaches towards the nature of a tent, and increases its quantity and pressure by locking it up, must be pernicious: therefore, I would exclude the use of all syndons whatever. The hasty application too of spirits of wine, which is so commonly advised, cannot be proper; as they are not only unfit for inflammations in general, but also crisp up the vessels of the *dura mater* and brain, and, stopping the suppuration, sometimes produce a gangrene. Since then a close application is inconvenient, and, whatever good there may be in topical medicines, it cannot for the most part be communicated to the abscess by reason of its extent

tent beyond the orifice, the best remedy will be dry lint only; which must be laid on loosely to give vent to the matter, and be repeated twice a-day till the discharge is lessened, when once in twenty-four hours will be sufficient to the finishing of the cure, which will be something retarded by the exfoliations that sometimes follow this operation. The patient afterwards may wear a plate of tin upon the scar, to defend it from blows or any accidental injury.

P L A T E VIII.

The EXPLANATION.

A. The perforator, commonly called the *perforating trepan*. With this instrument an orifice is usually made for the reception of the pin on the centre of the piece of bone that is to be taken away in the operation of trepanning; though, if the pin be very sharp, and project but little beyond the teeth of the saw, as in that marked with the letter *B*, the perforator would be needless; but as the point of the pin presently grows blunt with use, and in that case it is difficult to fix the saw, I think it is advisable to have this instrument in readiness. It is also handy for boring into the substance of the bones, in order to promote a granulation of flesh on their surfaces;



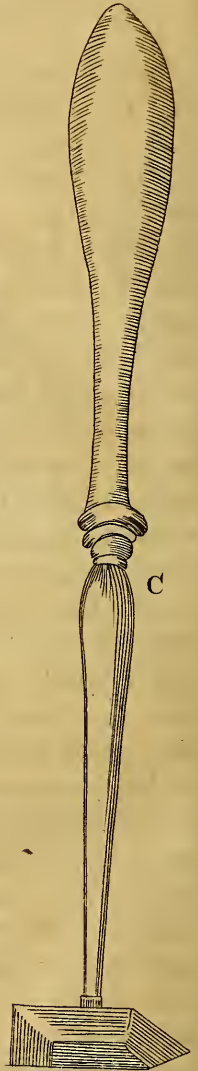
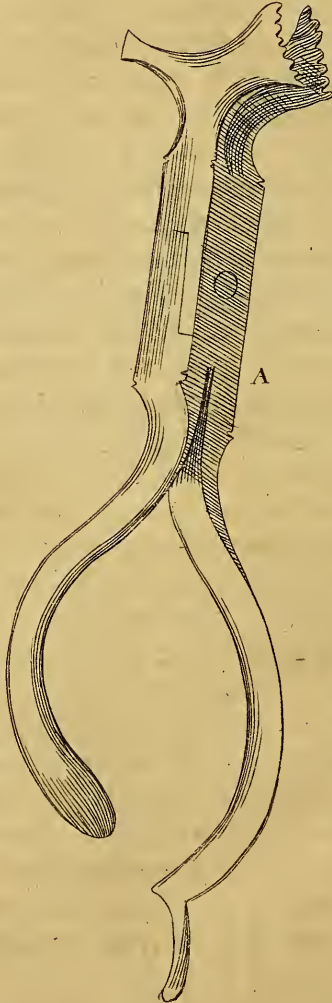
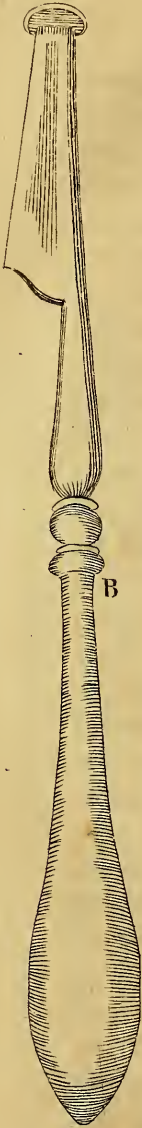


surfaces; when it is made use of, it must be received and fastened in the handle *C*.

B. The crown or saw of the trepan, with the pin appearing just beyond the extremities of the teeth. It may be observed the shape of this saw is cylindrical, differing from those in use, which are all conical, and some in a very great degree. Surgeons have generally conceived great advantages to arise from this form. First, as the circumstance of the utmost importance, they have imagined there would be danger of injuring the brain, by sawing too suddenly through the *cranium*, if the enlargement of the saw did not increase the obstruction, in proportion as they advanced towards it, and make the working of the instrument exceedingly slow. It has also been believed, that unless the saw was smaller near the teeth than towards its basis, it would be impossible to incline it on any part where it had not made so deep an impression as in others: in consequence of which, one side of the circle would be sawed through, and the membranes or brain injured; while on the other, perhaps, the saw would not have penetrated through the first table of the *cranium*. The last remarkable argument in favour of the conic saw, is, that it more readily admits, and afterwards retains, the sawed piece of bone in its cavity. But I think all the advantages attributed to this figure are almost

imaginary; and the great labour of working so slowly and difficultly, is not only very inconvenient to an operator, but by no means serviceable to the operation: for notwithstanding the saw be cylindrical, and works without any other impediment than what lies before the teeth, yet, even with this advantage, the operation goes on so gradually, that, from the experience I have had, I do not find the least danger of suddenly passing through to the brain, as is apprehended, if we proceed with the caution of not leaning too hard on the instrument when the bone is almost sawed through. And with respect to the impracticableness of inclining it on any particular part of the circle, when sawed uneven, which is commonly alleged, whoever will try the experiment, will in a moment discover the falseness of the assertion: besides, the very instance stated overthrows this reasoning; for if the circle has been already made deeper in one part than another, it must imply that we have leaned with more force on one part than another, and consequently may at pleasure do the same thing again. As to the last supposed advantage, of its receiving and retaining the sawed piece of bone in its cavity, the benefit would be so frivolous, if it had truly the preference of the cylindrical one in that respect, that it would not be worth mentioning; but, in fact, the cylindrical saw
receives





receives the piece of bone very readily, and often retains it in its cavity.

C. The handle of the foregoing instrument, called the *trepine*, which is much preferable to the *trepan* (an instrument like a wimble used by joiners), because of the great convenience of holding it, and leaning on one side or other of the saw as we find it necessary: the *trepan*, however, though allowed to be unhandy, is the instrument most used by surgeons in other parts of *Europe*, upon the supposition of its working quicker than the *trepine*.

I have represented the *trepine* of such a shape as to make it a convenient elevator; for which purpose the extremities of it are made rough.

D. A key to take out the pin *E*, when the saw has made an impression deep enough to be worked without the help of it.

E. The pin.

PLATE IX.

The EXPLANATION.

A. A convenient forceps to take out the circular piece of bone, when it does not stick to the saw. The contrivance by which they readily lay hold of it, is to make the extremities that are to grasp it, with an arch of the

1

O 2

same

same circle as the saw is made. Upon one of the handles there is added a little elevator, to lift up any small splinter of bone; but it is not of much use.

B. A lenticular: the fore-part of its blade is sharp, in order to scrape the lower edge of the orifice of the *cranium*, in case any splinters should remain after the operation; and the button at its extremity receives the dust, that it may not fall on the brain: but there is seldom any occasion for this instrument, and I have never myself been under the necessity of using it.

C. A rugine, or raspatory, which I have recommended for scraping bones, in order to promote granulations of flesh. The handles of these two last instruments are wood, whereas every part of the others should be made of steel.

C H A P. XXVIII.

Of the C A T A R A C T.

THE cataract, called by the *Latins* *suffusio*, is a disease of the crystalline humour, rendering the whole body of it opaque, so that the rays of light, which, in the natural state of its transparency, were transmitted to the *tunica retina*, become now totally intercepted, and produce no effect. This is pretty

pretty nearly the account delivered down to us by *Hippocrates*, and the ancient *Greeks*, who likewise knew it by the name of *glaucoma*. *Galen* was perhaps the first who specified any difference in defining the cataract to be a film situated behind the *iris*; and the *glaucoma*, a disorder of the crystalline humour: which opinion, with very little alteration, has prevailed from his time down to the latter end of the seventeenth century, when there arose a dispute on this distinction of *Galen's*; some of the moderns asserting with *Hippocrates*, that the cataract is always a disease of the crystalline humour; and indeed with so much reason, that there is now hardly any one who doubts it: however, during these last forty years this subject has produced many arguments on both sides.

The mathematicians having observed in those who have been couched, that the defect of sight remaining after the operation, answers nearly to what, in optics, the removing the crystalline humour would occasion, have endeavoured to prove, that the operation must in consequence be the depressing that humour, and leaving the eye to perform its function afterwards with the aqueous and vitreous only; which, wanting the density of that humour, will not refract the rays sufficiently to re-unite them on the *retina*; whence patients, after their cure, are obliged to use convex

glaffes, as substitutes for the depressed crystalline humour.

Dr *Petit*, a most accurate Anatomist of *Paris*, has, from a critical examination of the figure of the eye, argued against the possibility of a film's existence in the posterior chamber, by reason of the smallness of that chamber, or proximity of the crystalline humour to the back of the *iris*; and again, from the impracticability of dislodging such a film, without offending the sound crystalline humour.

Lastly, and what is more certain, Anatomists have frequently dissected the eyes of persons under this disorder after their death, and have found it to be always an opacity of the crystalline humour; agreeably to the definition of a *glaucoma*: so that by consequence we must understand the words *cataract* and *glaucoma* as synonymous terms, since they are, in fact, but one and the same disease.

I think it needless to state the reasons on the other side of the question, as they are of little weight, and indeed almost universally exploded.

In describing the nature of a cataract, it has hitherto been a positive maxim laid down by oculists of every nation, that there is one certain stage of the distemper, in which only the operation is proper; and this state of the disease is said to be maturity of the cataract.

They

They have compared it to the ripeness of fruits, and have supposed a regular change in the consistence of the crystalline humour, from the moment it is affected. They say, the disease, upon its first invasion, gradually liquefies the humour; and that, after its arrival to the utmost period of liquefaction, it then begins to acquire various degrees of tenacity, till at last it becomes perfectly hard, or, as they style it, horny: that the skill of the surgeon discovers itself, by fixing on that time for the operation, in which the fluidity of the cataract is no obstacle to the depression of it, from its want of resistance to the needle; nor its hardness, from the elasticity of its connecting fibres, which immediately return to their former position.

This, in a few words, is the general doctrine. But I think the regular alteration of the density of the crystalline humour is very much to be doubted: and for my part, I cannot help positively excepting to the rule here laid down; having not only seen cataracts of twenty or thirty years growth, often, upon the touch of the needle, prove soft and milky; but also many instances, in which a due degree of consistence occurred after four or five months, I may venture to say days, when the cataract was the consequence of a blow or puncture: both which cases so little correspond with this supposed change, that they

seem not only to overthrow it, but to imply that the cataract, after it has acquired its total degree of opacity, may frequently, if not generally, continue in the same state of tenacity to the life's end. And tho' I will not take upon me to affirm that cataracts come always very early to their greatest consistence; yet this we may safely deduce from these observations, that whenever they become entirely opaque, we may properly undertake the operation: which has been my method of practice hitherto; nor do I find any reason to lay it aside.

I shall, however, observe in this place, that, contrary to the received opinion, I have, upon examination, found cataracts of a proper consistence to be couched long before they would have been opaque: but this only confirms what I have already laid down, that there is not such a regular change in them as has been suggested, and that we may always venture on the operation when they are quite opaque; since it might be successful, as I have here intimated, even before that time; though I should never advise it, nor do I believe that patients would submit to it, whilst they enjoyed a certain degree of sight.

Since, then, the *glaucoma* is no other disease than the cataract, we must at once discard the distinction of these two distempers, as merely imaginary; and from what has been said

said with regard to the consistence of a cataract, that, whatever it be, the removal of the humour is the sole end of the operation, the distinction of a true and false cataract will appear equally frivolous; and consequently most of the subdivisions comprised under this last, such as the bag, the milky, the purulent, the doubtful, the membranous, the fibrous, the shaking, and many more, in the books on this disease; the greatest part of which are names that puzzle the memory without informing the understanding, and indeed have not a sufficient foundation in nature, but owe their diversity of character more to the imagination of writers than to any real variety in the disease.

The general criterion of the fitness of cataracts for the operation is taken from their colour: the pearl-coloured, and those of the colour of burnished iron, are esteemed proper to endure the needle: the white are supposed milky; the green and yellow, horny and incurable. The black cataract is described by most authors; but, I dare say, has been mistaken for a *gutta serena*; where no disease appearing, the pupil seems black, as in a natural state of the eye. And as to the green one, I have not, as I remember, in a great number of cataracts, met with a single instance of it: but possibly it may be in nature; and one would indeed imagine the describers of it could

could not be mistaken, in what must have been so evident.

The depression of a cataract of any colour would be the cure, if that alone was the distemper of the eye; but it generally happens, that the yellow cataracts adhere to the *iris* so firmly, as to become immoveable: besides, when they follow in consequence of a blow, which is often the case, either the cells of the vitreous humour are so much disturbed and broken, or the *retina* affected, that a degree of blindness will remain, though the cataract be depressed, and that one cause removed.

To judge whether the cataract adheres to the *iris*: If you cannot at once distinguish it by your sight, shut the patient's eye, and rub the lids a little; then, suddenly opening it, you will perceive the pupil contract, if the crystalline humour does not prevent the action by its adhesion: and when this is the case in any kind of cataract, the operation can hardly be advised; though, where the adhesion has been slight, I have now and then performed it with success.

Another consideration of the greatest moment, before undertaking the cure, is to be assured of the right state of the *tunica retina*: which is very readily learnt, where there is no adhesion of the cataract, from the light falling between the *iris* and crystalline humour; which if the eye is not sensible of, it
is

is a certain indication of another malady, and absolutely forbids the operation. Generally, this cataract takes its rise from head-achs, convulsions, and nervous disorders. How the eye perceives in this case, *vide* the copper-plate.

The operation for the soft species of cataract, which may perhaps properly be styled milky, has been by some writers falsely said never to succeed. Of this there are two sorts: some where we do not perceive any membrane, but which are almost uniformly soft, and, admitting the needle through them as through water, are consequently immovable; and others where the humour is liquefied, and contained in its own membrane, now pretty much thickened by the disease, which last frequently does well; for, upon breaking the membrane, the fluid bursts out and precipitates, and the membrane itself, if it is not depressed, in process of time shrinks into a small compass, or wastes quite away.

Whether the whole cataract after its subsiding continues to lie at the bottom of the eye, or is quite wasted by being separated from its vessels, I have never had an opportunity of knowing positively by dissecting one that had been couched; but by what we see of those which have not been totally depressed below the pupil, and continue in that state for ever after, we may suppose that they only waste a little.

little. I know one instance of a woman whose cataract, after couching, became quite loose in the eye, and in an erect posture sunk to the bottom; but by stooping the head forward, she could bring it quite over the pupil. On the other hand, I once couched a person, when, upon the first attempt to depress the cataract, it suddenly sprung up, and made its way through the pupil into the anterior chamber of the eye; where I left it, without endeavouring to dislodge it again. In about six weeks it began to diminish, and at the end of ten weeks was entirely wasted, and the patient saw extremely well.

When none of the objections I have stated forbid the operation, it may be thus done:— Having placed your patient in a convenient light, and in a chair suitable to the height of that you yourself sit in, let a pillow or two be placed behind his back, in such a manner that the body bending forward, the head may approach near to you; then inclining the head a little backward upon the breast of your assistant, and covering the other eye so as to prevent its rolling, let the assistant lift up the superior eye-lid, and yourself depress a little the inferior one: this done, strike the needle through the *tunica conjunctiva*, something less than one tenth of an inch from the *cornea*, even with the middle of the pupil, into the posterior chamber, and gently endeavour

your

vour to depress the cataract with the flat surface of it. If, after it is dislodged, it arises again, though not with much elasticity, it must again and again be pushed down. If it is membranous, after the discharge of the fluid, the pellicle must be more broke and depressed: if it is uniformly fluid, or exceedingly elastic, we must not continue to endanger a terrible inflammation, by a vain attempt to succeed. If a cataract of the right eye is to be couched, and the surgeon cannot use his left hand so dexterously as his right, he may place himself behind the patient, and use his right hand.

I have not recommended the *speculum oculi*, because, upon the discharge of the aqueous humour through the puncture, the eye being somewhat emptied, more readily admits the depression of the crystalline humour, than when pressed upon by the instrument.

As to the method of treating the succeeding inflammation, (when it happens, for sometimes there is none), I can advise nothing particular, but to refrain from those *collyria* that are charged with powders; for the thinner parts flying off, leave a gritty substance in the eye, which must be pernicious. Bleeding, and other gentle evacuations, are found absolutely necessary. The use of cool applications externally, is most easy to the eye; but, after all, there will sometimes ensue a trouble-

troublesome ophthalmy, which, with the uncertainty there always is of success after the operation, have deterred most surgeons from undertaking it, and, till lately, from studying the nature of the disease: but I fancy the operation will come into greater repute, when more generally practised by men of good character; for it is less the difficulty, than the abuse of it by pretenders, which has brought it into discredit.

Since the publication of the sixth edition of this treatise, a method of removing the cataract by opening the *cornea*, and extracting the crystalline itself, has been discovered. The experience of a little more time will evince whether it be preferable or not to the old operation. For the manner of performing it, and the success attending it, I must refer the reader for the present to the *Philosophical Transactions*, and to the third edition of my *Critical Inquiry*, where I have said all I yet know on this subject.

C H A P. XXIX.

Of Cutting the IRIS.

THERE are two cases where this operation may be of some service; one, when the cataract is from its adhesion immoveable; and the other, when the pupil of the eye is
totally

totally closed up by a disorder of the muscular fibres of the *iris*, which gradually contracting the orifice, at last leaves the membrane quite imperforate. This last distemper has hitherto been deemed incurable. The adhesion of the cataract I have spoken of in the preceding chapter, and considered it as a species of blindness not to be relieved: but Mr *Chefelden* has invented a method of making an artificial pupil, by flitting the *iris*, which may relieve in both the instances here stated.

In doing this operation, the patient must be placed as for couching, and the eye kept open and fixed by the *speculum oculi*: which is absolutely necessary here, for the very reason I would discard it in the other; since the flaccidity of the membrane from the issue of the aqueous humour, would take away its proper resistance to the knife, and make it, instead of being cut through, tear from the *ligamentum ciliare*: then introducing the knife in the same part of the *conjunctiva* you ~~would~~ ^{would} in couching, insinuate it, with its blade held horizontally, and the back of it towards you, between the *ligamentum ciliare* and circumference of the *iris*, into the anterior chamber of the eye; and after it is advanced to the farther side of it, make your incision quite thro' the membrane: and if the operation succeeds, it will, upon wounding, fly open, and appear

pear a large orifice, though not so wide as it becomes afterwards.

The place to be opened in the *iris* will be according to the nature of the disease: if the membrane itself be only affected with a contraction, the middle part of it, which is the natural situation of the pupil, must be cut; but if there be a cataract, the incision must be made above or below the cataract, tho' I think it more eligible to do it above.

The contracted *iris*, from a paralytic disorder, is so often complicated with an affection of the *retina*, that the success is very precarious in this case. This operation, by what I have seen, has answered best in adhesions of the crystalline humour, though, to speak truly, but very seldom even there. As I would not mislead any one who shall practise an operation not yet much known in the world, I do confess, that either the danger of the *iris* separating from the *ligamentum ciliare*, or of the wound not enlarging sufficiently, do upon the whole make the event very doubtful. I once performed it with tolerable success, and, a few months after, the very orifice I had made, contracted, and brought on blindness again. Since it has been discovered by the extraction of the crystalline, that a large wound may be made through the *cornea* without any bad consequence, I should imagine this operation would be much improved
by

by introducing the knife perpendicularly through the *cornea* and *iris*, and cutting both at the same time, so that the incision of the *iris* should be exactly in the same part and of the same dimensions as by the other method.

In these two chapters I have not once used the word *uvea*, but have made mention of the *ligamentum ciliare* two or three times; both which parts are but little understood for want of proper explanation, but which must be rightly conceived of in order to understand what I have said upon these diseases.

The generality of anatomists call that membrane, which I have spoken of under the name of *iris*, the *uvea*; and its anterior *lamina*, the *iris*: others again call the membrane, *uvea*; and the colour of it, *iris*: but both one and the other distinction confound learners exceedingly, and take their rise from a want of attention to the history of anatomy. The ancients, who have given most of the names we now employ in the description of the eye, were versed chiefly, if not altogether, in the dissection of brutes; amongst which, those of the graminivorous kind have a party-coloured *choroides*; one half of it being dark, and the other of a light shining green; this last, from its resemblance to an unripe grape, was called the *uvea*. But the succeeding writers amongst the moderns, applying themselves to

human dissections only, and not duly considering the difference of the human *choroides*, which is nearly of an uniform colour, and of that above described, have retained the appellation, though we have not the thing. Hence has arisen the great variety of misapplication of this word, which ought no more to be adopted in the anatomy of the human eye, than the *tunica nictitans*, which is proper to certain beasts and birds.

The *ligamentum ciliare* is that circular line on the globe of the eye, where the *sclerotis*, *choroides*, *retina*, *cornea*, *processus ciliares*, and *iris*, terminate; forming a whitish ring somewhat denser than any other part of the coats: but since the institution of this term the description of the part it implies has been very much neglected, and the term itself confounded with the *processus ciliares*; wherefore it was necessary to define it, that the process of the operation of the *iris* might be better comprehended.

PLATE X.

The EXPLANATION.

A. The couching-needle; the broad part of which towards the point is flat on one side; but on the other, is a little convex, to give it more substance and strength.

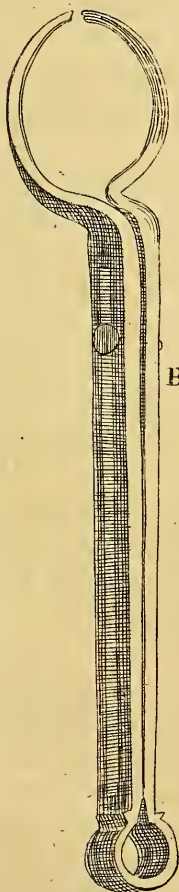
The handle of this instrument is white ivory,



C



D



B



A

ivory, inlaid with a streak of black in that part of it lying even with the convex surface of the blade: the meaning of which is, that by holding the handle with the streak upwards, we may be guided to depress the membrane of a milky cataract with the flat surface, though the substance of the cataract swimming in the eye obscures the needle, and prevents its being directed in a proper position by the sight.

B. A *speculum oculi*, which is made to open or shut by an iron button sliding along a slit in the handle. This instrument is composed of one piece of steel, in such a manner that it would fly open by its elasticity, if the two branches of the handle were not confined by the button. The circle of it should be covered with velvet, to make it lie softer in the eye-lids.

C. The knife for cutting the *iris*, the blade of which has two edges, resembling a lancet, which are more advantageous than one only in cutting the *cornea* for the extraction of the cataract.

D. The figure of the eye.

The small arch on the fore-part of the figure is the *cornea*; the two straight lines tending to each other are the *iris*; and the opening between them is the *pupil*: the space between the *cornea* and the *iris*, is the anterior chamber of the eye; the spheroidal body is the

crystalline humour; the space between the *iris* and crystalline humour, is the *posterior chamber*; and the two short lines which arise from the meeting of the *cornea, iris, &c.* and run upon the crystalline humour, are the *processus ciliares*. The design of this representation is to show the smallness of the posterior chamber, and how some light may pass obliquely between the *iris* and crystalline humour, thro' the interstices of the ciliary processes, and occasion that degree of sight which people with cataracts have.

C H A P. XXX.

Of the FISTULA LACHRYMALIS.

THE *fistula lachrymalis* is generally understood to be such a disorder of the canals leading from the eye to the nose, as obstructs the natural progress of the tears, and makes them trickle down the cheek: but this is only the first and mildest stage of the disease. In the next, there is a mucus resembling matter, and afterwards matter itself discharged with the tears from the *puncta lachrymalia*, and sometimes from an orifice broken thro' the skin between the nose and angle of the eye. The last and worst degree of it is, when the matter of the abscess, by its long continuance, has

has not only corroded the neighbouring soft parts, but also affected the subjacent bone.

For the better understanding the seat and nature of this distemper, I have here annexed a representation of the *lacrimal* ducts.

In treating of the *fistula lacrymalis*, most writers mention the inflammation and ulceration of the *saccus*, as being sometimes the immediate causes of it; but then they all suppose that the tears becoming acrid and corrosive, excite the inflammation and abscess; though many of them imagine that the tears themselves, not finding a way through the nasal duct, do, from stagnating in the *saccus*, corrupt, and become the matter discharged by the *puncta lacrymalia*. But the latter opinion is most certainly ill-grounded; for besides that the tears are not of a composition to become *pus*, it may be observed, almost at any time, upon pressing the abscess, that the two fluids appear unmixed: and with regard to the general doctrine of the sharpness of the tears producing the disorder, I think it is much to be questioned; since the *cornea* and *tunica conjunctiva* being more sensible membranes than the *saccus*, would more readily be offended by them; but as we see they are not in the least injured, and every part of an animal body is subject to inflammation, &c. from internal causes, I believe this external one may be justly doubted.

Whatever be the cause of the inflammation, whether the small-pox, *lues venerea*, &c. the effect of it is an obstruction of the *ductus ad nasum*. That a total obstruction should follow upon an inflammation in so large a vessel as the nasal duct, I presume is owing to its situation in the bony groove of the *os unguis*, which not allowing it to dilate in its inflammation and thickening, must necessarily make it fill up the whole channel, and cause that regurgitation of tears and matter which is the constant symptom of this disease.

Some years since, Monsieur *Annell*, a French surgeon, recommended, in the recent fistula, to pass a small probe through one of the *puncta lachrymalia* into the *saccus* and nose, in order to break the concretions which were supposed to make the obstruction, and with a small pipe and syringe to throw an injection through the other, in order to wash them away. This method was at first received with great applause, and still continues to be practised by some very eminent surgeons: yet, by what I have been able to learn from the experiments of others, and the reason of the thing, I am by no means inclined to think favourably of the invention; for as the very characteristic of this state of the fistula, is the reflux of the tears from the *saccus*, the channels leading to it from the *puncta lachrymalia* must be supposed clear: and as to the obstruction

tion in the nasal duct, an injection thrown with so little force can hardly be imagined sufficient to remove it; and still less, if it be true that the obstruction is not owing to any loose substance clogging up the passage, but to an inflammation of the membranes.

If, then, the injection cannot assist by the force of its stream, the advantage must arise from its balsamic qualities; but no surgeon at this time dilates an abscess of any kind by injections when the *pus* is good-conditioned, and he can by compress diminish the cavity of it, as may be done in this very case, and which should be practised before any other method is undertaken.—Indeed *Annell* and his followers, after the injection, applied a compress and bandage; to the good effects of which, rather than any of the other processes, I am inclined to think the success was owing.

When the quantity of matter returned by the *puncta* increases, notwithstanding the use of compress, and the tumour of the *saccus* grows larger, it then becomes necessary to perform the operation; the design of which is to cure the ulcer, and make way for the tears into the nose.

The general notion that the abscess of the bag always occasions a caries of the *os unguis*, perhaps may have led surgeons into the method of destroying both *saccus* and bone with a perforating instrument, and afterwards

more effectually with an actual cautery, in order to remove the disordered bone, and at the same time to make an artificial canal into the nose. But as there are many instances of cure by a mere incision of the *saccus lachrymalis*, the rougher method of perforation ought not to be used, unless there is evidently a cavity in the adjacent bone, or that, after the ulcer of the *saccus* is healed, the tears cannot be made to pass through the duct; though, even in that case, the application of fire is not only generally useless, but often proves hurtful, and defeats the very end it was intended to promote. The design of the cautery, is to prevent the artificial canal made by the perforation from closing: but the operators who recommend it confess, that, in persons who have been cauterised, even at the best the tears trickle down ever after; whereas that accident does not so often attend on those where the incision only is practised. The reason of this difference may perhaps be more clearly explained by a parallel instance: if we divide a vein quite through, and cauterise its extremities, it is well known that the sloughs formed by the fire, hardly ever separate from the living parts of the vein, until they are totally closed up so as to prevent any effusion of the circulating blood; the consequence of which is, the breaking off the communication of the divided parts of the vein; whereas

whereas, if there was only an opening made with a sharp instrument, or even a piece of the vein carried away by it, the divided parts would soon re-unite, and the circulation be continued through them. For the same reason, by the use of the cautery, the communication between the *puncta lachrymalia* and *saccus* will often be entirely destroyed; and the perforation into the nose, though it remain open, will of consequence not answer the purpose for which it was intended.

It may perhaps be said, that by introducing the cautery through a *canula*, the upper part of the *saccus*, or opening of the *lachrymal* channels, may be protected from these ill effects. But I believe it will plainly appear, by the rudeness of the scar after the healing of the wound, how powerfully fire will work upon the neighbouring parts, notwithstanding this precaution.

From what has been said of the nature of this disease, the use of fire must be discarded in all the stages of it, and even perforation for the most part be practised only when the subjacent bone is carious. But this circumstance is very rare; and for my own part, since I have doubted its frequency, it has not been my fortune to meet with a single instance of it, though I have had fistulas of many years standing under my care, in some of which the *pus* has found issue through the
bag

bag and skin, and formed an external ulcer likewise. The reason why the inferior part of the *saccus* is not so often corroded as the superior (in which case the bone would necessarily be affected) is, that here, as in every other part of the body, abscesses will break where they are least under confinement, as in those places they sooner give way to the preternatural influx of the juices, and in consequence becoming weaker will sooner be destroyed. Since, therefore, neither the long continuance of the disease, nor the great discharge of matter, are positive symptoms of a caries, we ought to be well satisfied of it by the feel of the probe before we perforate; but if, upon opening the bag, or in the course of the dressings, it appears the *os unguis* is bare, we are not to wait for an exfoliation, the bone being so very thin, but to break through with a small perforator.

Many writers mention the success of having sometimes treated the *fistula lachrymalis* as a mere abscess of the *saccus*, though in general they recommend the use of fire: but when the abscess is so foul as not to cure by incision, a piece of the bag itself must be cut away; and thus *Celsus* treated the *fistula lachrymalis* (though he also used the cautery) without perforating.

The manner of operating in those cases where perforation is not required, in this:

Supposing

Supposing the abscess not broken, choose a time when it is most turgid with matter : and to this end, you may shut the patient's eye the day before, and lay little slips of plaster upon one another across the lids, from about the *puncta lachrymalia* to the internal angle ; which compressing their channels, and preventing the flux of the matter that way, will heap it up in the bag, and indicate more certainly the place to be cut. If the abscess is already open, the orifice and probe will inform you where to enlarge : then placing the patient in a seat of convenient height for the management of your hand, with a small incision knife dilate from the upper part of the bag down to the edge of the orbit, without any regard to the tendon of the orbicularis muscle, or fear of wounding the blood-vessels ; though, if you see the vessels, it is proper to shun them : the length of this incision will be near four-tenths of an inch. It has been advised in opening the bag, to introduce a small probe through one of the *puncta* into its cavity, to prevent wounding the posterior part of it : but I think this excess of care may be more troublesome than useful ; since, in so large a vessel, a very small share of dexterity is sufficient to avoid the mistake. In making this incision, care must be had not to cut too near the joining of the eye-lids, because of the deformity of the succeeding scar : though the
blear

blear eye, or uneven contraction of the skin in that part, after the operation, is generally owing to the use of the cautery, and not to the wound of the tendon of the orbicularis muscle; for this last is necessarily, from its situation, always cut through, but without any inconvenience, because of the firm cicatrix afterwards that fixes it strongly to the bone.

When the bag is open, it is to be filled with dry lint, which the next day may be removed, and exchanged for a dossil dipt in a soft digestive medicine: this must be repeated every day once or twice, according to the quantity of the discharge; now and then, when the matter is not good, using the precipitate medicine, and from time to time a spongent, to prevent the too sudden re-union of the upper part of the abscess. When the discharge begins to lessen, it will be proper to pass a small probe, a small bougie, or silver wire, through the nasal duct into the nose every time it is dressed, in order to dilate it a little, and make way for the tears and matter, which, by their drain, will continue to keep it open. This method must be followed till the discharge is nearly over (which will be in a few weeks); and then dressing superficially with dry lint, or any drying application, the wound will seldom fail of healing.—After the cure, in order to prevent a relapse, it will be
proper,

proper, for a few weeks, to wear the compressing instrument represented in the copperplate.

When the bone is bare, and the fistula requires perforation, the perforator is not to be carried down the *ductus ad nasum*, for fear of boring into the *sinus maxillaris*; but more internally towards the nose, which will bleed freely, if properly wounded: the wound afterwards should be dressed with dossils, in the manner above described, and the probe or silver wire be every day passed through the *ductus ad nasum*, lest, after the cure of the abscess, it should still remain obstructed; and if, upon trial, the duct should be so filled up as not to admit the wire, it will be right to keep open the perforation into the nose, with a small tent, till the discharge is almost quite ceased.

I shall finish this chapter with observing, that though a weeping eye will sometimes remain after the treatment of the *fistula lachrymalis*, yet the inconvenience of it is so small, compared with a discharge of matter, that it would be happy if this was the worst consequence of the operation: but it sometimes happens, that the ulcer, when healed, breaks out again; and sometimes, too, that it cannot be quite healed by reason of the inferior part of the *saccus* and nasal duct lying so deep below the edge of the orbit, which makes the proper application of dressings to the bottom
of

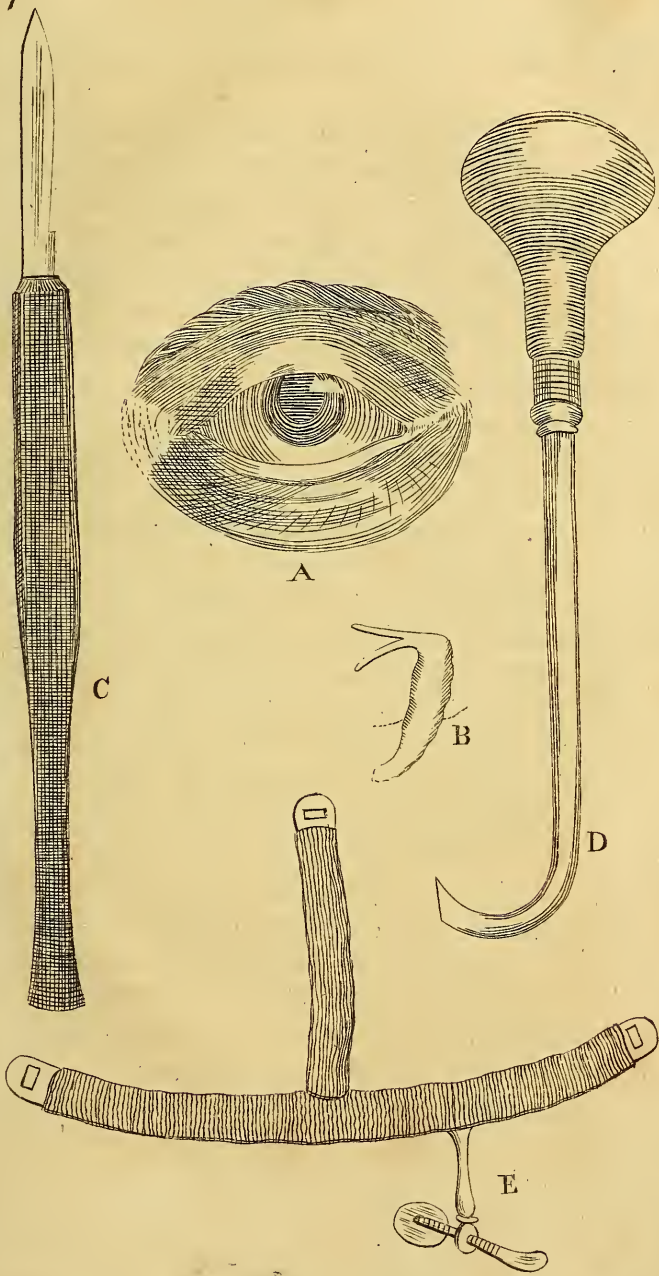
of the ulcer more difficult. It is this situation of the *saccus*, that in a great measure prevents any good effects from burning and perforating, if the perforation only be dressed, as is very much practised, since the dressing will not be full four-tenths of an inch above the lowest part of the ulcer.

With regard to the trickling of the tears, though, generally speaking, it is prevented by the method I have recommended; yet it does not appear at all wonderful it should so frequently be the consequence of the others, when we consider how much at best the *saccus* contracts after a great deal of it has been destroyed; and how possible it is for the wound to fill up with granulations of flesh, which cannot fail to prove an obstacle to their passage into the nose.

PLATE XI.

The EXPLANATION.

A. The eye, with the skin of the eye-lids denuded in order to show the orbicularis muscle: the white streak running from the inner angle of the eye toward the nose is called the tendon of the orbicularis muscle, though I think it rather a small ligament. At a little distance from the internal angle, on the edge of the eye-lids may be observed two black spots, which are the orifices of the lachrymal



chrymal channels, and called the *puncta lachrymalia*.

B. The exact dimension of the lachrymal channels and bag. The pricked line represents the edge of the orbit. I have here taken care to show the oblique direction of the bag, as it runs from the nose towards the orbit.

From comparing this figure with the situation of the *puncta lachrymalia* in the foregoing one, it will appear that only the upper part of the bag lies under the tendon of the orbicularis muscle, and consequently is the only part wounded, and burnt through in the common operation, when the perforator is carried horizontally from the angle into the nose, as is generally practised. And I believe the size of the bag here represented, though not so large as when it is diseased, will at once show the propriety of opening it first by an incision down to the orbit, or even farther, and then treating the fistula with the same dressings as we do other fistulous ulcers.

C. A small incision-knife, more handy than a larger for opening the bag.

D. The perforator to destroy the *os unguis*, if ever it should happen to be necessary.

E. An iron instrument, made thin and pliable, to set even on the forehead, and for use covered with velvet: the holes at the three extremities receive two pieces of riband, by which it is fastened on the forehead: the
button

button at the end of the screw is to be placed on the *saccus lachrymalis*, and the screw to be twisted till the button makes a considerable pressure on the bag: the button should be covered with velvet, and a little compress of plaster be laid on the bag before it is applied, to prevent the skin from being galled by the pressure.—The little branch of iron which receives the screw must be soft enough to admit of bending, otherwise it will be difficult to place the button exactly on the bag. This instrument is for the left eye only; it should be worn night and day in the beginning of a fistula, and after a fistula has been healed by incision: but as the success depends upon the exact situation of the button upon the bag, it should be carefully looked after.

C H A P. XXXI.

Of the BRONCHOTOMY.

THE operation of *Bronchotomy* is an incision made in the *aspera arteria*, to make way for the air into the lungs when respiration is obstructed by any tumour compressing the *larynx*, or some other disorder of the *glottis* and *aspera arteria*, without any apparent tumour. These are the cases in which it is supposed to be useful. But I am inclined to think it hardly ever can be of service,

service, but where the complaint is attended with some swelling, since I cannot find any instance to my satisfaction of good done by this operation in the other species of *angina*; nor has it appeared, upon examination of several who have died of it, that the air was obstructed by any stricture of the *glottis* or *aspera arteria*: if then the passage remains open, and respiration be disturbed from other causes, the making a new orifice can be but of little advantage: I once performed it under this circumstance; but it gave no sort of relief.

Upon the whole then, I imagine the practice of this operation useful only in that species of *angina* where the throat is exceedingly enlarged by the swelling of the thyroid gland; and parts adjacent, called *bronchocele*, which, by their weight, may press upon the *trachea*, so as to make it in some degree narrower; and prevent the free course of the air to and from the lungs. But should any one judge it proper in the instance I object to, the operation is so easy to perform, and so utterly void of any danger whatsoever, notwithstanding the frightful cautions laid down by writers, that I would not altogether discourage the trial, till I have farther proof of its insignificance.

The manner of doing it, is by making a longitudinal incision through the skin, three

quarters of an inch long, opposite to the third and fourth ring of the *trachea*, if you have the choice of the place; and when you cannot make it so high, the rule will be to wound a little below the tumour: it is always advised to pinch up the skin for this process, which, however, may be left to the discretion of the surgeon. When the skin is cut thro', you must make a small transverse incision into the windpipe, and immediately introduce a silver crooked *canula* near half an inch long, with a couple of little rings at the top of it, through which a ribband may be passed round the neck, to keep it fixed in the wound.

Some have prescribed making an incision through the skin and *trachea* at once, with a lancet or knife, as the more easy and expeditious method; and I once saw it performed in that manner, but it proved very inconvenient; for the windpipe in respiration moving up and down, slipped from the orifice of the skin, and made it very difficult to introduce the *canula* and afterwards to maintain it in its situation: wherefore I think it absolutely necessary to make the internal incision longitudinal, and even pretty large, as I have directed above.

The caution laid down of raising the *sternohyoidei* and *sternothyroidei* muscles, before cutting the windpipe, is not to be regarded; and

and as to the division of the recurrent nerves and great blood-veffels, fo much apprehended in this operation; it is not in the leaft to be feared, fince they are quite out of the reach of the instrument, as any one skilled in the anatomy of thofe parts muft very well know.

The method of dressing will be eafily understood; fince, after the patient can breath by the natural paffage, if you withdraw the hollow tent, the wound will become a fimple one, and; notwithstanding its penetration through a cartilage into a large cavity, require a fuperficial application only.

C H A P. XXXII.

Of the Extirpation of the TONSILS.

THESE glands fometimes grow fo large and fcirrhus as to become incurable; and even to threaten fuffocation, if not extirpated. The manner of doing this operation formerly, was by cutting them off: but the almoft constant confequence of this wound was a violent bleeding; and fometimes too a mortal one; on which account it is rejected in favour of the ligature, which is not only void of danger, but alfo feldom fails of cure.

If the basis of the tonfil is fmallier than the

upper part, you may pass the ligature by tying it to the end of a probe, bent into the form of an arch, and set into a handle, which being carried beyond the gland, and round it, is to be brought back again: this done, you may easily tie it by the means of an instrument of Mr *Cbeselden's* contrivance, which holds one end of the string on the side of the tonsil next the throat, while you make the knot by pulling the other with the right hand quite out of the mouth, as will be easily understood by the draught in the copperplate. Should it happen that the tonsils are conical, so that the ligature will necessarily slip over its extremity when we attempt to tie, in this case he has recommended an instrument like a crooked needle, set in a handle, with an eye near the point threaded with a ligature, which is to be thrust through the bottom of the gland; and being laid hold of with a hook, the instrument is to be withdrawn; then pulling the double ligature forwards, it must be divided, and one part tied above, and the other below the tumour: the knots are to be always double, and the ligature to be cut off pretty near them. However, to confess the truth, I have never in one instance been obliged to use this method: for where the tonsils have been conical, I have employed a very thin thread, which has cut into the substance of the gland a little, and, making

king a small groove, prevented its sliding over. If after four or five days they slip, or seem to have mortified the tonsil only in part, you must repeat the whole operation; and if it fail a second time, you must even repeat it again, as I have sometimes done, though it frequently happens that the cure is effected by the first operation.

This kind of extirpation is more practised in large piles, that are esteemed incurable; and if the success of it were better known, the operation would be much more frequent. I have by this method cured several people that have discharged blood every stool for many years, and some that have been almost quite destroyed by the repeated losses of it. When the piles are withinside of the intestine, you must place your patient over a fomentation in a closetool, and have a crooked needle with a double ligature ready to pass through them, when, by straining, they are pushed out of the *anus* (for sometimes the intestine will return suddenly), and tie above and below, as in the instance of the tonsil.— Sometimes the piles are of that shape as to admit a single ligature to be tied round them without the help of a needle, which is less painful: if there are several, you must only tie one or two at a time; for the pain of the ligature is excessive, and would be intolerable if many were tied at once:—however, every

five or six days, the operation may be repeated, till all are extirpated; and the parts must be kept supple by some emollient ointments.

When the piles are small, they may safely, and with much less pain, be cut off; but when this method has been taken with very large ones, I have seen the patient in the utmost danger, from a violent effusion of blood.

The *uvula* is subject to so great a degree of relaxation sometimes, that it almost chokes the patient: the readiest cure is cutting off all but half an inch of it, which may be done at one snip with a pair of scissars (particularly curved for that purpose,) laying hold of it with a forceps, lest it should slip away. I once cut off a *uvula* that lay rolled upon the tongue about two inches: the patient recovered immediately, and never felt any inconvenience afterwards.

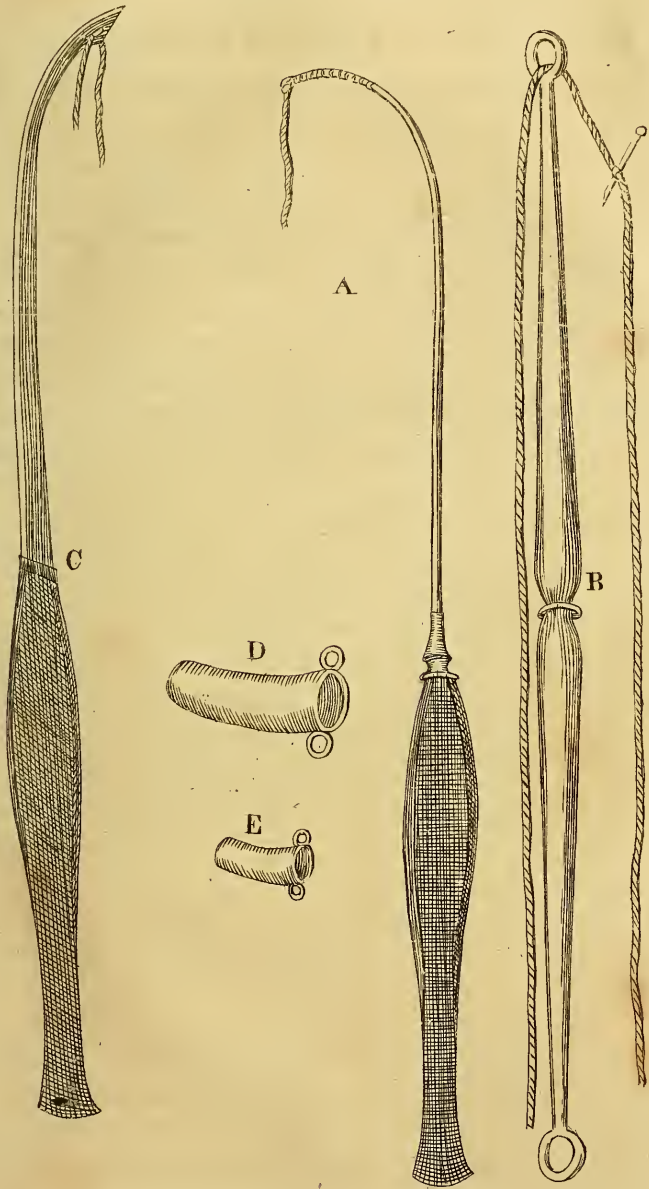
P L A T E XII.

The E X P L A N A T I O N .

A. The bent probe fixed in a handle, with the ligature made of the same thread as the ligatures for tying the blood-vessels.

B. The iron instrument for tying the tonsils.

I have here made a knot upon a pin, which is to be supposed in the situation of one of the tonsils, and may easily be imagined to
have





have been tied by pushing the string beyond it, when held firm by one hand against the instrument, and pulled by the other, on the outside of the mouth.

This instrument is also of great service in extirpating by ligature a species of scirrhus that sometimes grows from the neck or cavity of the *uterus*.

C. The needle with the eye towards the point, for passing the ligature through the tonsil, when the basis is larger than the extremity.

D. A *canula* made of silver, to be used in the *empyema*.

E. A *canula* to be used in *bronchotomy*.

To keep the *canulas* in their place, small ribands may be passed through the rings of of them, and carried round the body and neck; or they may be held by a ligature run through and fastened to a hole cut in a piece of sticking plaster, which is to be laid on each side of them.

C H A P. XXXIII.

Of the P O L Y P U S.

THE *polypus* of the nose, is said to be an excrescence of flesh, spreading its branches amongst the *laminæ* of the *os ethmoides*, and through the whole cavity of one or both nostrils.

nostrils. It happens very often to both sides of the nose at once; and in that case is very troublesome, almost suffocating the patient, at least making respiration very difficult. The intent of the operation is the removal of this obstacle; but as it is attended with different events from the variety of nature in the several sorts of *polypuses*, I shall endeavour to distinguish their species, so as to lead us into some judgment of the greater or less probability of success.

They all arise from the membrane spread upon the *laminae spongiosæ*, pretty nearly in the same manner as the *hydatids* of the *abdomen*, in one kind of dropsy, do from the surface of the liver; or as ganglions from the tendons, borrowing their coats from a production of its fibres and vessels: if they appear soft, and of the colour of the *serum* of the blood, in all likelihood they are formed of such a sort of water contained in cysts, which, upon breaking the membrane, leaves so little hold for the instrument, that but a small part of it can be extracted afterwards. This *polypus* is to be left to harden before the operation be undertaken, which in process of time it generally will do. In the next degree of consistence, they retain pretty nearly the same colour, and are often partly watery, and partly of a viscid texture, which, tho' not tenacious enough to admit of drawing them out by the

roots,

roots, may at several attempts be taken away by bits. The next degree of consistence, is that which is neither so soft as to be squeezed to pieces, nor so hard and brittle as to crumble, or adhere to the membrane with that force as not to admit of separation: this is the most favourable one. The last is hard and scirrhus, adhering so tight as to tear rather than separate in the extraction, and sometimes even tends to degenerate into a cancer: this *polypus* is very difficult of cure.

The *polypus* sometimes dilates to that degree, as not only to extend beyond the *os palati*, and hang over the *œsophagus* and *trachea*; but also spreading into the *sinus maxillaris*, so exactly fills up every interstice of the nose, as to obstruct the lower orifice of the *ductus ad nasum*, and prevent the descent of the tears, which necessarily must return through the *puncta lachrymalia*: and sometimes they grow so enormously large, as even to alter the shape of the bones of the face.

When the *polypus* appears in the throat, it is always advisable to extract it that way; it being found by experience, more ready to loosen when pulled in that direction, than by the nose. To this end, it would be right, before undertaking the operation, to let your patient lie supine two or three hours, which will bring it still farther down; for the body of the *polypus* does not universally adhere, and will

will by its weight stretch out the fibres, by which it is connected to the nose; nay, there are instances where, by a little effort, such as hawking, they have dropt quite off.

The method of extracting it is by a pair of forceps, with a slit at their extremities for the better hold, which must be introduced into the nostril about an inch and a half, to make more sure of it towards the roots; then twisting them a little from one side to the other, you must continue in that action, while you pull very gradually the body of the *polypus*. If it break, you must repeat the extraction as long as any remains, unless it is attended with a violent hæmorrhage; which is an accident that sometimes follows upon the operation, and seldom fails when the excrescence is scirrhous. However, the surgeon is not to be alarmed at the appearance of an immoderate effusion the moment after the separation: for, generally speaking, the vessels collapse very soon again; but if they do not, dry lint, or lint dipt in some styptic, will readily stop it.

After the extirpation, it has been usual, in order to prevent a relapse, to dress with escharotic powders, and even to burn with the actual cautery: but neither the one or the other can be of great service in this case, and both are painful and dangerous. If ever the use of corrosive medicines is advisable, it should be for destroying the remainder of a

polypus

polypus which cannot all be taken away : and then the escharotics may, in my opinion, be better conveyed to the part by a long tent, than a seton passed through the nose and mouth, which is difficult to do without hurting the patient, and very nasty to bear ; though this is the method at present practised, and recommended by some eminent surgeons.

C H A P. XXXIV.

Of the H A R E L I P.

THIS disease is a fissure in the upper lip, with want of substance ; and is a natural defect, the patient being always born with it, at least that species of hare lip which requires the operation I am going to describe. The cure is to be performed by the twisted future, the explanation of which I have reserved for this chapter. There are many lips, where the loss of substance is so great, that the edges of the fissure cannot be brought together, or at best where they can but just touch ; in which case it need not be advised to forbear the attempt : it is likewise forbidden in infants, and with reason if they suck ; but otherwise it may be undertaken with great safety, and even with more probability of success than in others that are older, as I have myself experienced.

It

It is not uncommon for the roof of the mouth to be fissured likewise: but this is no objection to the operation, if the skin of the lip is loose enough to admit of re-union: and it may be remarked, that the fissure of the palate, in length of years, closes surpris-ingly in some cases.

The manner of doing it is this:—You first with a knife separate the lip from the upper jaw, by dividing the *frænulum* between it and the gums; and if the *dentes incisorii* project, as is usual in infants, they must be cut out with the same knife: then with a thin pair of straight scissars take off the callous edges of the fissure the whole length of it, observing the rule of making the new wound of it in straight lines, because the sides of it can never

be made to correspond without this caution. For instance, if the hare lip had this shape, the incision of the edges must be continued in straight lines till they meet in the manner here represented. The two lips of the

wound being brought exactly together, you pass a couple of pins, one pretty near the top, and the other as near the bottom, through the middle of both edges of it, and secure them in that situation by twisting a piece of waxed thread cross and round the pins seven or eight times; you must then cut off the points, and lay a
small



small bolster of plaster underneath them, to prevent their scratching: but when the lower part only of the hare-lip can be brought into contact, it will not be proper to use more than one pin.

The pins I employ are made three-fourths of their length of silver, and the other part towards the point of steel; the silver pin is not quite so offensive to a wound as a brass or steel one: but a steel point is necessary for their easier penetration, which indeed makes them pass so readily, that there is no need of any instrument to assist in pushing them through. The practice of bolstering the cheeks forward does little or no service to the wound, and is very uneasy to the patient; wherefore I would not advise the use of it. The manner of dressing will be to remove the applications, which are quite superficial, as often only as is necessary for cleanliness. The method I would recommend, is to desist the three first days, and afterwards to do it every day, or every other day: I do not think it at all requisite to dress between the jaw and lip, where the *frænum* was wounded, there being no danger that an inconvenient adhesion should ensue. In about eight or nine days, the parts are usually united, and in children much sooner; when you must gently cut the threads, and draw out the pins, applying on the orifices a piece of plaster and dry lint. It will be proper, in
order

order to withdraw the pins more easily, to dab the ligatures and pins with warm water; and also moisten them with sweet oil, two or three days before you remove them; which will wash off the coagulated blood; that would otherwise fasten them so hard to the ligature as to make the extraction painful.

The twisted suture is of great service in fistulas of the *urethra* remaining after the operation for the stone; in which case the callous edges may be cut off, and the lips of the wound be held together by this method.

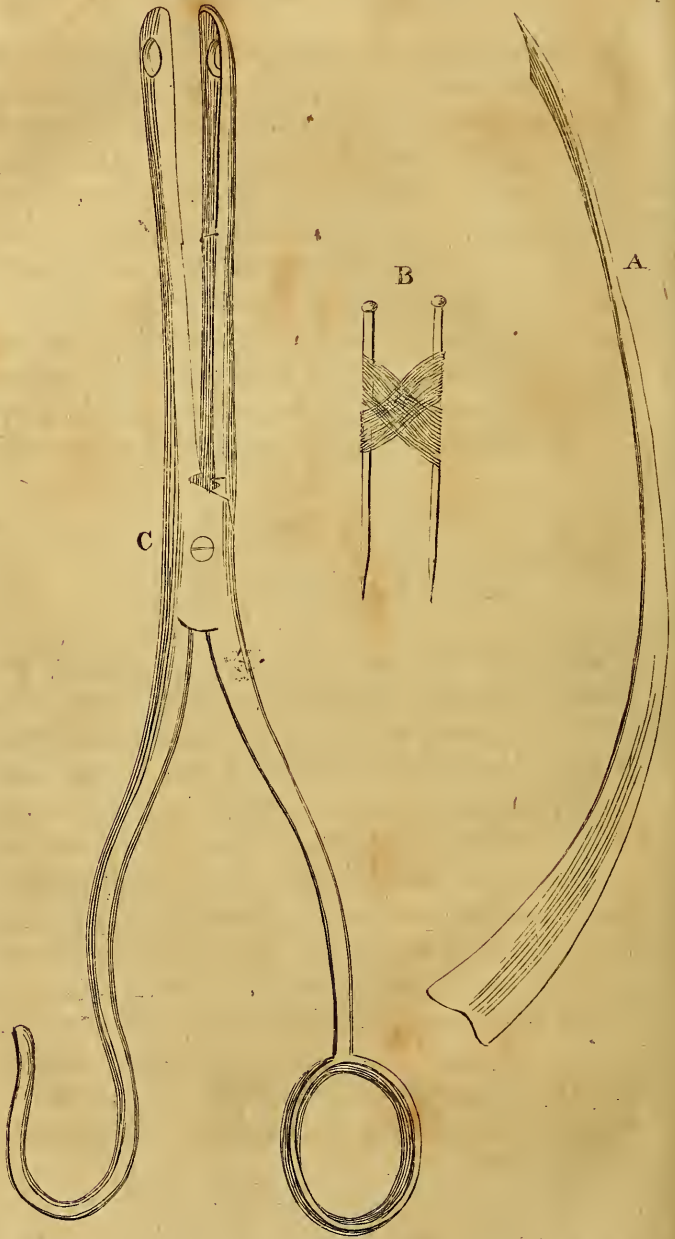
C H A P. XXXV.

Of the WRY NECK.

THE operation of cutting the wry neck is very uncommon; and is never to be practised but when the disorder is owing to a contraction of the *mastoidæus* muscle only; as it can answer no purpose to set that muscle free; by dividing it, (which is all that is to be done); if the others in the neck are in the same state; and more especially if it has been of long standing from infancy; because the growth of the *vertebræ* will have been determined in that direction, and make it impossible to set the head upright.

When the case is fair, the operation is this. Having laid your patient on a table, make a
transverse





transverse incision through the skin and fat, something broader than the muscle, and not above half an inch from the *clavicle*; then passing the probed razor with care underneath the muscle, draw it out and cut the muscle. The great vessels of the neck lie underneath; but I think, when we are aware of their situation, the danger of wounding them may be avoided. After the incision is made, the wound is to be crammed with dry lint, and always dressed so as to prevent the extremities of the muscle from re-uniting; to which end, they are to be separated from each other as much as possible by the assistance of a supporting bandage for the head, during the whole time of the cure, which will generally be about a month.

P L A T E XIII.

The EXPLANATION.

A. The instrument called the probe-razor, to cut the *mastoidæus* muscle in the wry neck; and is sharp only about half its length, at that end where the blade is broad.

B. The two pins with the twisted future, used in the hare-lip.

C. The *polypus* forceps, with one of the rings open for the reception of the thumb, which would be cramped in pulling the forceps with much force, if it were received in
the

the same sort of ring as in the other handle. It is for this reason I have represented the stone forceps with open rings.

C H A P. XXXVI.

Of the ANEURISM.

THIS is a disease of the arteries, in which, either by a preternatural weakness of any part of them, they become excessively dilated; or, by a wound through their coats, the blood is extravasated amongst the adjacent cavities. The first species of *aneurism* is incident to every part of the body; but does not often happen, except to the curvature of the *aorta*, which is subject to this disorder from the extraordinary impulse of the blood on that part: from the curvature, it runs upwards along the carotids or subclavians, generally increasing, till by its great distension it is ruptured, and the patient dies.

There have been great disputes amongst writers concerning the nature of this dilatation of the artery; some even denying the fact, and supposing it always a rupture; some, that all the coats are distended; others, only the external one; and again others, whose doctrine has been the best received, that the internal coat was ruptured, and the external dilated: these last have supported their hypothesis

thesis with arguments drawn from the Anatomy of the internal coat, which is ligamentous and incapable of much distension; so that if an artery be inflated with a sufficient force, the air will burst that coat, and expand the external one, that is, make an artificial *aneurism*, in the same manner as blood is supposed to make a natural one. But this argument is of little force, when we consider, that there are many parts of an animal-body, which violence cannot stretch considerably, but which, by the gradual influx of the juices, become susceptible of monstrous distension, as is the case of the *uterus*; and, upon observation, is evidently the case likewise of all the coats of the artery, as I have had an opportunity to examine in several *aneurisms* in the collection of the late Dr *Douglas*, which he was so kind as to lend me for that purpose.

There are several histories given of *aneurisms* of the curvature of the *aorta*, in some of which the vessel has been so excessively dilated, as to possess a great space of the upper part of the *thorax*; and the most curious circumstance to be gathered from them is, that the spot of the vessel which is weakest, and where the disease begins, generally gives way in such a manner to the force of the blood continually pushing it outwards, as to form a large pouch or cyst, with coats nearly as thick as those of the artery itself: however,

the thickness of the coats of these cysts will last but to a certain period; for when the vessels of the coats can no longer conform to the extension, the circulation grows languid, the cyst becomes thinner at its apex, and soon after bursts.

From this description of the cyst, it will be understood to resemble the bladder, having a large cavity, and a narrow neck or opening.

The symptoms of this *aneurism*, are a strong pulsation against the *sternum* and ribs, every *systole* of the heart; and when it extends above the *sternum*, a tumour with pulsation: upon dissection, the ribs, *sternum*, and *clavicle*, are sometimes found carious, from the obstruction of the vessels of the *periosteum*, which are pressed by the tumour. What are the causes of a particular weakness in any of the coats of the artery, I cannot take upon me to determine: but it is worth observing, that the dilated *aorta* every where in the neighbourhood of the cyst, is generally ossified; and indeed ossifications or indurations of the artery appear so constantly in the beginnings of *aneurisms* of the *aorta*, that it is not easy to judge whether they are the cause or the effect of them.

What I have spoken of hitherto, has been only the *aneurism* of the *thorax* from an internal disorder. *Aneurisms* of the extremities, are,
for

for the most part, owing to wounds; though, when they happen of themselves, they differ very little from the description I have given of that in the *thorax*. The farther symptoms of them are (besides pulsation), the tumour's being without discolouration in the skin; its subsiding when pressed by the hand, and immediately returning when the hand is taken away; though, if it be upon the point of bursting, the skin will grow inflamed, and the coagulated blood in the cyst will sometimes make the pulsation much less perceptible.

This species of *aneurism* may sometimes be supported a great number of years, if we resist its dilatation by proper bandage: but if we do not there is danger of its bursting; and, if it be pretty large, of rotting the adjacent bones.

A sound artery, wounded through part of its external coat, would, in all probability, produce nearly the same appearances as where the whole coat is weakened from an internal indisposition: and this most likely is the case after bleeding in the arm, when it has not been immediately perceived that the artery was pricked, and the tumour has begun to form some days after the puncture; though the common appearance of an *aneurism* from the wound of a lancet, is a discharge of blood first through the orifice of the skin, and,

R 2

upon

upon being stopt from bleeding outwardly, an insinuation of it among all the muscles, as far as it can spread, in the shoulder and arm: here the arm grows livid from the *ecchymosis*; and the blood coagulating to the consistence of flesh, prevents any sensible pulsation. The cyst which arises near the orifice of the artery is formed by the cellular capsula enveloping the vessels of that part, and a portion of the *aponeurosis* of the biceps muscle, which admitting of some extravasated blood underneath it, become excessively thickened and expanded. These membranes must make the cyst, otherwise we could not, upon opening the tumour in the operation, discover so readily the puncture; or if the coats of the artery made it, we could not separate it distinctly from the vessel, which would be always dilated above and below the cyst, as we see in other *aneurisms*.

There are some few instances of small *aneurisms* and punctures of the artery from bleeding, doing well by bandage: but they almost all require the operation at last, which is to be performed nearly in the same manner in every part; and, supposing it in the bend of the arm, is to be done after the following method.

Having applied the tourniquet near the shoulder, and laid the arm in a convenient situation, make an incision on the inside of the
biceps

biceps muscle, above and below the elbow a considerable length, which being in the course of the artery, will discover it as soon as you have taken away the coagulated blood, which must be all removed with the fingers, the wound being dilated sufficiently for that purpose. If the orifice does not readily appear, let the tourniquet be loosened, and the effusion of blood will direct you to it: then carefully carrying a crooked needle with a ligature under it, tie the vessel just above the orifice, and passing the needle again, make a second ligature below it, to prevent the return of the blood, and leave the intermediate piece of the vessel to slough away without dividing it. To avoid wounding or tying the nerve in making the ligature, the artery may be cleared away from it first, and held up with a hook; but should the nerve be tied with the artery, no great inconvenience would ensue from it. After the operation, the arm must be laid easy, on a pillow in bed, and the wound be treated in the common method, keeping it in that posture a fortnight or three weeks, especially if it should swell much, and not digest kindly.

In doing this operation, it will be proper to have the amputating instruments ready, lest it should be impracticable to tie the artery, (though I have never met with such an instance). And even after having tied it, the

arm must be carefully watched, that in case of a mortification it may be taken off; which, though from experience we learn is very seldom the consequence, should to all appearance be the perpetual one: for these *aneurisms*, following always upon bleeding the *basilic* vein, must necessarily be *aneurisms* of the *humeral* artery near an inch above its division; which being obstructed by the ligature, one would think, should necessarily bring on a mortification; but we see the contrary, though for some time after the operation we can hardly distinguish the least degree of pulse, and ever after it continues languid. If the *humeral* artery happens to divide above the elbow, which is not very uncommon, the prospect of cure is better, and the pulse will be stronger after the operation.

C H A P XXXVII.

Of AMPUTATION.

A Spreading mortification has been always esteemed so principal a cause for amputation, that it is a fashion with writers to treat of the nature of a gangrene, previous to the description of this operation; and I think they have all agreed, that whatever the species of it be, if the remedies they prescribe do not prevent its progress, the
limb

limb must be amputated. However, this operation is spoken of as frequently unsuccessful; and in length of time, its want of success has been so unquestionably confirmed by repeated experiments, that some of the most eminent practitioners here in *England*, make that very circumstance an exception to the operation, which so few years since was the great inducement; and the maxim now is, never to extirpate till the mortification is absolutely stopped, and even advanced in its separation.

Gangrenes may be produced two ways; either by indisposition of body, or by accident in a healthful state. For as the life of a part depends upon the circulation of its fluids, whatever shall make the circulation cease, will inevitably occasion a gangrene: thus a mere compress preventing the course of the blood, as effectually causes a mortification as any indisposition in the fluids or vessels.

It frequently happens in old age, that the arteries of the lower extremities ossify; which destroying their elasticity, must in consequence produce a gangrene in the toes first, and afterwards in the limb nearly as high as where the ossification terminates; so that in mortifications arising from this cause, we at once see why amputation during their increase is of so little service, unless perfor-

med above the ossification. But we have no way to judge where the ossification ends, but by the inference we make from the gangrene's stopping: hence we may learn the propriety of our modern practice in this case.

If by any accident the limb has been injured to that violent degree as to begin to mortify, it will be no more fit to operate here till it stops, than in the other instance; because all parts that are mortified have had the disposition to become so before the effect is produced: and cutting off a limb, half an inch above the absolute dead skin, is generally leaving a part behind, with the seeds of a mortification in it; so that, unless we can be sure the vessels are not affected to the place of amputation, which will be hard to know but from the consequence, the operation will be useless.

Sometimes the fluids of the body are so vitiated, as to lose their proper nutritious qualities; and the limb becomes gangrened, not from any alteration in its vessels, but chiefly from its situation, which being at a great distance from the heart, will be more prone to feel the ill effects of a bad blood than any other part, as the circulation is more languid in the extremities: and it seems not very improbable, that, in some dispositions of the blood, a mortification may also be a kind of critical discharge. When therefore

a gangrene arising from either of these causes is running on, amputation above it will, for the most part, be useless, since it is only removing one degree of the effects of the bad juices, and leaving them in the same state to produce the like mischief in other parts. Thus we see after amputations on this account, the gangrene sometimes falls on the bowels, or the other extremities: from which observation, I think, we may conclude it not safe to amputate, till the fluids are altered; and this alteration will presently discover itself by the stopping of the mortification.

I have laid it down as a rule, that the mortification should not only be stopped, but advanced in its separation; the reason of which is, that tho' the blood is so much altered for the better as to occasion a stoppage of the gangrene, yet at this point of alteration it is still in a bad state, and should be left to mend, with the utmost tranquillity of body and assistance of cordial medicines, till such time as granulations of flesh upon the living part of the extremity shew the balsamic disposition of the blood: in the mean while, to take off the stench of the gangrene, it may be wrapt up in spirituous or odoriferous applications. I have seen some limbs taken off immediately upon the mortification's ceasing, when afterwards the patients have sunk from frequent effusions of blood, not discharged by
by

by the great vessels, but the whole stump:— these hæmorrhages I conceive were owing to the thinness of the blood, which hardly gave a reddish tincture to the cloths and bandages. On the other hand, upon waiting a considerable time after the ceasing of the mortification, I have taken off some myself with as good success as for any other disorder.

Gunshot-wounds, compound fractures, and all sudden accidents requiring amputation, are attended with the best success, if immediately performed. Disorders of the joints, ulcers of long standing, and all scrophulous tumours, do sometimes return on other parts after the operation. When a leg is to be amputated, the manner of doing it is this.

Lay your patient on a table two feet six inches high; which is much better than a low seat, both for securing him steady, and giving yourself the advantage of operating without stooping, which is not only painful, but inconvenient in the other situation. While one of the assistants holds the leg, you must roll a slip of fine rag, half an inch broad, three or four times round it, about four or five inches below the inferior extremity of the *patella*: this being pinned on, is to serve as a guide for the knife, which, without it, perhaps would not be directed so dexterously. The manner of rolling has always been perpendicular to the length of the leg: but having
sometimes

sometimes observed, that though the amputation at first be even, yet afterwards the *gastrocnemius* muscle contracting, draws back the inferior part of the stump more strongly than the other muscles can do the rest of it, I have lately, in order to preserve the regularity of the cicatrix, allowed for this excess of contraction, and made the circular incision in such a manner that the part of the wound which is on the calf of the leg is a little farther from the ham than that on the shin is from the middle of the *patella*.

In the mean time, one of your assistants must carry a strong ligature round the thigh, about three or four inches above the *patella*, which passing through a couple of slits in a square piece of leather, he must twist with a tourniquet, till the artery is sufficiently compressed to prevent any great effusion of blood; and to do it more effectually, he may lay a bolster of tow or linen under the ligature, upon that part where the artery creeps. It will also be a little more easy to the patient, to carry a compress of linen, three or four times double, round the thigh, on that part where the ligature is applied, in order to prevent it from cutting the skin.

The course of the blood being stopped, you must begin your incision just below the linen roller, on the under part of the limb, bringing your knife towards you, which at one sweep

fsweep may cut more than the femicircle; then beginning your fecond wound on the upper part, it muft be continued from the one extremity to the other of the firft wound, making them but one line. Thefe incifions muft be made quite through the *membrana adipofa*, as far as the mufcles; then taking off the linnen roller, and an affiftant drawing back the fkin, as far as it will go, you make your wound from the edges of it when drawn back, through the flefh to the bone, in the fame manner as you did through the fkin. Before you faw the bones, you muft cut the ligament between them with the point of your knife: and the affiftant who holds the leg while it is fawing, muft obferve not to lift it upwards, which would clog the inftrument; and at the fame time not to let it drop, left the weight of the limb fhould fracture the bone before it is quite fawed through.

In amputating below the knee, it is of advantage to ftand on the infide of the leg; becaufe the *tibia* and *fibula* lie in a pofition to be fawed at the fame time, if the inftrument be applied externally:—whereas, if we lay it on the infide of the leg, the *tibia* will be divided firft, and the *fibula* afterwards; which not only lengthens the operation, but it is alfo apt to splinter the *fibula* when it is almoft fawed through, unlefs the affiftant be very careful in fupporting it.

When

When the leg is taken off, the next regard is to be had to the stopping the blood; which must be effectually done before the patient is put to bed, or there will be great danger of bleeding again, when the fever is excited; and the vessels of the stump dilated; both which happen a very little while after the operation. There is no method for this purpose so secure, as taking up the extremities of the vessels with a needle and ligature in the following manner. As soon as the amputation is performed, the assistant must loosen the tourniquet for a moment, upon which the orifices of the arteries will appear by the issue of the blood. The operator having then fixed his eye upon one of the largest vessels, passes a crooked needle through the flesh, a little more than a quarter of an inch above the orifice, and about the same depth, in such a direction as to make nearly one third of a circle round the vessel: then withdrawing the needle, he a second time passes it into the flesh and out again, in the same manner and about the same distance below the orifice of the vessel: by this means, the thread will almost encompass the vessel, and when it is tied (which should be done by the surgeon's knot) will necessarily inclose it within the stricture. All the considerable arteries are to be taken up in the same manner:—that is, the tourniquet is to be loosened in order to
discover

discover the vessel, and then the needle is to be passed round it as I have here described. This is a much better way than using the artery forceps, where the vessels are apt to slip away out of the ligature: and as to styptic applications, their want of safety is so well known now, that the use of them, in hæmorrhages from large vessels, is almost universally rejected; though it is thought by several surgeons who have experienced the virtue of agaric, that it will be found to be a more powerful astringent than any hitherto discovered.

It sometimes happens in a large stump, that ten or more vessels require tying: which done, you must apply loose dry lint to the wound; or, in case the small vessels bleed plentifully, you may throw a handful of flour amongst the lint, which will contribute to the more effectual stopping up their orifices. Before you lay on the pledgit, you must bind the stump, and begin to roll from the lower part of the thigh down to the extremity of the stump. The use of the roller, is to keep the skin forwards, which, notwithstanding the steps already taken to prevent its falling back, would in some measure do so, unless sustained in this manner. The dressing may be secured by the cross cloth and gentle bandage; and the method of treating the wound may be

be learnt from what has been said with respect to recent incised wounds.

Before the invention of making the double incision I have just now described, the cure of a stump was always a work of length of time: for by cutting down to the bone at once, and sawing it directly, the consequence was, that the skin and flesh withdrew themselves, and left it protruding out of the wound two or three inches in some cases; so that it rarely happened, that an exfoliation did not follow, which besides being tedious, also frequently reduced the wound to an habitual ulcer, and at best left a pointed stump, with a cicatrix ready to fly open upon the least accident. All these inconveniences are avoided by this new method; and I know not of any objection to it, unless that the pain of making the wound is supposed to be twice as much as in the other, because of the double incision: but when we consider, that we only cut the skin once, and the flesh once, though not in the same moment, I fancy upon reflection, the difference of pain will be thought inconsiderable.

It must be confessed, however, that notwithstanding we derive such benefits from the double incision, the contractile disposition of the muscles, and perhaps of the skin itself, is so great, that, in spite of any bandage, they will retire from the bone, especially in
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the thigh, and sometimes render the cure tedious.

To remove this difficulty, I have lately in amputations of the thigh made use of the cross-stitch; which I would advise to be applied in the following manner.

Take a seton-needle, and thread it with about eight threads of coarse silk, so that when they are doubled the ligature will consist of sixteen threads, about twelve or fourteen inches long: wax it pretty much, and range the threads so that the ligature may be flat, resembling a piece of tap; after which oil both it and the edge of the needle. The flatness of the ligature will prevent its wearing through the skin so fast as it would do if it was round, and the oil will facilitate its passage. Then carry the needle through the skin, at about an inch from the edge of the stump, and out again on the inside of the stump; after which it must be passed through the opposite side of the stump, from within outward, exactly at the same distance from the lips of the wound: this done, the silk is to be tied in a bow-knot. With another needle and skin of silk, the same process is to be repeated, in such manner, that the ligatures may cut each other at right angles. If it is a large thigh, the lips of the wound may be made to approach each other so nearly, as that the diameter of the wound may be about two inches long:

long: but in this, and in all other stumps, the approximation of the lips will depend upon the laxness of the skin, and the quantity preserved by an artful double incision; for the skin must not be drawn together so tight as to put it upon the stretch, lest it should bring on inflammation and pain.

The manner of applying the cross-stitch after the amputation of a leg has nothing particular in it; only that the threads must be carried between the *tibia* and *fibula*, rather than directly over the *tibia*: and before the skin is drawn over the end of the stump, it will be proper to lay a thick doffel of lint on the edges of the *tibia*, in order to prevent them from wounding the skin. The dressings must be superficial; and to preserve the wound clean, an injection of barley water, or warm milk, may be thrown in, with a small syringe, between the stitches, which will prevent any matter from harbouring there.

I have advised the skains of silk to be tied with a bow-knot, that, in case of a *hæmorrhage*, they might be undone in order to discover the vessels more easily; and also, if any tension should ensue, that they might be loosened for three or four days, and then tied again when the suppuration comes on and the parts are more at liberty.

Perhaps it may be objected, that the double incision is of itself sufficient for answering the

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ends proposed by this measure: but whoever is conversant in this branch of practice, must know, that notwithstanding the lax state of the skin and muscles at the time of the operation, yet, some days after, they fall considerably back from the bone, and in the thigh particularly so much, that no bandage will sustain them; the consequence of which is a proportionable largeness of wound, a tediousness of cure, and some degree of pointedness in the stump. It may be observed too, that the strictness of bandage employed for supporting the skin and muscles of the thigh, is not only painful, but in all probability may obstruct the cure of the wound by intercepting the nutrition: for it is certain, that by long continuance it often wastes the stump; and I am jealous it may also be necessary to abscesses, which sometimes form amongst the muscles in different parts of the thigh.

The question then remaining is, whether these stitches will support the skin and muscles more effectually than bandage, without producing some new evil, a point which can only be decided by experiment. It is true that this very method was followed by some of our ancestors, and the objections to it have absolutely prevailed over the arguments in favour of it; for few people now even know it ever was practised. Yet I cannot help imagining that caprice may have had more share
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in utterly discarding this method, than reason and observation: for it is positively said, by some of the most able and candid practitioners, to have succeeded marvelously; and as the inflammation and symptomatic fever, supposed to be excited by it, were always relievable by cutting or loosening the stitches, there does not seem to have been reasonable grounds for wholly giving up such great advantages.

But if the objections to it were of force when the single incision was practised, they diminish exceedingly now that we perform the operation by the double incision; for though the double incision does not wholly prevent the withdrawing of the muscles from the bone, yet it abates the degree of it so much, that they can suffer the stitches, without incurring either inflammation or pain, to which they were much more liable after the single incision. It must be remarked, however, that they draw with that strength as to make the stitches wear thro' the skin and flesh in twelve or fourteen days: but this is done so gradually, that it causes very little pain or inflammation; and though they consequently come off with the dressings, yet by this time the skin and muscles are fixed, and a slight bandage will be sufficient to maintain them in the same position.

The two greatest objections I know of, to

this method, are, the deformity of the stumps, and the additional pain of the operation. But as a stump is not exposed to view after the cure, its want of beauty is of no great consequence: and though it must be granted that the stitches cannot be made without some pain, perhaps it will not be found so bad as one is apt at first to suggest; for the mere passing of a large needle through the flesh, without making a *stricture*, is very bearable in comparison of a tight ligature: but whatever be the increase of pain for the present, the future ease in consequence of it, is an ample compensation; and, if I am not mistaken, there is still another consideration of a much higher importance than any I have mentioned, I mean a less hazard of life.

For the symptomatic fever, and the great danger of life attendant upon an amputation, do not seem to proceed purely from the violence done to nature by the pain of the operation and the removal of the limb, but also from the difficulties with which large suppurations are produced. And this is evident from what we see in very large wounds that are so circumstanced as to admit of healing by inosculation, or, as surgeons express it, by the first intention: for in this case, we perceive the cure to be effected without any great commotion; whereas the same wound, had it been left to suppurate, would have occasioned

sioned a a symptomatic fever, &c. but in both instances, the violence done by the mere operation is the same, whether the wound be sewed up, or left to digest.

Upon this principle, we may account for the diminution of danger by following the method here proposed: because as the stitches have a power of holding up the flesh and skin over the extremity of the stump till they adhere to each other in that situation, they actually do by this means lessen the surface of the wound; in consequence of that, the suppuration; and, in consequence of both, the danger resulting from the suppuration.

In amputating the thigh, the first incision is to be made a little more than two inches above the middle of the *patella*. After the operation, a roller should be carried round the body, and down the thigh, to support the skin and flesh: this is also the most proper bandage, as abscesses will sometimes form in the upper part of the thigh, which cannot discharge themselves so conveniently with any other, it being almost impracticable to roll above the abscess, unless we begin from the body.

The amputation of the arm or cubit differs so little from the foregoing operations, that it will be but a repetition to describe it. However, it must be laid down as a rule, to preserve as much of the limb as possible, and, in

all amputations of the upper limbs, to place your patient in a chair.

There are in the army a great many instances of gun-shot wounds of the arm near the *scapula*, which require amputation at the shoulder; but the apprehension of losing their patients on the spot by the hæmorrhage, has deterred surgeons from undertaking it. I have known where it has been done more than once with success; but though it had never been performed, we might learn it is practicable, from the case of a poor miller, whose arm and *scapula* were both torn from his body, by a rope which was accidentally twisted round his wrist, and suddenly drawn up by the mill. Almost every one in *London* knows the story, and that he recovered in a few weeks. It is very remarkable in this accident, that, after fainting, the hæmorrhage stopped of itself, and never bled afresh, though nothing but lint and turpentine were laid on the great vessels. In case, therefore, of a wound or fracture near the joint, or incurable fistulas in the joint, not attended with much caries, I think the operation may be performed safely in this manner.

The patient being laid on his back, with his shoulder over the edge of the table, make an incision through the *membrana adiposa*, from the shoulder across the pectoral muscle, down to the armpit: and in order to save as much
skin

skin as possible, begin it about two inches below the joint; then turning the knife with its edge upwards, divide that muscle, and part of the *deltoid*: all which may be done without danger of wounding the great vessels, which will become exposed by these openings; if they be not, cut still more off the *deltoid* muscle, and carry the arm backward. Then with a strong ligature having tied the artery and vein, carefully divide those vessels at a considerable distance below the ligature, and pursue the circular incision thro' the joint, cutting first into that part of the bursal ligament which is the nearest to the *axilla*: for if you attempt to make way into the joint, on the upper part of the shoulder, the projection of the *processus acromion* and *processus coracoïdes*, will very much embarrass, if not baffle the operation. After the amputation, the cross-stitch may be practised here with great benefit.

The amputation of the fingers and toes are better performed in their articulation, than by any of the other methods. For this purpose, a straight knife must be used, and the incision of the skin be made not exactly upon the joint, but a little towards the extremity of the fingers, that more of it may be preserved for the easier healing afterwards. It will also facilitate the separation in the joint, when you cut the finger from the *metacarpal* bone,

each side of it first. In these amputations, there is generally a vessel or two that require tying, and which often prove troublesome when the ligature is omitted.

It may happen that the bones of the toes, and part only of the *metatarsal* bones, are carious; in which case, the leg need not be cut off, but only so much of the foot as is discovered. A small spring-saw is better to divide with here, than a large one. When this operation is performed, the heel and remainder of the foot will be of great service, and the wound heal up safely, as I have found by experience.

PLATE XIV.

The EXPLANATION.

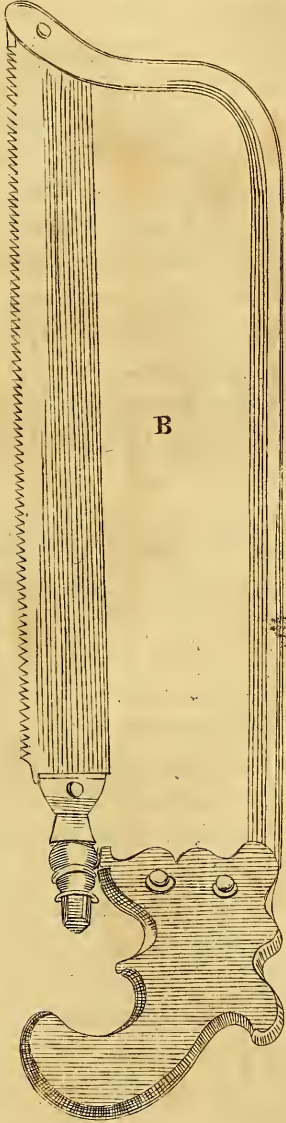
A. The figure of the amputating knife. The length of the blade and handle should be about thirteen inches.

B. The figure of the saw used in amputating the limbs. The length of the handle and saw should be about seventeen inches.

CHAP. XXXVIII.

Of INOCULATION.

IT is usual to prepare the patient for this operation, by diet and evacuations; which,





which, according to the habit of body, are to be more or less severe. Some physicians recommend frequent bleedings or purgings, with a strict milk-diet, the preceding two months; others, a regimen of mercurial alteratives, with gentle purges at proper intervals, for the same length of time. But I think those of the greatest eminence in *London* seldom prescribe bleeding more than once, and frequently not at all; trusting to an abstemious course of life, and two or three gentle purges, and sometimes to one only, the week before the operation, at least where the subject is young.

The proper time for inoculation, is generally supposed to be infancy; and some think the earlier, the better. But as children, the two or three first years of their life, are subject to many terrible disorders from the circumstance of breeding their teeth, and indeed seem more liable to fatal convulsions upon the eruption of the small-pox than after that time, I believe it is advisable to postpone the operation till they are three or four years old: when, probably, the longer it is deferred, so much the worse; though the success of this practice has been surprising, even in the most advanced age.

Physicians have not unanimously determined which is the preferable part for inoculation, the arms or legs; and some order the

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the operation to be performed in one of each. In either case, it is right to do it in two places; though probably it will not be absolutely necessary: but as one of the applications may by accident fall off, or slip on one side from the orifice, the other will generally take effect, and prevent a disappointment. The practice of inoculating in the legs is preferred to the other method by some, from an observation that the incisions in these parts are more disposed to ulcerate and yield a greater discharge than those in the arms; which circumstance they imagine to be advantageous, upon a persuasion it makes a powerful revulsion of the morbid matter from the face and throat. On the contrary, the advocates for inoculating in the arms, advise it for the very reason that the orifices are less liable to become sore and painful: alleging, that the discharge from the wounds cannot be favourable to the eruption, since it seldom happens till the pustules appear, and are even ripe; or should it be judged necessary, from the nature of the distemper, or the patient's constitution, to continue the discharge, still it may be done as efficaciously in the arms by converting one or both incisions into an issue. These considerations have induced the generality of physicians to approve of this last method.

The operation is to be performed after
this

this manner. You must with a stocking-needle prick five or six large pustules on the arm or leg of the subject you inoculate from, when they are plumpest, and the distemper is at its height: then taking a few threads of lint, roll them up so as to make one thread of the thickness of fine worsted: draw this over the orifices made into the pustules, till a sufficient quantity of it is moistened by the matter issuing out of them. Cut this thread into pieces of the length of a barley-corn, and put them immediately into a little box or bottle, which should be shut up close; and though perhaps the matter may retain its efficacy for many hours or days, yet it is advisable to use it as soon as possible. It would be of no importance, what part of the arms or legs were to receive the infection, but that a drain may be desirable after the illness; and therefore the incisions should be in those places where issues are generally ordered, that, by putting in a pea, you may at pleasure procure a discharge from them as long as you shall think proper, a month, two months, or more. The orifices should be cut with a lancet, the length of a barley-corn, and so shallow as barely to fetch blood. The pieces of lint must be laid exactly on them, and secured in their situation by a sticking plaster and bandage. This application should remain twenty-four or thirty-six hours; and afterwards, the orifices
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may be treated every day with digestives or other medicines, according to their degree of inflammation, ulceration, and pain. After the operation, the patient must be confined, and live low till the time of the eruption, which is usually about the eighth or ninth day, when the distemper is to be managed as in the ordinary method.

It is imagined by some, that the matter from an inoculated subject is less malignant than from a person who has the distemper, however mildly, in a natural way. But, I think, there is not a sufficient foundation for this opinion. It is without doubt proper to take it from a kind sort of a healthy subject: and though it is not probable any other constitutional illness will be communicated with the small-pox by inoculation, rather than by the natural way, which nobody even suggests; yet, as we may have choice of patients to borrow it from, we should not run any risk, but fix on such, if possible, who are under nine or ten years of age, and whose parents have always been healthy as well as themselves.

It may not be amiss to observe, that upon the introduction of the practice of inoculation into *England*, amongst the many popular prejudices which prevailed against it, there was none of such seeming weight, as the opinion that it did not absolutely secure the patient

tient from contracting the distemper again in the natural way ; but length of years, and a strict inquiry, have at last entirely falsified this doctrine amongst men of learning and candour. Great improvements have been made in *England* since the publication of the foregoing chapter, both in the method of inoculating, and the manner of treating the distemper ; but as they are described with great precision by Baron *Dimsdale*, I shall refer the reader to his pamphlet on this subject.

F I N I S.



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