Treatise on the excision of diseased joints / by James Syme.

TREATISE

ON THE

EXCISION OF DISEASED JOINTS.

BY JAMES SYME, F.R.S.E.

SURGEON OF THE EDINBURGH SURGICAL HOSPITAL, LECTURER
ON SURGERY, &c. &c. &c.

EDINBURGH:
SUTHERLAND AND KNOX, GEORGE STREET.
LONDON: SIMPKIN, MARSHALL, AND CO.
MDCCCXXXI.

TO

SIR GEORGE BALLINGALL, M. D.

PROFESSOR OF MILITARY SURGERY IN THE UNIVERSITY OF EDINBURGH, CONSULTING SURGEON OF THE SURGICAL HOSPITAL, &c. &c. &c.

My dear Sir George,

THE assistance which I have so often experienced from your able and friendly advice in conducting the treatment of the cases related in the following pages, and many others, both in public and private, leaves me no choice as to whom this Treatise should be dedicated; and regretting that it is not more worthy of your acceptance, I remain,

Most sincerely yours,

JAMES SYME.

PREFACE.

My object in offering this Treatise on the Excision of Joints to the profession is to call their attention to an operation which seems to have been unjustly neglected. When the arguments for and against it are carefully considered, the presumption appears strong in favour of the proposal; and when the results of its application in practice are examined, they leave no room for doubt that in many cases of frequent occurrence it might supersede the necessity of amputation. A prejudice has hitherto existed against the operation, which not only opposed its general introduction, but even prevented any inquiry into its merits.

Feeling assured that the removal of this prejudice would tend to raise the credit of sur-

gery, and benefit a numerous class of patients, I have endeavoured to give a general view of the considerations which seem to be of most importance in regard to the operation, hoping that they will thus produce a more deep and lasting impression than when dispersed and unconnected. Several gentlemen have been induced to perform excision since the publication in the Edinburgh Medical and Surgical Journal of some cases in which I practised it; and I trust that the additional facts and arguments now submitted to the profession, will persuade many more of its members to adopt the operation.

CONTENTS.

CHAP. VI.

CHAP. VII.

CHAP. VIII.

CHAP. IX.

CHAP. X.

EXCISION OF JOINTS.

CHAP. I.

OF THE DISEASES AND INJURIES OF THE JOINTS IN WHICH EXCISION MAY BE PERFORMED.

Owing to the improvements of modern surgery, more particularly in the treatment of aneurism, fractures, and necrosis, amputation of the extremities is now very seldom performed in civil practice, except in cases of disease or injury of the joints. The size and complicated structure of these parts expose them in a peculiar manner to disease, and render it extremely unmanageable when affecting them. Their synovial membrane cannot be wounded without the risk of intense inflammation, and violent constitutional disturbance; and

when altered in structure by diseased action, it is still more prone to inflame and suppurate, the consequences of which, though not so immediately dangerous to life, very frequently occasion the sacrifice of the limb. Their cartilage of articulation possesses little power of action either in health or disease; but it is apt to be detached from the bone, and then to keep up irritation by its presence; and the spongy osseous tissue which enters into their constitution, instead of dying and exfoliating like the dense texture of the shafts when inflamed, readily passes into the obstinate condition of caries. Another circumstance which greatly increases the frequency of disease in the joints, is their disposition to suffer from the indirect irritation of constitutional disturbance, or, as it is expressed in common language, from disease fixing itself in a joint.

Though amputation is a measure very disagreeable both to the patient and to the surgeon, it has hitherto, with hardly any exception, been regarded as the only safe and efficient means for removing diseased joints which

did not admit of recovery. The idea of cutting out merely the morbid parts, and leaving the sound portion of the limb, seems to have hardly ever occurred, or to have been met by so many objections that it was almost instantly abandoned. The serious consequences of wounds accidentally or intentionally inflicted on sound joints, gave this proposal the character of extreme rashness; and the unseemly as well as unserviceable condition of limbs, in which anchylosis had occurred, afforded little encouragement to encounter the hazard of an operation, which seemed to promise this as its most favourable result. In order to decide how far these objections are valid, it is necessary to ascertain what cases require and admit the operation.

Of these by far the greatest number is presented by those affections of the joints which are comprehended under the general denomination of White-Swelling. Notwithstanding the accurate observations of Mr Brodie, and the exertions of other modern pathologists, the precise seat and nature of these diseases at their commencement have not yet been satisfactorily

ascertained; but the following facts, which are quite sufficient for the present purpose, do not admit of any question. Sometimes the synovial membrane is the part primarily affected, and, suffering a remarkable change from its usual structure, instead of being smooth, thin, and tough, becomes converted into a thick, soft, gelatinous mass, which exhibits no trace of its original appearance. Thus far the morbid process is attended with hardly any pain, or other inconvenience, except what proceeds from increased size or stiffness of the joint concerned. But, sooner or later, the symptoms of inflammation are perceived, the surface becomes red, pain is felt in the joint, and pressure or motion occasions much distress. Though there is great variety in the acuteness of these symptoms, from the slightest uneasiness to the most violent agony, they generally terminate in the same way, that is, in the formation of an abscess, which contains a thin sero-purulent fluid. It is not often that an opportunity occurs of laying open a joint at this stage of the disease; but I have had occasion to do so, and can verify the statement of Mr Brodie, that even then the cartilages and part of the

synovial membrane which covers them, may be still, to all appearance, perfectly sound. If an opening is made naturally or artificially into this abscess, and its contents evacuated, a copious discharge, secreted by the morbid surface, continues to issue from it, until the patient's strength sinks under the weakening effect of the constant drain thus established, and the occasional attacks of inflammation which accompany it, or a cure is accomplished by anchylosis. When the disease is examined at the more advanced period, of which there is no want of opportunity, as this is one of the conditions in which amputation is most frequently performed, the synovial membrane does not display its gelatinous alteration so distinctly as before; it is collapsed, thinner, and, as it were, wasted by the suppurative process. The articulating surfaces are rough and unequally covered with cartilage, which in some places is merely thinner than usual, in others, ulcerated and discoloured, and usually also detached in flakes of various size; while the cancellated structure of the bone is either exposed, or covered with a dark-coloured fleshy growth.

In another description of cases, the cartilage seems to be the texture primarily affected. The patient complains from the first of pain, which is described as gnawing, deep-seated, and often confined to one particular point of the articulation; but, at the same time, he is often distressed with a pain shooting into distant parts of the limb, which generally becomes very weak, and sometimes altogether powerless. There is often considerable œdema of the limb below the joint affected; but at the seat of the disease the swelling is in general not very remarkable at first; it gradually increases, however, and though usually said to be distinguished by smaller size, more limited extent, and firmer consistence from the swelling which attends the gelatinous alteration of the synovial membrane, it can hardly, so far as I have observed, be thus characterized with any certainty. On the contrary, the swelling has appeared to me to show every variety of size and consistence, which is not surprising, since, though the thickening of the synovial membrane may exist independently, the form of white-swelling at present under consideration is almost always accompanied by more or less of it; and in both cases the enlargement of

the joint is in a considerable degree owing to the thickening of the surrounding cellular substance, tendons, and ligaments. In this, as in the former disease, there is seldom an opportunity of examining the joint while the cavity remains entire; but sometimes the pain is so violent and unremitting, while the weakly frame of the patient is so little able to bear it, that the surgeon considers himself warranted to perform amputation; and then the following appearances are observed. The cartilage is of a dark colour, and seems as if eroded; there is very little fluid in the joint, indeed, I have seen it altogether wanting; the synovial membrane, except at the part where the cartilage is destroyed, may remain little altered, but much more frequently it is thickened and changed by the gelatinous degeneration which has been already described. There is ground for believing, that, if this ulceration of the cartilage, as it is called, be arrested at an early stage of its progress, the parts affected may be restored completely to their natural state; but it much more frequently terminates in anchylosis or suppuration. In the latter case, amputation affords abundant opportunity of examining the

morbid appearances, which in their advanced stage are found to differ little from those observed in that form of the disease which originates in thickening of the synovial membrane.

There is still a third kind of disease comprehended under the title of White-Swelling, in which the bone is the tissue primarily affected. The symptoms are nearly the same as those which characterize the commencement of ulceration of the cartilage, viz. a deep-seated gnawing pain felt for some time previous to the appearance of swelling, with weakness and œdema of the limb. An abscess forms in the spongy extremity of the bone, and opens either on the external surface or into the joint. This affection is, for the most part, associated with thickening of the synovial membrane, and ulceration of the cartilages, so that the appearances which present themselves on dissection after suppuration has taken place, are nearly the same as those observed in the last stage of the other kinds of white-swelling. The most remarkable difference consists in the bone being more deeply affected; sometimes it is enlarged and hollowed out into a shell, constituting the *spina*

ventosa of the old surgeons; and, at all events, instead of having merely its surface reduced to the carious state, it is hollowed out into a cavity which often contains fragments of dead bone, and exhibits the characters of caries over the whole extent of its interior.

The treatment of these different diseases may be divided into that which is proper before, and that which is required after suppuration. In respect to the first of these stages, it will be recollected that the symptoms are either acute or chronic. For the former, the abstraction of blood, generally, and locally by leeches or cupping, is most suitable, while the chronic symptoms, generally speaking, are most under the control of counter-irritation. Blisters, warm plasters, and pressure, are most useful in the chronic state of the thickening of the synovial membrane. The practice of applying pressure, together with some liniment to promote absorption, has been lately brought very prominently forward by Mr Scott,* who, in his treatise, gives many cases of what he alleges to be perfect cures

* Scott on Diseases of the Joints. London, 1828.

obtained by its means. Some of these cases must appear very surprising to every practical surgeon; and, though not inclined to go quite so far as Mr Brodie,* who denies the possibility of recovery in this disease altogether, I must say that my experience would lead me to a very different opinion as to the facility of cure from that of Mr Scott. As there can be no doubt, however, that nothing conduces more to retard the progress of the disease than rest conjoined with pressure, I should be sorry to oppose myself to this plan of treatment; and to prevent an abuse of it, which I have frequently had occasion to regret, it would be well to recollect that it can be serviceable only when it does not occasion pain, since every thing which does so must tend to strengthen and accelerate the morbid action. In the other forms of white-swelling, those, namely, in which the cartilages and bones are principally affected, there is no remedy so beneficial as the actual cautery. Issues may, it is true, be opened by other means, but by none so effectually as by this. There is a prejudice against the cautery, from its appearing a very severe remedy; but every one who has com-

* Treatise on the Joints, p. 99.

pared its effects with those of caustic, must admit that the pain occasioned by it is infinitely less prolonged, and perhaps hardly more severe, even during the instant of its application; and it is worthy of notice, that, though the use of the red hot iron to effect counter-irritation was introduced here by myself, I have never been prevented from employing it by prejudice on the part of the patients.

In the second stage of the disease, that is to say, after matter is formed, it comes to be a question whether the surgeon should evacuate it, or wait for a natural opening. The objection to interfering is, that the case generally assumes a much more unpromising aspect when the abscess is opened; and it is difficult to prevent the patient or his friends from attaching some degree of blame to the practitioner, when he has hastened, or, as it may seem to them, has caused this disagreeable change by making an aperture. The objection, on the other hand, to waiting for the natural process, is, that the patient sometimes suffers great pain, and an injurious extension of the abscess from delay. The safest course is to be guided by circum-

stances, and to make the opening in question only when it is indicated by the distress of the patient, and the tension of the swelling. I have seen abscesses connected with disease of the vertebræ and hip-joint exist for years without occasioning the patient much inconvenience, but prove rapidly fatal on being opened.

The treatment at this stage consists of dilating the sinuses; applying metallic washes, such as the solutions of acetate of lead and sulphate of zinc; effecting moderate pressure on the joint; keeping the limb steady by means of splints; and supporting the patient's strength by nourishing food and exercise, so far as it can be accomplished without causing irritation by the motion. The chance of recovery varies very much with the age and strength of the patient; it is greatest in childhood; next in youth; and least of all in the adult age, at which time of life, indeed, there is hardly any to be expected. In very young children, again, if the exhaustion occasioned by the disease does not prove too great for the strength of the patient, there is considerable prospect of a cure by anchylosis; and it appears daily from experience, how-

ever improbable and paradoxical the statement may seem, that the more unhealthy the individual is, especially if he is so much so as to be affected in more than one of his joints, the greater is his chance of recovery, provided he is able to undergo the process. The reason of this is probably the weakness of vital action in the osseous tissue of such subjects, which renders the spongy bones nearly as ready to die and exfoliate as the dense tissue of the shafts; and the diseased portions accordingly separate sometimes in masses of considerable size, but more frequently in small particles, which might easily pass without notice, unless they were looked for. It is possible also that the diseased action or caries of the bone may not be quite so incorrigible at this early period of life as experience proves it to be at a more advanced age, and may therefore be cured without the death and exfoliation of the affected portion.

When white-swelling does not terminate in a spontaneous cure, it either remains obstinately in the same state for an indefinite period, or destroys the patient by exhausting his strength. In these circumstances, there are two modes of

affording relief, viz. amputating the affected limb, and performing the operation which it is the object of this treatise to recommend; but before comparing the respective merits of these two procedures, it will be right to say a few words as to the other cases in which it is necessary to make a choice between them. These are, either the consequences of inflammation induced by injuries, or the immediate effects of external violence. In the former the state of parts differs little from that which has been already described as existing in the last stage of white-swelling. In the latter there is merely such an injury inflicted as experience leads us to consider incurable. The judgment to be formed in such cases depends so much on the particular joint concerned, that it is difficult to make any remarks of general application. I will therefore delay making any attempt to ascertain what injuries require immediate operation, as well as the mode of operating best suited to the occasion, until the excision of the joints in particular is considered, and will now proceed to compare the merits of this operation with those of amputation in the other cases that have been mentioned.

CHAP. II.

OF EXCISION OF THE JOINTS AS A REMEDY IN WHITE-SWELLING, AND ITS MERITS IN COMPARISON WITH AMPUTATION.

The advantages of amputation are, that it quickly, easily, and effectually removes the disease ; but these are balanced by the serious objection of its depriving the patient of a limb ; and, it may be added, that, though this operation cannot now be regarded as attended with much danger, it is certainly not by any means free from it. To say nothing of the ordinary bad consequences of amputation, I must here particularly notice the risk of inflammation and suppuration of the lungs, or other internal organs, which renders the result of amputation for caries so unsatisfactory, especially in hospitals. Every one who has attended the Hotel-Dieu must have remarked the frequency of death, or rather the rarity of recovery af-

ter the removal of limbs in such circumstances; and though the evil seldom goes to such an extent in other places, I am sure all practical surgeons must be familiar with it. It is also observed that adult patients who have suffered amputation for caries often fall into bad health, and die of dropsy or some other chronic complaint within a year or two after the operation. These bad effects seem referable with most probability to the disturbance which is excited in the system by taking away a considerable part of the body; but, whatever be the true explanation of them, there can be no doubt as to the fact of their occurrence, which ought to be carefully remembered in making the comparison that is now attempted.

The great recommendation of excision is, that it saves the patient's limb; and the benefits accruing to him from this are so important and conspicuous, that, unless the objections which can be urged against it should appear after mature consideration to be very serious indeed, we ought not to hesitate in giving it the preference. These objections, so far as I have been able to ascertain, are the following:—

First, The difficulty of the operation. *Second*, Its danger. *Third*, The useless condition of the limb in which it has been performed.

In taking into consideration the difficulty of the operation, it must be ascertained, in the first place, what is requisite to constitute its effectual performance; in other words, how far it is necessary to take away the diseased integuments, synovial membrane, articulating cartilage, and extremities of the bones. In cases of old standing, where the sinuses are numerous and the suppuration has been profuse, the integuments surrounding the joint often retain hardly any trace of their original appearance or structure. They lose their laxity and mobility, from effusion of lymph into the subjacent cellular substance; become smooth and shining on the surface, which is often of a dark-red or purple colour; and are so soft, that, if stitches are introduced to approximate the edges of an incision made in them, the threads instantly cut their way out. It might, therefore, be supposed that no healthy union or permanent cure could be obtained if parts in such a morbid state were allowed to re-

main, and that, consequently, the operation could very seldom be practised with propriety. Experience, however, has shown that this is not the case; and that in a very few days after the operation, when the swelling and inflammation immediately consequent upon it begin to subside, the diseased integuments regain their natural characters, and ultimately become perfectly sound.

As to the synovial membrane, Mr Brodie has stated his opinion, that, when once its structure has been completely altered, it cannot be restored.* Independently of his high authority, it might be readily believed, that, if any of the thick gelatinous substance into which this membrane is transformed were permitted to remain, a cure could hardly be accomplished; and that, as this portion of the articular apparatus is not only very extensive, but likewise most intimately connected with the surrounding tissues, it must consequently be next to impossible to perform the operation of excision effectually. Experience here also, however, has decided the matter to be otherwise; and it is proved beyond dispute, by the facts

* Vid. Op. et loc. cit.

hereafter to be mentioned, that the synovial membrane, though thickened and gelatinized to the utmost, affords very little obstacle to recovery, since it speedily disappears, partly by sloughing, but chiefly through the absorbent action of its own vessels, during the copious suppuration which ensues.

With regard to the cartilage, it might be expected that no harm could result from leaving any part of it that remained sound; but here, too, the judgment of theory is reversed by experience, since it has been found, that, when any portion of the articulating surface was left, the disease required a subsequent operation. The cause of this is probably to be referred, not so much to any morbid process in the cartilage itself, as in the synovial membrane lining it, and in the spongy bone immediately subjacent, which has its tendency to morbid action excited by the injury sustained in its neighbourhood. The operation, therefore, essentially requires the removal of the whole cartilaginous surface.

Lastly, as to the bone, one not acquainted

with the pathology of the osseous tissue, who examined the bones of carious joints after maceration, might be apt to suppose that the diseased part could not be removed without sacrificing so large a portion of the whole, as to render it useless and unworthy of preservation. Plate I. Fig. 1, will illustrate this. The bones represented here are those of an elbow-joint, which I amputated before adopting the plan of treatment now under consideration. It will be observed that they are much increased in thickness to a considerable distance from the articulation, and that their surface in the whole of this extent is covered with irregular warty excrescences, which give it a rough tubercular appearance. When these tubercles are examined more particularly, they are found to consist of a compact osseous substance, which is smooth on the surface, and perforated with numerous apertures for the transmission of blood-vessels. This is new bone, and perfectly healthy in its actions; it resembles in all respects the callus, or new osseous substance, which effects the reparation of fractures, and is thrown out in consequence of the irritation of the disease. The truly morbid or

carious portion of the bone is seen between the lines AA and BB, occupying merely the articulating surfaces. The external shell of the spongy bone is here removed by the disease, and the cancelli are exposed to view, presenting a rough surface composed of rigid plates and spiculæ, which are white and more brittle than usual, so as to seem as if they had been subjected to the action of fire. The depth to which the bone is thus affected varies considerably, according to the origin of the disease. When the morbid action commences in the synovial membrane or cartilage, it is generally superficial; but when the inflammation is primarily seated in the substance of the spongy bone, as in the third kind of white-swelling which has been mentioned, then, as has been already stated, the substance of the bone is more deeply affected, being often excavated into a hollow, which is carious over the whole of its surface. The extent of this cavity seldom, or rather never, exceeds the bounds of the epiphyses, except sometimes in young subjects, where the bone has been widely altered by scrofulous action, previous to suffering the inflammation which more immediately occa-

sions the caries. From not distinguishing between the truly diseased bone and that effused in consequence of its irritation, it appears that a much larger portion has been taken away in some of the cases of excision hitherto published than there was any occasion for. Less than a half of the portions of the humerus and femur which were removed by Moreau and Crampton, I should certainly think, so far as can be judged from the evidence of their drawings, would have been sufficient for the purpose, in which case it is plain the limbs would have been much less shortened and weakened, and the magnitude and consequent severity of the operation diminished. As already stated, the caries seldom goes beyond the epiphyses, which are all the part of the bone that the surgeon requires to remove, except in the rare cases where the bone is found to be more extensively affected; and in these it will probably be most prudent to perform amputation.

From this analysis of the operation, it appears that all it essentially requires is the removal of the articulating epiphyses; and the next

question that presents itself is, by what means is this to be accomplished? It is difficult to divide bones by means of a common saw, unless they are fairly exposed and held steady; and as these conditions can seldom be obtained in operating on the extremities forming a joint, various modifications of this instrument have been contrived for the purpose Of these the most ingenious are the chain-saw of Dr Jeffrey, Machell's saw, and other kinds of rotatory saw; but it is quite unnecessary to enter into either any description of these instruments, or inquiry as to their respective merits; for they are all complicated in their structure, and perplexing in their application, when employed under the adverse circumstances of a deep situation, bleeding, and diseased soft parts, that obscure the bone, and the restlessness of a patient suffering a severe and protracted operation. Were it absolutely necessary in any case to use a saw for this purpose, I should certainly prefer the common one, believing it both much easier and much safer to expose the bone sufficiently for permitting its application by free incision, than to overcome the difficulties attending a less complete exposure by the

mechanical contrivances in question. But fortunately we are not reduced to this disagreeable alternative, since the cutting-pliers which have been introduced into operative surgery with so much advantage by Mr Liston, enable us to attain the object in view with perfect ease, whenever the ordinary saw is not applicable. That there is no difficulty at all in the operation of excision, it would be absurd to affirm; and that in some joints, particularly in certain states of disease, it is extremely perplexing, I am ready to admit; but when the object to be gained is the saving of a limb, the trouble or difficulty of its attainment ought not to be considered an objection; and from what has been said, it will, I trust, appear that there is nothing required in this operation except what a moderate share of dexterity and coolness is sufficient to achieve.

The next question respects the danger of the operation. Here it ought, in the first place, to be recollected, that there is no parallel between a wound inflicted on a sound joint and that by means of which a carious articulation is cut out. In the former, unless the solution

of continuity heals by the first intention, inflammation must necessarily supervene, when all the complicated, extensive, and irritable apparatus of articulation will be ready to suffer with its usual intensity and constitutional disturbance. In the latter case, the joint is already open, there being always one or more sinuses leading into it in the advanced stage of the disease which renders the operation of excision warrantable, so that the wound which the surgeon makes cannot, merely on account of exposing the cavity of the joint, be the cause of inflammation; and even though inflammation were to happen, its bad effects would be comparatively inconsiderable, since the structure which is so apt to be violently affected is removed by the operation. But this is not all; for the effect of cutting out the diseased parts is rather to allay than excite irritation, both by removing a source of constant gnawing pain, and at the same time freeing the limb most effectually from tension. Hence patients have been observed to sleep better the night after the operation than for a long time previously. It also ought not to be forgotten, that the question here is, not whether the cutting

out of diseased joints be attended with *any* danger, but whether this operation is more dangerous than amputation? and if, in addition to what has been said already, it be kept in mind that in excision the great nerves, arteries, and veins are not divided—that there is hardly any loss of blood—and that the system is not subjected to the disturbance which results from taking away a large part of the body at once, it seems to me not unreasonable to conclude, that the danger is greater in amputation. But experience here too may assist in settling the point. I have cut out fourteen elbow-joints, and the operation has been performed in Edinburgh three times by other practitioners; of all these seventeen cases only two have terminated fatally; and in one of them the patient would, I believe, have died from any operation whatever, while in the other, the disease was found so extensive as to render the excision almost impracticable. I believe the result of seventeen amputations in similarly unfavourable constitutions would not be so satisfactory. I am aware that some may think it unnecessary to prove that the risk attending excision is not greater than that of amputation, since

the great advantage of saving the limb might be thought sufficient to counterbalance some additional risk; but I have no hesitation in declaring, that, in such circumstances, I do not think a surgeon would be warranted in recommending the operation. The great object of medicine is the preservation of life, and the patient's mere convenience ought always to be reckoned a secondary consideration. Thus, if the fair induction from extensive experience should satisfy us that the limbs of ten persons labouring under diseased joints might be amputated with the probability of saving the lives of nine out of the whole, while excision of the joints would probably prove fatal to two, so that only eight would recover, though the condition of the eight would doubtless be preferable to that of the nine, I do not think this advantage ought to be regarded as sufficient to balance the life that would be lost. Having, however, as I hope, shown reason for thinking that the greater danger, generally speaking, proceeds from amputation, I will proceed to consider the last objection that has been alleged against excision, viz. that the limb thus preserved is useless, and not worth the pain or trouble required for its preservation.

It has been said, that after the joint is cut out, the bones must either unite together, so as to render the limb rigid and unserviceable, or, if it remain moveable, the attachments of the muscles having been separated, it must be no less unfitted for use by its flaccidity and want of subjection to voluntary motion. With regard to the first of these events, I think it cannot be denied that anchylosis of the shoulder or elbow, provided the other joints remained entire, so far from rendering the limb useless, would not prevent many of its usual actions, and certainly not to the extent of permitting it to be compared, in respect of utility, with an artificial substitute. But it has been ascertained by the sure decision of experience, that true anchylosis or osseous union does not occur generally or even frequently in these circumstances; indeed, I feel authorized to say, not without very great attention on the part both of the surgeon and patient in favouring its accomplishment, particularly in preserving absolute rest; but when no such precautions are used, the union is established by means of a tough, flexible, ligamentous-like substance that permits the bones to be used with more

or less freedom, according to the exercise which they are made to undergo during the process of healing. And the voluntary motion, though at first impaired or altogether lost, owing to the relaxation of the muscles, which is caused by the approximation of their attachments, necessarily resulting from the shortening of the bones, gradually returns, and ultimately becomes as strong as ever. What seems to occasion the greatest difficulty in conceiving the possibility of recovering voluntary power over the new joint, if joint it may be called, proceeds from inattention to the fact, that muscles or tendons, when cut away from their attachments, fix themselves to the parts on which they come to rest. Thus the muscles of a stump adhere round the bone, so as to enable the patient to use it with force and freedom; and when amputation is performed through the tarsus, the *tibialis anticus* and extensors of the toes fix themselves so as to counteract the extensors of the heel. Independently of theory, however, we have here the more satisfactory assurance of positive facts; and the cases related below, will, I trust, be considered sufficient evidence to show that it is possible to save

limbs by excision of diseased joints, nearly, if not altogether, as useful as before they suffered from disease.

In addition to the arguments against excision which have now been considered, it has also been objected that the operation affords no assurance against a return of the disease; but as this objection applies equally to amputation, it need not be taken into account.

CHAP. III.

METHOD OF PERFORMING EXCISION OF THE JOINTS.

HAVING now considered the objections which, so far as I know, have been urged against the operation of excision, I will next make some general observations on the mode of performing it, and the treatment to be followed subsequently. As the operation is painful and tedious, the patient ought to be placed in that position which most completely exposes the articulation, and can be preserved steadily with least inconvenience. I have never found it necessary to apply a tourniquet; but if the patient is very weak, and the surgeon is anxious to prevent the loss even of a small quantity of blood, there can be no objections to its application. The knife which seems to answer best for the requisite dissection is represented in Plate IV. Fig. 1. It is

merely a long narrow scalpel, straight in the back, and very slightly convex in the edge, stoutly made, and having a small part of the back ground off obliquely at the point, so as to render it less apt to be broken, and bring it to correspond with the axis of the handle.

The preliminary incisions ought to be free, and so directed as to facilitate as much as possible the exposure and removal of the ends of the bones. In making them, the knife should be thrust at once into the joint, and afterwards carried close down to the bones, which is much better than cutting by degrees, as it shortens the operation, lessens pain, and renders the line of direction of the incision more determined. It is always necessary, of course, to divide more or less of the muscular and tendinous parts; but they ought to be as little injured as possible, and the most effectual method of saving them is to cut them close away from their attachment.

It is impossible to form any idea of the kind of difficulty which is encountered in performing this operation on the living body from trials

made on the dead subject where the parts are not diseased. The thickening and condensation of the cellular tissue, together with the gelatinous synovial membrane, which invests the articulating extremities of the bones, and fills the space between them, throw many obstacles in the way of an unpractised operator, by disguising the different tissues, and matting them into one, so that the articulation requires as it were to be carved out of a homogeneous mass. The saw employed for removing the bones may be either a simple blade, as is represented, Plate IV. Fig. 2. or the one in common use for amputation, which is, I believe, on the whole, the most convenient for the purpose. For defending the soft parts while the bone is undergoing division, flexible copper spatulas have been recommended; but I have always found the hand a more convenient and effectual guard; and instead of cutting completely through, it is often better to divide the bone only partially with the saw, and then resort to the cutting-pliers, which readily detach the fragment so soon as there is a groove formed for the reception of their blades. Unless the bone is very large and hard, the pliers are

of themselves sufficient for the purpose. It is worthy of notice, that the flat sides of the blades ought to be turned towards that surface of the bone which is to remain, as it will thus be less apt to be splintered or irregular. When all the diseased bone has been got away, which will be learned by a careful examination of the separated fragments and the remaining surface, if there are any large masses of gelatinous substance which can be easily detached, it is as well to remove them, since, though they would not afford any great obstacle to recovery, they might have some effect in retarding it, and also preventing the edges of the wound from coming readily together. Though the hemorrhage is generally pretty free in the first instance, it seldom persists so as to require the application of ligatures. The general oozing from the surface is usually soon checked by exposure to the air, or washing with cold water; but if, after the operation is ended, one or more arteries should continue to throw out a jet, they ought to be secured, as it is next to impossible to exert pressure with any effect, and considerable inconvenience is apt to result from the cavity becoming distended with blood. The

vessels that prove obstinate are generally situated in the indurated subcutaneous cellular tissue, and require considerable care both for their discovery and ligature.

The next part of the process is to place the edges of the wound in contact, and retain them together, which is best effected by the interrupted suture, unless the integuments should be so very soft as to give way under the pressure of the threads, in which case compresses of lint must be used in their stead. It is always of most consequence to unite the edges of the transverse incision, if there is one, since, if they do not heal by the first intention, they are afterwards brought together with very great difficulty, and the broad cicatrix which results from their separation is very adverse to the mobility of the joint. Some compresses of lint ought to be applied over the flaps, and then the limb being placed in a proper position, that, namely, in which it will most frequently be required after the cure is completed, it ought to be enveloped with a long roller, which affords the requisite support much better than splints or rigid cases of tin or pasteboard.

The constitutional disturbance, for the reasons already stated, is usually very slight, and requires nothing more than some gentle purgative or slight antimonial, with spare diet and rest. The pain is usually severe for the first five or six hours, but then subsides, and seldom proves troublesome afterwards. The dressings ought to be changed ten or twelve hours after the operation, by which time the oozing of blood and serum will be at an end; and then also any inequality or gaping of the edges may be rectified by slips of sticking-plaster. Union by the first intention sometimes takes place through nearly the whole line of incision, except where old sinuses exist in its course; more frequently the adhesion is only partial, and the wound opens out more or less widely, according to the degree of local inflammation, and the distension caused by blood contained within its cavity. In the course of a few days, the discharge, which was at first copious and offensive, begins to diminish; all the clots of blood issue from the wound; the swelling subsides; and the favourable change is altogether so sudden and satisfactory, as to surprise those who are not accustomed to witness the operation.

During the cure, every means is to be employed either to keep the limb perfectly quiet, to favour anchylosis, or to exercise it in the degree and extent of mobility which will be required of it. The wound is generally very nearly healed in the course of a few weeks, but one or more sinuses continue to discharge for months, or even a year or two. Small portions of bone also occasionally come away; but if the surgeon has done his duty in the first instance, he need not be under any apprehension on these accounts; and the patient will be too well pleased with being freed from the pain of his disease, and having regained the use of his limb, to feel annoyed by the trifling inconvenience which he thus experiences.

CHAP. IV.

EXCISION OF THE SHOULDER-JOINT.

In proceeding to treat of the excision of the different joints in particular, I think it best to begin with that of the shoulder, because this was the one first subjected to the operation.

The shoulder-joint, like others of the ball and socket kind, is very little subject to disease originating in the synovial membrane; but inflammation of the bone, and subsequent caries of the articulating surfaces, are of more frequent occurrence. The disease is generally referred to some bruise or other external injury, and commences with deep-seated pain of the shoulder, which is more or less acute, and generally most severe at night; this pain is not confined to the joint, but shoots down the limb, and is particularly complained of about the elbow. The deltoid and other neighbouring muscles are weak, or

even powerless; they are also soft and relaxed, so that they seem smaller than usual, and hence give the shoulder a flattened appearance, which is increased by an œdematous swelling that generally exists in the lower part of the limb. If the actual cautery be used freely and early, and the best place for its application is, I believe, either the hollow at the posterior edge of the deltoid, or that between the deltoid and *pectoralis major*, it has a powerful effect in arresting the morbid action; but if the case is trusted to less efficacious remedies, or allowed to follow its own course without any interference, in process of time matter is formed, and the bones pass into the state of confirmed caries. The progress of the disease is generally slow, sometimes requiring years to arrive at its height; but it is not the less sure; and I have therefore been particular in describing it, as its comparative rarity and resemblance in some respects to ordinary cases of rheumatism render it apt to be overlooked, or treated with too little attention. When the abscess opens, it is not easy to reach the carious bone with a probe, owing to the tortuous course which the sinuses usually take; and it has even been found impossible to do so, notwithstanding every care, and the assistance

derived from curving the instrument. In such cases, the history of the disease must be the surgeon's guide; and if he feels authorized to operate, he ought to commence so as to ascertain the true state of the parts, without inflicting any more injury than is absolutely necessary, lest he should prove to have been mistaken.

There is no case in which excision is so decidedly preferable to amputation as caries of the shoulder-joint. The diseased bone can here be readily cut away without injury to any important organ, and the object gained is no less than the preservation of the whole superior extremity. When amputation, again, is performed, besides the severe loss which is sustained, there is a division of the large nerves and blood-vessels, and also the sudden removal of a large portion of the body, consequently a much greater risk of local and constitutional disturbance.

In 1768, Mr White of Manchester treated a case, of which he gives the following relation:

"Edmund Pollit, of Sterling, near Cockey-

Moor, in this county, aged fourteen, of a scrofulous habit of body, was admitted into the Manchester Infirmary, April 6, 1768. The account I received with him was, that he had been suddenly seized, about a *fortnight before*, with a violent inflammation in his left shoulder, which threatened a mortification, but at last terminated in a large abscess, which was opened with a lancet a few days before his admission. The orifice was situated near the axilla, upon the lower edge of the *pectoralis major*, and through it I could distinctly feel the head of the *os humeri*, totally divested of its bursal ligament. The matter, which was very offensive, and in great quantity, had made its way down to the middle of the humerus, and had likewise burst out at another orifice, just below the *processus acromion*, through which the head of the *os humeri* might easily be seen. The whole arm and hand were swelled to twice their natural size, and were entirely useless to him. He suffered much pain, and the absorption of the matter had brought on hectic symptoms, such as night sweats, diarrhœa, quick pulse, and loss of appetite, which had extremely emaciated him.

"In these very dangerous circumstances, there seemed to be no resource but from an operation. The common one in these cases, that of taking off the arm at the articulation with the scapula, appeared dreadful, both in the first instant, and in its consequences. I therefore proposed the following operation, from which I expected many advantages, and performed it on the fourteenth of the same month. I began my incision at that orifice which was situated just below the *processus acromion*, and carried it down to the middle of the humerus, by which all the subjacent bone was brought into view. I then took hold of the patient's elbow, and easily forced the upper head of the humerus out of its socket, and brought it so entirely out of the wound, that I readily grasped the whole head in my left hand, and held it there till I had sawn it off with a common amputation saw, having first applied a pasteboard card betwixt the bone and the skin. I had taken the precaution of placing an assistant, on whom I could depend, with a compress just above the clavicle, to stop the circulation in the artery, if I should have the misfortune to cut or lacerate it, but no accident of any kind happened,

and the patient did not lose more than two ounces of blood, only a small artery which partly surrounds the joint being wounded, which was easily secured.

"He was remarkably easy after the operation, and rested well that night; the discharge diminished every day, the swelling gradually abated, his appetite returned, and all his hectic symptoms vanished. In about five or six weeks *I perceived the part from which the bone had been taken had acquired a considerable degree of firmness, and he was able to lift a pretty large weight in his hand. At the end of two months I found that a large piece of the whole substance of the bone that had been denuded by the matter, and afterwards exposed to the air, was now ready to separate from the sound, and with a pair of forceps I easily removed it.* After this exfoliation the wound healed very fast, and on August 15, he was discharged perfectly cured. On comparing this arm with the other, *it is not quite an inch shorter; he has the perfect use of it*, and cannot only elevate his arm to any height, but can likewise perform the rotatory motion as well as ever. The fi-

gure of the arm is no ways altered, and from the use he has of it, and its appearance to the eye and to the touch, I think I may safely say the head, neck, and part of the body of the *os humeri* are actually regenerated."

"*I could not help being surprised to find so much strength and firmness, as evidently showed a regeneration of the bone, before the lower part had exfoliated, or even before it had begun to loosen. The osseous matter could not proceed from the scapula, the glenoid cavity of that bone not being divested of its cartilage, could it then possibly escape from the end of the sound bone, before the morbid part had begun to separate from it?* Or are there any vessels that could convey the boney matter, and deposit it in the place of what had been removed."*

I have put some expressions in italics which seem to me of importance in explaining the true nature of this case. It is quite clear, from an attentive consideration of it, that it was not one of caries, but an instance of that acute necrosis which is so frequently met with in the

* Cases in Surgery, by Charles White. London, 1770, p. 57.

finger, and occasionally also in the larger bones, (See first Quarterly Report of the Edinburgh Surgical Hospital, Ed. Med. and Surg. Journal, No. 101.) This will account for the facility of the operation and also its great success, particularly in respect to the length of the limb, which was not diminished. In all the other cases of excision which have hitherto been published, there was uniformly a degree of shortening proportioned to the extent of bone removed, yet, though nearly four inches were taken away by Mr White, the limb was not perceptibly shortened. It may be asked how is the explanation easier on the one supposition than on the other? Why should new osseous matter be effused to repair the loss of substance caused by necrosis, and not after the excision of bone? These are difficult questions, and the only answer to them that I can offer is the well known fact, that there is a much greater disposition for the effusion of new bone in the one case than in the other. It is probable, too, that the foundation of a substitute may have been laid previously to the operation;—indeed, it is quite clear that this must have been the case with regard to the second portion removed by Mr White.

My reasons for giving such particular attention to this case are, *first*, because it led the way to all that has been done in this department of surgery; and *secondly*, because erroneous opinions regarding its real nature, arising from the superficial consideration of it, have rendered the result so difficult of belief as to throw an air of absurdity over the whole subject.

Soon after the publication of Mr White's case, his example was followed by Mr Bent of Newcastle,* and Mr Orred of Chester.† It appears, from the accounts we have of these operations, that the disease for which they were performed was really caries of the shoulder, and that the patients retained limbs, which, if not perfect, were at least extremely useful. Notwithstanding this encouragement to extend the practice, it seems to have been afterwards treated in this country with entire neglect. In France, Moreau the elder performed the operation successfully in 1786, and the army surgeons, particularly Barons Percy and Larrey, frequently resorted to it on account of recent gun-shot wounds instead of

* Philosoph. Trans. Vol. lxiv. † Ibid. lxix.

removing the limb. In civil practice, however, and for the cure of caries, I may say that excision of the shoulder-joint, until a few years ago, was never mentioned but with ridicule and disapprobation. About five years ago I met with a case which afforded a very favourable opportunity of reviving this obsolete proposal, and carried it into effect with such success as confirmed me in the opinion of its advantages that I had previously been led to entertain. Before relating the particulars of this case, it will be proper to make some general observations on the mode of performing the operation in this situation.

The humerus is not always affected to the same extent, but the whole of its head, that is to say, all that part above the attachments of the *pectoralis major* and *latissimus dorsi* muscles ought to be taken away; and this should be done in the first instance, to afford room for getting access to the scapular part of the disease. The glenoid cavity is sometimes affected only in a part of its surface, but the whole of it ought to be removed on the general principle already stated. The acromion process, though not entering into the forma-

tion of the joint, sometimes participates in the disease, and then, of course, requires removal no less than the other parts concerned. The axillary plexus lies at such a distance below the joint as to be perfectly safe, provided the surgeon opens the articulation at its external or lateral part, and then cuts close to the bones. The only vessel of a size that renders the necessity of a ligature at all probable is the posterior circumflex artery, which may be either tied at the time it is cut, or compressed by an assistant until the operation is finished. The joint may be opened by incisions made in various directions; a single perpendicular one from the acromion will hardly be sufficient, except in such cases as Mr White's, or in recent gun-shot wounds, where the surrounding parts are not thickened or preternaturally adherent, and where the comminution of the bone renders its free exposure for the application of a saw unnecessary. Mr Bent made a perpendicular incision, commencing midway between the acromion and coracoid process, and then cut inwards or towards the sternum from both extremities of this incision, so as to form an oblong flap of the *pectoralis major* and clavicular portion of the deltoid. It is difficult to conceive

a plan of operating more dangerous to the axillary plexus than this one, or less favourable to the easy and effectual attainment of the objects in view. Sabatier proposed to extirpate a portion of the integuments and deltoid of a V shape, which, though not so objectionable in respect to its danger and inconvenience in the first instance, must be regarded as extremely adverse to a speedy and satisfactory cure. Moreau made a square flap of the deltoid, turned it down, and then gained what more room was required, by cutting upwards at both extremities of the transverse incision, so as to obtain another flap. Mr Morel, in operating on account of a gun-shot wound of the shoulder-joint, six months after it was received at the battle of Waterloo, made a semilunar incision with the convexity downwards, so as to form at once a large flap from the deltoid. This mode of procedure does not appear to have been very convenient, if we may judge from what is stated by Mr Morel as to the length of time required for the operation, which was no less than three quarters of an hour, and the quantity of blood lost, viz. two pounds.*

* Med. Chirurg. Trans. Vol. vii.

I believe that the best way of bringing the bones completely within reach with least injury to the soft parts, is to make a perpendicular incision from the acromion through the middle of the deltoid, nearly to its attachment, and then another shorter one upwards and backwards, from the lower extremity of the former, so as to divide the external part of the muscle, (See Plate V. Fig. 1.) The flap thus formed being dissected off, the joint will be brought into view, and the capsular ligament, if still remaining, having been divided, the finger of the surgeon may be passed round the head of the bone, so as to feel the attachments of the spinati and subscapular muscles, which can then be readily divided by introducing the scalpel first on the one side, and then on the other. After this the elbow being pulled across the fore part of the chest, the head of the humerus will be protruded, and may then be easily sawn off while grasped in the operator's left hand. The subsequent part of the operation will be conducted on the principles already explained, and, as it is of course desirable to preserve as much mobility as possible, no means should be used

to restrain motion further than are necessary for preventing irritation and displacement. The *pectoralis major* and *latissimus dorsi* tend to draw the extremity of the bone inwards; but this may be easily prevented by placing a cushion in the axilla.

Case I.

Christian Laing, aged 38, was recommended to my care by Dr Belfrage, of Slateford, in June 1825. She complained of her left shoulder, the articulation of which was nearly immoveable, though the perfect mobility of the scapula rendered this not very obvious. There was a small opening directly under the acromion about half way between this process and the humeral attachment of the deltoid, and another about the middle of the clavicular part of the *pectoralis major;* both of these openings allowed the probe to pass in the direction of the joint to a considerable depth. The discharge was thin and copious; the integuments were natural; and there was little

swelling; the limb was entirely useless, being kept constantly suspended in a sling. The patient stated that she suffered much from pains in the shoulder, shooting down the arm even to the fingers. She was a healthy-looking woman, apparently somewhat exhausted by anxiety and suffering, but had no particular complaint, except what has been described. On inquiring into the history of the disease, I was told that it had commenced six years before, in consequence of a fall on the shoulder from a wall about two feet high. This accident was followed by pain and stiffness of the joint, which gradually incapacitated her for work; and at length, after five years of great suffering, which excited little sympathy, as there was no visible imperfection, she was induced to employ a bone-setter, who used very rough measures, and aggravated her distress. A large abscess pointed on the fore-part of the joint, and was opened by a surgeon in this city, to whom she next applied. On returning home to Roslin after this operation, she caught cold, and was confined to bed for six weeks; another abscess then formed, and opened spontaneously not long before the time I saw her.

From an attentive consideration of all the circumstances which have now been mentioned, I strongly suspected that the bones of the joint were diseased, and that a severe operation would be required for restoring the patient to health; but not seeing any reason for haste, and being averse to proceed rashly, I contented myself with dilating the sinuses, and opening an abscess which had formed in the axilla. Soon after this her health became considerably impaired, and I advised her to return to the country.

I saw nothing of the patient until the beginning of the following March. She then seemed to be much thinner and weaker than formerly, but the joint was little altered, except that there was another sinus just above the posterior margin of the axilla, resulting from an abscess that had been opened in the Royal Infirmary, whence she had been discharged two months before, after a residence of several weeks. She now suffered more than ever from an almost incessant gnawing pain; slept ill; had little appetite; and found herself becoming every day weaker, owing to an exhausting diarrhœa.

Though it was still impossible to pass a probe through any of the sinuses to the bone, and though no crepitus could be perceived when the joint was made to undergo the slight degree of motion which it still possessed, I now felt fully satisfied that nothing but an operation afforded any chance of relief, and therefore proposed to cut down upon the joint, so as to ascertain its actual condition; after which the diseased bone might be removed, either alone, if practicable, or together with the limb, if circumstances should render this necessary. The late Dr Dease, who was then surgeon to the forces in North Britain, having examined the patient, formed the same opinion, and gave me his assistance at the operation, which was performed on the 1st of April.

The patient being seated in a chair, I made a perpendicular incision from the acromion through the middle of the deltoid, nearly to its insertion, by thrusting the knife at once to the bone, and then carrying it downward at the same depth. By introducing my finger into the opening thus made, I felt that the

head of the humerus was hollowed into a cavity, and therefore determined to cut it out. With this view, I cut upwards and backwards from the lower end of the first incision, and having dissected the flap thus formed, so as to expose the joint, detached the scapular muscles from their connections with the tuberosities. When the arm was now carried forward across the chest, I easily made the head of the humerus protrude, grasped it in my left hand, and sawed it off without any injury to the soft parts, (See Plate II. Fig. 1.) I next examined the glenoid cavity, which seemed to be sound, though divested of its cartilage. The coracoid process appeared to be unaltered; but as the extremity of the acromion was bare and rough, I removed the affected portion by means of the cutting-pliers.

The first incision was followed by a considerable gush of blood; but the only artery divided of such consequence as to require a ligature, was the posterior circumflex, which Dr Dease compressed with his fingers till the operation was finished. This vessel was then tied. Five or six sutures were introduced to

keep the edges of the wound together, and some compresses of lint were secured by a spica bandage.

The whole operation, including the dressing, occupied ten minutes. The patient bore it well, and lost very little blood. She passed a quiet day, and had a good night.

On the second day after the operation, there was a slight attack of erysipelas, for which she had fourteen ounces of blood taken from the arm, and used a weak antimonial mixture. On the fourth day the erysipelas was declining. The edges of the wound were generally adhering; but at the site of the old sinus below the acromion, there issued a dark-coloured, profuse, and fœtid discharge. On the fifth day, there was a sudden and rather alarming sinking of her strength, from which she readily recovered, under the influence of wine and beef-tea. After this the cure went on steadily and rapidly; so that in a few weeks the wound was entirely healed, except those parts of it which corresponded with the openings of the sinuses that previously existed; and she was

able to go about free from the former pain, and exhausting discharge of matter. The use of the limb returned gradually, and, though serviceable to her almost from the first, that is to say, a month or two after the operation, it has been gradually becoming more and more so ever since. The sinuses dried up by degrees, and one of them continued to afford a few drops of serous exudation for nearly two years.

She is now in the following state, four years and a-half after the operation :—Instead of being a thin, exhausted, anxious-looking creature, who seemed about to sink under her sufferings, she is now a stout, active, young-looking woman for her time of life. She manages the whole of her domestic concerns, and performs all the manual offices which the wife of a tradesman is accustomed to do. She sews, knits, and washes. She carries a full pitcher of water, a basket, or any other ordinary load, with the left arm. There is no discharge, pain, or uneasiness of any sort. The left arm is about an inch shorter than the right ; a difference which is best observed when the two arms are viewed from behind, while the elbows are bent; indeed, it can hardly be remarked in any other

position. When the shoulder is examined without any covering, it exhibits a very deep, irregular, unseemly cicatrix, owing to the great increase which has taken place in the subcutaneous adipose tissue since the operation.

The joint, if it may be so called, allows the limb to be moved in all directions to nearly the natural extent, but her voluntary command over it is much more limited. She can move it across the chest, both forwards and backwards, with considerable force and freedom, but she has very little power of abduction; this, however, gives her very little inconvenience, as, when she wishes to separate the arm from the side, she easily does so with the assistance of her left hand. The result of this case far exceeded my expectations, and afforded great encouragement to persevere in the practice.

Case II.

Charles Borthwick, aged 40, a mason by trade, applied to me in May 1826, on account of a

disease in the left shoulder, in many respects bearing a strong resemblance to the one that has just been described. There were several sinuses opening about the margin of the axilla and all running towards the joint, though one only allowed a probe to reach the bone; there was little, if any, mobility of the articulation; and there was great wasting of the deltoid muscle, from which circumstance the bones appeared more distinct and larger than usual. The patient's pulse and appetite were good; but he was very thin and exhausted-looking, and suffered from an almost constant cough, which was particularly troublesome at night.

He stated, that between four and five years ago, till which time he had been a remarkably strong and healthy man, he suddenly felt, during the cold weather of winter, a severe pain in the left shoulder, which immediately rendered him incapable of moving the joint. Soon afterwards the integuments became red and swelled; and in the course of a year several abscesses formed about the joint, which, when opened, did not heal, but continued to pour out a thin and copious discharge. He

had recourse to various practitioners, who prescribed injections and pressure; but as these means were employed without any benefit, he determined to let things take their own course, and had accordingly done so for two years before the time I saw him. During the last six months his strength, which till then had been little affected, began to give way; and at the same time his cough also commenced. An aggravation of the pain, from which he had never been altogether free, induced him to apply to me.

Although I much feared that the period for an effectual operation had been allowed to go by, I felt very unwilling to leave him to the certain destruction of his complaint, which threatened to be very speedy, and therefore determined to try what effect a change of air and diet would have in restoring his health. With this view I sent him out of town, where he had every thing that could be desired in respect to diet and attendance. A remarkable improvement was soon manifest in his appetite, strength, and general appearance. The cough continued, but seemed to depend in a

great measure on irritation, as it regularly kept pace with the pain in the shoulder. His respiration was performed naturally, and the stethoscope afforded my friends, who examined his chest by its means, no reason to forbid the operation. In the course of four or five weeks, the patient becoming very anxious for relief, I began to think seriously of operating, and proceeded to do so on the 11th July.

Having brought the head of the bone into view by means of incisions similar to those described in Christian Laing's case, I attempted to detach it from the scapula, but, in effecting this, experienced considerable difficulty from ligamentous anchylosis of the joint; the muscles, too, were very rigid, and the long head of the biceps was attached to the humerus, between the tuberosities. Having, at length, divided all the connections, I turned out the head of the bone, and sawed it off. On examining the state of the scapula, where we were prepared to expect disease, I ascertained that the root of the coracoid process, and upper part of the glenoid cavity, were carious. After making a very free removal of the diseased

bone by means of cutting-pliers, I secured the posterior circumflex artery, put two stitches in the transverse part of the wound, filled the cavity with caddis, and then fixed the limb with a sling, and a single turn of a roller.

Notwithstanding the pain and tediousness of this operation, which, together with the dressing, lasted twenty minutes, the patient never had a bad symptom, and was walking about at the end of a week. The wound suppurated most favourably, and a great many fragments of bone came away, so as to leave the surface uniformly covered with firm healthy granulations. It is needless to detail particularly the future progress of the case; it may be sufficient to state, that the cavity gradually contracted, and in the course of six weeks was nearly healed. After that time the improvement was not so rapid, and an old sinus which ran along the *fossa supra spinata* under the trapezius rather became larger; I could not, however, discover any diseased bone, and trusted that the progress, though slow, would ultimately terminate in recovery. His pectoral complaints, however, became more troublesome,

and he died about six months after the operation, when his lungs were found on dissection to have been almost entirely destroyed by suppuration. The extremity of the humerus was rounded off and connected to the scapula by strong ligamentous bands.

The result of this case cannot be regarded as unfavourable to the operation ; on the contrary, it shows with how little constitutional disturbance excision of the shoulder-joint may be performed even in the most unfavourable circumstances ; and there can be little doubt, that, had this patient undergone the operation before the irritation of the disease had affected his lungs, his recovery would have been no less complete than that of Christian Laing.

CHAP. V.

EXCISION OF THE ELBOW-JOINT.

The difficulties which attend the removal of carious bones from the elbow-joint are considerably greater than those encountered in operating on the shoulder, owing to the number and form of the articulating surfaces and their strong ligamentous connections, while the objection to amputation, so far as regards its danger, is of much less weight. The proposal of cutting out the elbow-joint has accordingly proved even still more unpopular than that of excision of the shoulder; and until a few years ago, the only instances on record of its actual performance were those related by Moreau, though their successful issue might have been expected to overcome the prejudices of other surgeons against the operation, and, as it were, force them to adopt it. The original idea of this operation proceeded from Mr Park

of Liverpool, who tried it on the dead subject, but, for what reason does not appear, never applied it in practice. The two Moreaus, however, adopted it in good earnest, and employed it at Bar-sur-Ornain with great success. Three of their cases are detailed in the treatise of Moreau Junior, and two others are simply mentioned by him, in which the result was equally satisfactory, but the patients being young ladies, the particulars are not related.

Considering the great frequency of caries in the elbow, and the severe operation which is commonly resorted to for its removal, viz. amputation of the arm, the apathy of the profession to these facts seems very extraordinary. During the present century, in which so much has been done towards the improvement of surgery, hardly any attention has been given to this subject; I am not aware, indeed, that the records of our profession contain even a single instance of the operation being performed in Great Britain, previously to the cases which will be found below.

The elbow-joint may require excision for

caries, and also for the effects of external injury, both primary and secondary. The part of the articulation that usually suffers most from caries is the olecranon, which is not unfrequently hollowed into a cavity, and diseased throughout; the radius and humerus are in general affected but superficially; and the disease very seldom, if ever, extends beyond the head of the former, and tuberosities of the latter. It is always right to take away the whole of the sigmoid cavity of the ulna, which comprehends the olecranon and coronoid processes, together with the head of the radius and extremity of the humerus as high as its tuberosities. More than this, for the reason just mentioned, need not be removed; and a smaller portion would not include the whole of the cartilaginous surface, none of which, according to the general principle already explained, ought ever to be allowed to remain.

The easiest way of accomplishing this is to remove the olecranon in the first place; then to cut the lateral ligaments of the joint, so as to free the extremity of the humerus, and saw it off; lastly, to detach, by means of cut-

ting-pliers, the head of the radius, and the remaining part of the sigmoid cavity. The reason for not separating at once the whole of the ulna that requires to be removed is, that, in case it is divided below the insertion of the *brachiæus internus*, its removal becomes extremely difficult. Having experienced this inconvenience in one of my first cases, I have since always proceeded as has just been described, and never found any difficulty in detaching the coronoid process after gaining the free space that was afforded by removing the olecranon.

A simple longitudinal incision will not give sufficient access to the joint to allow of its excision, even in a sound state of the parts, much less when they are thickened and preternaturally adherent, as in cases of caries. An additional transverse cut was therefore proposed by Mr Park, intersecting the other at right angles; but this plan labours under the double objection of splitting the triceps, and not permitting free exposure of the humerus. A method still more objectionable, on the ground of unnecessarily injuring the muscles, is to make a longitudinal incision, and two trans-

verse ones at its extremities, so as to form two lateral flaps. By far the best plan that has yet been contrived is that of Moreau; and though it may appear at first sight complicated and destructive to the soft parts, it is really the easiest and least injurious that can be imagined. The figure H gives a perfect idea of his incisions; and it is only necessary to state further in explanation of them, that the transverse one should be close above the olecranon. In making this cut the ulnar nerve is apt to be wounded or divided; and though the facts mentioned below make this injury appear of very little consequence, as there can be no advantage in inflicting it, the surgeon ought to use the precaution of ascertaining the situation of the nerve before introducing his knife. The thickening of the limb is sometimes not so great as to prevent the nerve from being felt, but more frequently its situation can be discovered only by recollecting its position relatively to the bones; it lies close to the inner edge of the olecranon, and will certainly be cut if the transverse incision is prolonged farther than this towards the internal tuberosity of the humerus. The surgeon, there-

fore, ought to feel for the olecranon, and introduce his knife close to its upper surface, with the back turned towards its inner margin, but somewhat nearer its radial side. Having thrust the knife down into the joint, he ought to cut transversely, with a sawing motion, so as to insure the division of the tough tendinous parts, until he arrives at the radial tuberosity of the humerus. He may then make the longitudinal incisions, which should extend about an inch and a-half upwards and downwards, without any danger whatever, as the oblique course of the nerve recedes from the line of division. Both flaps should be dissected previously to commencing the excision of the bones, as it is thus rendered much easier than when the exposure is confined to the part that is to be first removed. The hemorrhage is generally profuse immediately on the incisions being made, but soon diminishes, and seldom persists to such extent as to require the application of a ligature; on the principle already stated, however, it is right to secure any vessel, however small, that threatens to continue to bleed. In those rare and perplexing cases, where the ulna is diseased below the coronoid process,

and requires to be divided through its shaft, the interosseous artery is very apt to be divided, and must, of course, be tied. As to the humeral artery, it is always perfectly safe, being protected from injury by the whole thickness of the *brachialis internus*.

There is a great variety in the difficulty which is experienced in performing this operation in different cases. The adhesions are sometimes so general and so firm that no way can be made without the knife; while, at other times, the suppuration has, as it were, already dissected the bones, so that the surgeon, after making his incisions, has little to do but to apply his saw and pliers for their removal. When the operation is concluded, the edges of the wound are to be stitched together; the limb ought to be half bent; and a long roller applied in the figure of eight to give it proper support.

In cases of wounds where caries has been induced by the subsequent inflammation, the operation ought to be conducted in the same manner, except that, if there is a large opening

into the joint, the incisions ought to be directed so as to take advantage of it.

In recent cases of compound dislocation, and gun-shot wounds of the joint, the surgeon must decide as to the operation to be performed, from a general and attentive consideration of the injury sustained, and the care that can be bestowed on the treatment. Unless there be a wound of the great vessels and nerves, a splintering of the bone high up, a very unfavourable state of the system, or difficulty of procuring the requisite attention, as sometimes happens in military service, he will be warranted in giving his patient a chance of retaining the limb, by abstracting the broken fragments and removing the articulating surfaces, either through the openings that already exist, or a suitable extension of them.

The best position for the patient in cutting out the elbow, is lying with his face downwards on a sofa or table covered with a mattress. It is disagreeable to place him in this posture, which naturally increases his dread of the sufferings he is about to undergo; but no other

will enable the surgeon to command the joint so readily.

Case III.

Mr Y., twenty-four years of age, about fourteen months before asking my assistance, began to feel flying pains in the left elbow-joint. He could not in any way account for the origin of this complaint, and paid little attention to it, until after the lapse of several months it became gradually much aggravated, and accompanied by a weakness of the limb, which at length deprived him of its use. The joint being now considerably swelled, was leeched, but without any relief. Poultices were then applied for several weeks, when the practitioner in attendance made an incision over the inner tuberosity of the humerus, and evacuated a large quantity of matter. Other incisions were subsequently made in different parts of the arm for the same purpose. Though somewhat relieved after the discharge of these abscesses, he still continued to be tortured with pain, which was particularly severe during the night, when it not only

deprived him of rest, but almost made him distracted.

I saw him first in October 1828, and found his strength, as well as appetite, less impaired than might have been expected. His countenance, however, betrayed intense and long-continued suffering, and exhibited very remarkably that peculiar anxious look which so often accompanies disease of the bones. The limb was perfectly powerless, and œdematous from the lower third of the humerus downwards. After several unsuccessful trials, I succeeded in passing a probe into the posterior part of the joint, which was then felt to be extensively carious.

As the disease appeared to be confined to the bones, as the patient was young, and as the irritation of the disease was much greater than any that could result from an operation which had the effect of removing the source of it, I resolved to cut out the joint, and accordingly performed the operation on the 3d November, in the presence of Professor Russell and Sir George Ballingall.

Having placed the patient on a sofa, so as to present the elbow in a favourable position, I made a transverse incision at once into the joint immediately above the olecranon, and extending to the radial tuberosity of the humerus, but at such a distance from the inner one as to avoid the ulnar nerve. I then cut upwards and downwards for about an inch and a-half at each extremity of the first incision, so as to form two square flaps, which being dissected from the subjacent bones, exposed them completely. Having ascertained that the ulna was carious as far as the coronoid process, I sawed it across at this part, and then insulating the extremity of the humerus, divided it in the same way immediately above the tuberosities. I lastly removed the head of the radius, which was very much diseased.

No vessel required a ligature, but there was a considerable general oozing from the cut surface. After exposing the wound for a few minutes, and sponging it with cold water, I brought the flaps together, and retained them in contact by means of one stitch in each of the perpendicular incisions, and three in the trans-

verse one. Some compresses of lint and a roller were then applied, after which the patient was put to bed. Those present were much struck by the very slight alteration that appeared in the shape of the limb after the stitches were introduced.

On the following morning, I found that the patient had passed an indifferent night, and was looking rather anxious and exhausted from want of sleep, notwithstanding an opiate which he had taken the preceding evening. His pulse, however, was good, and he had had no rigor or other unpleasant symptom. As his bowels had not been evacuated the day before, I directed an injection to be administered without delay. In the evening, he was in all respects well; a soft pulse, a clean tongue, and a countenance nearly free from the expression of anxious distress which had characterized it previously to the operation, led me to conclude that there was little reason for apprehension.

Great part of the wound healed by the first intention, leaving very little deformity; but the cure was delayed by an œdematous state

of the limb, which distended the newly-formed cicatrix, and impeded the contraction of the granulations in those parts which did not unite in the first instance. To counteract this disposition, I used fomentations with warm salt water, and the pressure of a firmly applied flannel roller. The joint remained moveable to the natural extent; but though the patient could use his hand almost from the first, he did not regain any command over the elbow until the end of several months. And even now he does not possess much strength in it. He is able, however, to use it in giving instructions in arithmetic, &c. It may be proper to observe, that this individual is characterized by an extreme degree of what is usually called nervous constitution, and altogether a most unfavourable subject for this or any other operation.

Case IV.

A. L., aged 8, in February 1828, fell upon his left elbow, while playing with some other boys. The joint soon afterwards became enlarged, stiff, and painful; but not so much so

as to excite alarm, until the month of April, when his mother brought him to me for advice. I then found the appearances very unfavourable, the limb being straight and nearly immoveable, with much swelling of the joint. The usual measures were employed, but did not prevent the formation of an abscess, which pointed on the outer side of the elbow between the radius and olecranon. I evacuated the matter by incision, and advised that the patient should be taken to the country, as his health had suffered considerably. About the middle of August he returned to town much improved in all respects; his general health being quite restored, and the joint being much more moveable, as well as diminished in size. Matters continued in pretty much the same state till October, when, finding that the sinus did not heal, I introduced a probe, and ascertained that the olecranon was carious. Having explained the obstinate nature of the complaint, which rendered a spontaneous cure hardly, or rather not at all, to be expected, and the necessity of amputation at some future period almost certain, I readily obtained permission to do what I thought proper for the patient's relief.

On the 20th October, I exposed the olecranon, and by means of cutting-pliers removed a great part of the shell into which it had been expanded; this enabled me to extract some loose pieces which lay within the cavity. Hoping that these might have occasioned the obstinacy of the complaint, I prosecuted the excision no further, and dressed the wound with dry caddis.

The patient made no complaint whatever after the operation. He could not be confined to bed after the first day, and was with difficulty persuaded even to remain at home. The wound assumed a very healthy appearance, and soon contracted to its former size; but then it remained stationary, and the probe discovered that there was still some diseased bone.

Perceiving that another operation was required, I determined to make it an effectual one. On the 27th November, I made a crucial incision, like a St Andrew's cross, so as to obtain four flaps, which, being reflected, I divided the ulna below its coronoid process with

the cutting-pliers, and then removed the detached portion, not without considerable difficulty, owing to its connection with the *brachialis internus*. I next examined the radius, and, finding that the centre of its round articular surface was carious, cut off the head with the pliers. I then directed my attention to the humerus, and, observing an unsound part in the trochlear hollow, removed the whole articulating surface. Having thus finished the operation, I brought the edges of the wound together by means of four or five stitches. There was little bleeding, and no occasion for any ligatures.

Very slight disturbance of the constitution followed, but the wound did not unite in any part by the first intention. There was some sloughing of the unhealthy soft parts, and very profuse suppuration, which, however, in the course of a few days, diminished to the usual proportion of a healthy sore. The patient was running about by the end of the first week, and in a fortnight longer the wound was all but healed. It continued to discharge a small quantity of thin serous matter for

some months afterwards, but at length closed entirely. The mobility of the limb was at first considerable, but gradually diminished, owing, I believe, partly to the increasing contraction and rigidity of the cicatrix, and partly to the wilfulness of the patient, who would not exercise the limb as he was instructed to do. The elbow is now nearly stiff; but as the other joints are perfect, and the muscles of the limb retain their full strength, he suffers little inconvenience.

I may remark that this case led me to adopt excision of the elbow-joint. I had been long thinking of this operation, and in 1826, was very anxious to perform it on a boy, whose arm I afterwards amputated, as the other gentlemen consulted would not sanction my proposal. In the case just related, the disease seemed to be so completely limited to the olecranon, that I expected to remove the diseased bone without encroaching on the joint. This expectation was not realized, but the very slight irritation which followed the imperfect operation I performed with this view, emboldened me to act with more freedom, and, happening to meet at this time with the case of

Mr Y. I did not hesitate to perform the complete excision that has been related.

Case V.

Ossory Fitzpatrick, forty years of age, a ship-carpenter from Liverpool, applied to me on the 1st January 1829, on account of an affection of the left elbow, of which he gave the following history:—Somewhat more than a year before he began to feel occasional wandering pains about the joint, together with some stiffness in moving it, but was not deprived of the use of the limb until several months afterwards, when it swelled, and became excessively painful, with violent disturbance of the whole system. The fever subsided, but the joint remained swelled and painful. An abscess was opened by the knife, and others which formed afterwards were evacuated spontaneously, but none of the apertures had closed. On examining the sinuses with a probe, I readily passed it through the joint, grating against carious bones. I proposed excision, and, meeting with the patient's ready consent, performed it a few days afterwards.

Having placed him on a table with his face downwards, so as to present the elbow conveniently, I made two square flaps, as in the first case. Finding that the ulna was diseased as far down as the coronoid process, I first sawed off the olecranon, and then cut away what more of the bone required removal with the pliers; this mode of procedure obviated the difficulty occasioned by the attachment of the *brachialis internus* which I had experienced in the second case. I next detached the head of the radius, which was completely carious, and then sawed off the extremity of the humerus; but as the disease did not seem to be eradicated at the ulnar tuberosity, I cut away both it and the radial one, so as to leave no room for anxiety or doubt. No ligatures being required, I inserted five or six stitches, so as to keep the cut edges in contact; then applied some folds of caddis; and, lastly, supported the limb by means of a roller. The operation in this case was much more difficult than in either of the former, owing to the extremely firm connection of the soft parts.

The wound healed entirely by the first in-

tention, except a space not larger than one of the original sinuses, and the patient suffered no constitutional disturbance. In two or three days he was walking abroad; and about the end of a fortnight, the cure might be considered complete. Happening to lecture at this time on the subject of caries, I showed him, together with the other patients, to my class, as a proof that the recovery after excision of a joint was not so tedious as had been represented. The mobility of the elbow in flexion, extension, and rotation, was hardly, if at all, impaired; there was no deformity; and he not only retained the full use of his hand, but had regained very considerable voluntary power over the motions of the fore-arm. He left Edinburgh, about the end of February suddenly, in bad humour, at my refusing to give him a certificate of the operation he had undergone, which, as it could have been used only for begging, I did not feel inclined to grant. I have neither seen nor heard distinctly of him since; but vague and contradictory rumours have reached me, from time to time, of his being under treatment in some of the Dublin hospitals, on account of the old com-

plaint. Should this really be the case, I think his relapse might be easily accounted for, by the exposure to which he must have been subjected, in performing so long a journey, at such an inclement season of the year, and so soon after the operation.

Case VI.

Janet Burns, aged 25, from Carnwath, was admitted into the Surgical Hospital on the 8th of May 1829, for caries of the elbow-joint, which had existed for twelve months, and would have been considered amply sufficient to justify amputation. The operation was performed in the manner that has been described, and the after-treatment did not differ in any respect that requires to be mentioned. She was harassed by a slight degree of chronic bronchitis, which delayed her recovery, and rendered the complete and permanent re-establishment of her health somewhat doubtful.

She returned to the Hospital last June,

on account of a ganglionic affection of her knee, and had then regained the use of her elbow-joint so completely, that, when her hands were used in any ordinary employment, such as adjusting her dress, sewing, &c. no one would have supposed that it was in any respect defective; and, when she was so engaged, I have repeatedly puzzled strangers, by desiring them to fix on the arm which had been the subject of operation.

Case VII.

John Wells, aged 9, was admitted into the Surgical Hospital on the 7th of July 1829, on account of disease in the left elbow, which arose from a fall, and had existed for several months. The limb was considerably swelled about the joint, and there was a sinus which allowed a probe to reach the bone.

The olecranon seemed to be the part chiefly, if not solely, affected; but I resolved to remove the whole articulation, both because some other part of it might be affected, and also because any portion of it allowed to re-

main might occasion a relapse. After sawing off the extremity of the humerus, and cutting away with the pliers the olecranon and head of the radius, I thought, from the appearance of the different surfaces, that enough had been done, and dressed the wound. When the excised portions were afterwards more carefully examined, it was observed that the surface of the olecranon presented a small carious cavity, a portion of which must have been allowed to remain. I immediately undid the dressings, and, by replacing the olecranon, discovered the carious part, which was a sort of cylindrical excavation, no wider than a common quill, but running deeply into the bone. Having ascertained its extent by introducing a probe, I insulated the ulna as far as was necessary, and cut it across through the shaft, so as to detach the whole spongy portion of the bone. In doing this, a large vessel, I suppose the interosseous, was cut, and required a ligature.

Notwithstanding the comparative severity of this operation, in which the bone was removed to so great an extent, and the attachments of all the muscles were divided, except

that of the biceps, the patient made an excellent recovery, and, being of a most docile disposition, assiduously exercised the limb in performing its different motions. In the course of a few weeks it became almost as useful to him as ever, and it can now hardly be distinguished from the other; the patient uses them equally for climbing, lifting weights, and wrestling with his companions. When I asked him one day if he knew any difference between them, he replied: "None, except that he could houk (*Anglicè* dig) a hole deeper with the one than the other;" and it was accordingly found, by measurement, that there is nearly an inch of difference between their respective lengths, though this difference is not perceptible, except on a careful comparison.

This boy resides in the neighbourhood of the Hospital, and can be seen at any time by those who are interested in the subject. To give some idea of the perfect freedom with which he can use the arm, I have caused it to be represented in the most complete states of extension and flexion which he can make it undergo by the action of its own muscles.—Plate IV. Fig. 3 and 4.

Case VIII.

Elizabeth Johnston, aged 15, from Falkirk, entered the Hospital on the 25th August, on account of a disease in the right elbow-joint, which had existed for six months, having commenced spontaneously, and increased progressively, notwithstanding the efforts of her medical attendants. It now presented a most formidable appearance, the joint being so much swelled as to measure thirteen inches in circumference, while the arm above was reduced to little more than skin and bone. The skin over the olecranon was extensively ulcerated, and at different places, both in the front and back of the joint, the probe could be passed into sinuses which extended to the bones. The limb was straight, and nearly immoveable. The discharge was profuse; the pain unceasing; and the irritation so great that the patient's strength seemed rapidly sinking. It was plainly necessary to do something effective for her relief; and both Sir George Ballingall and myself, on first examining the case, were of opinion that any operation short of amputation would be inexpedient, where there was such

extensive disease, not only of the bones but also of the soft parts. In the course of ten days, however, whether it was owing to a real improvement proceeding from the free vent which had been afforded to the matter by incisions, or was merely the effect of familiarity with the appearance of the joint, I fancied that it was not so hopeless as we at first believed, and resolved to make an attempt at excision.

The operation was performed in the usual manner, and was attended with very little difficulty, owing to the separation of the surrounding soft parts, which had been caused by collections of matter. The olecranon was greatly expanded, and crumbled into fragments, which were extracted piecemeal; the radius adhered to the humerus, and was taken away along with it. Before dressing the wound, I observed that the ulnar nerve was partially divided by an oblique incision, and therefore cut it completely across, to avoid the danger which is usually believed to attend such an injury. The patient did extremely well; the wound healed kindly; the swelling of the joint subsided; and she gradually regained its use.

For some time after the operation she complained of coldness and numbness in the ulnar side of the hand, but, before many weeks, was entirely relieved from these sensations.

She returned home with an arm nearly as moveable as ever, and becoming every day more useful to her; and when her father died soon afterwards, leaving a large family in very destitute circumstances, she was able to contribute towards their support by tambouring muslin. In the ensuing spring, in consequence, it was supposed, of having made too great exertions in the occupation just mentioned, she began to complain of pain and swelling in the wrist of the arm which had been subjected to operation. She returned to the Hospital in June, and we were then sorry to find a very considerable enlargement of the wrist, with a sinus leading into the carpal extremity of the radius. In these circumstances, there was no resource but amputation, and I, therefore, performed it above the elbow, which could not have been left with any advantage, and, indeed, not without the risk of affording room for more mischief in a limb, and in a constitution that

manifested so strong a disposition to diseased action.

We had thus an opportunity of ascertaining the state not only of the newly formed uniting medium between the bones, but also of the nerve which had been divided. When all the muscles and other parts covering the joint were dissected off, it seemed at first sight as if the articulation still remained, the appearance presented being nearly the same as usual; but on closer examination, it was found that the place of the extremities of the bones was occupied by a mass of strong fibrous substance, closely resembling the ligamentous tissue, which allowed of motion in all directions. The triceps was attached to the posterior surface of this newly formed ligament, and through means of it to the extremity of the ulna. The representation in Plate III. gives a very perfect idea of this structure, and will probably be regarded with interest, as being the first of the kind which, so far as I know, has ever been published. In respect to the nerve, I am happy to be able to give the following report from my friend Dr Sharpey:—

"A large oblong swelling, fully an inch and a half in length, enveloped the divided extremities of the nerve, which overlapped each other to some extent. The substance of this swelling was of a grayish colour, and exceedingly hard and tough; it was continuous with the sheath of the nerve, and insinuated itself between the nervous bundles, so as to spread them out from one another as they passed through the swelling. The several fasciculi of the nerve could be traced a certain way through the hard matter, both from above and below, without difficulty, as, in the greater part of their course, they adhered to it but slightly, and were distinguished by their yellowish colour.

"A few bundles from the lower part of the nerve, but a greater number from the upper, after passing through part of the swelling, terminated on its surface by a free divided extremity, which had undergone no thickening, enlargement, nor other apparent change; but it is doubtful whether these cut extremities had been formed by the original section of the nerve, or in cutting out the preparation. Each of the

remaining fasciculi, after advancing some way through the enveloping mass, became at length more adherent to it, lighter in colour, and augmented in size, expanding into a flattened enlargement, at which point it was united to one or more bundles from the opposite portion of nerve, and to collateral fasciculi of its own portion, which had undergone a similar enlargement. On minutely examining these points of union, of which there were several, it seemed as if the small cords, or funiculi of the upper and lower divisions of the nerve, were connected together by an intermediate flocculent substance of less than a line in extent, which, when macerated and viewed with the microscope, appeared to be made up of fine filaments crossed and interwoven with one another. At some points, however, I thought I could distinguish parallel filaments, which passed between the upper and lower funiculi, and seemed to establish their continuity by a tissue more analogous to their own; but it is doubtful whether that appearance was not owing merely to a particular cord being continued beyond the point of connection of the rest. When acted on by concentrated nitric acid, the interme-

diate filamentous matter acquired a deep yellow colour, with increased firmness and opacity.

"The nerve had been kept for some months previous to examination in a spirituous solution of corrosive sublimate. The upper portion was of a deeper colour than the lower, but no other difference could be perceived in the two parts; the appearance of transverse stripes, which nerves usually present, was equally evident in both."

Case IX.

James Page, aged 8, was recommended to the Surgical Hospital by Mr Fergusson of Auchtermuchty, as a proper subject for excision of the elbow-joint, and was admitted on the 2d of January 1830. The right elbow was much enlarged, discoloured, and stiff. There were two sinuses opening on each side of the triceps, through which a probe could be passed to the bone. The operation was performed in the ordinary manner on the 12th of the same

month, and he was dismissed on the 12th of March.

This boy was remarkably obstinate and unmindful of the constant injunctions impressed upon him to exercise the joint; it has consequently become very rigid, and therefore impaired the utility of the limb; but that the arm is still of no small advantage to him, will, I trust, appear from the following letter which the Rev. Dr Taylor was good enough to write in reply to my queries respecting the patient's state after recovery could be considered complete.

AUCHTERMUCHTY,
28th July 1830.

DEAR SIR,—I am happy to be able to state respecting the boy James Page, on whose elbow you operated in the Surgical Hospital last winter, that his general health is quite good—that his elbow is free from pain, and about the same thickness as the other,—that though the wound cicatrized very slowly, it is now, and has been for some time, perfectly whole,—that his use of the *hand* seems to be not the least impaired; and accordingly he employs it, being his right hand, for ordinary purposes which do not re-

quire much motion of the elbow-joint,—that he seems to have the same strength in the arm operated on as in the other, for when he has any thing of considerable weight to carry, for instance, as much water as he can bring in a pitcher, he does it with his right arm,—and that, though, as you must be aware from the state in which he left the Hospital, he has but very limited motion at the elbow, yet he has a little. He usually puts on and takes off his bonnet, and can also use a spoon with his right hand, but for the latter purpose he generally prefers the left. On the whole, he is certainly in a vastly better situation than if he had lost his arm. I believe every one who sees him readily acknowledges that.—I am, Dear Sir, yours truly,

J. Taylor.

Case X.

James Alexander, aged 9, from Arbroath, entered the Hospital on the 2d of February 1830, on account of a disease of the elbow, under which he had laboured for eighteen months. There was a large opening on the external tuberosity of the humerus, through which the

bone could be readily felt, and indeed seen. As there was no prospect of recovery without amputation or excision, I chose the latter operation, and performed it on the 9th of February. It was impossible to cut away the diseased part of the humerus, which was of very considerable extent, without opening the joint. And therefore, in coincidence with the principle so often referred to, I removed all the articulating surfaces.

The patient recovered extremely well and speedily from the operation; but when almost quite well, and just about to be dismissed from the Hospital, he fell into a bad state of health, one effect of which was a superficial ulcer over the site of the old opening, that proved extremely obstinate, and yielded only to time, and an alterative course of blue pill and sarsaparilla. He was dismissed cured on the 6th of May. In reply to an inquiry respecting his present state, which I addressed to Dr Arrott of Arbroath, I received the following letter from his son :—

ARBROATH, 17*th Dec.* 1830.

MY DEAR SIR,—I called upon James Alexander yesterday, and was much pleased to find his elbow-joint quite sound. Though the motion is a good deal limited, yet the limb is equally strong with the other, and as useful for many purposes. There are several sores on different parts of his body, the same as the one which made its appearance when he was in Edinburgh. Is there any thing which you think would be of use to him? His health is otherwise good.—I remain, Dear Sir, most truly yours,

WILLM. H. ARROTT.

CASE XI.

John Malloch, æt. 30, from Perth, a missionary of the Baptist persuasion, entered the Hospital on the 23d of June 1830, on account of a diseased elbow-joint, of which the following account appears in the Journal:—

"His left elbow is very much enlarged, œde-

matous, and inflamed. There are two sinuses communicating with the joint; one situated immediately over the olecranon, and the other about three inches lower down. There is little pain, except on pressure, when it is very acute. He cannot allow of any motion of the joint, keeps his fingers extended, and seems to be afraid of moving the arm in the slightest degree.

"Seven years ago, he fell upon his left elbow and bruised it; two months afterwards it swelled and suppurated; and the discharge continued through several successive openings for two years. It then healed up, but remained swelled and stiff. Last January he was attacked with severe pain in the joint, which increased till five weeks ago, when matter formed, and was discharged by one of the former openings. A fortnight afterwards, another abscess collected over the olecranon, and was opened by a surgeon in Perth.

"25th, Mr Syme proceeded to cut out the elbow-joint. Running the knife into the joint with its back to the ulnar nerve, he made a

transverse incision across the arm, close to the olecranon, as far as the external condyle. From the middle of this incision another was made down the arm over the ulna about three inches in length, and from the extremities of the one first mentioned, two were made up the arm about two inches long. The flaps being dissected back, the articulating extremities of the ulna, humerus, and radius, were removed. The diseased synovial membrane was cut out, and the edges of the wound were then brought together by stitches. Two arteries spouted, but did not seem to require ligatures. The limb was placed in a bent posture enveloped with caddis and a long bandage, to give it support. In this case a longitudinal incision was made downwards from the centre of the transverse one, instead of two at its extremities, since the sinuses were thus included in the line of incision, and the ulna more readily exposed, which was the bone principally diseased.

"Cloths wet with cold water were applied after the operation to check the disposition to

bleed; but about two o'clock, as there was still a good deal of hemorrhage, the dressings were removed, when it was found to proceed from an artery in the integuments of one of the lower flaps. The bleeding vessel being tied, the dressings were replaced.

"26th, The wound is looking very well, and seems as if it would heal by the first intention. Pulse quick. Cold lotion to be continued. Tartrate of antimony, with Epsom salts, to be taken every hour.

"28th, There is a good deal of constitutional irritation. He complains of oppression over the stomach, and a little difficulty of breathing. The wound has not healed.

"29th, A copious fœtid discharge from the elbow, with some redness and tension.

"30th, Feels much better; swelling subsiding. Acetate of lead lotion, with bandage, to be continued.

"July 1st, Appetite much better. To sit up in bed.

"2d, He was out of bed most of the day.

"3d, The redness and swelling are quite gone. The edges of the wound to be brought together with adhesive plaster, and sulphate of zinc wash to be applied with bandage.

"5th, The elbow is looking well, and the wound is granulating kindly. To have steak and a pint of porter.

"9th, He had rigors yesterday. Elbow appears to be doing very well.

"15th, The cross incision has almost healed, but the longitudinal one is kept open by the ulna being bare at its extremity, which threatens to exfoliate. A large abscess has formed on his right hip.

"16th, The abscess was opened and a poultice applied.

"19th, He has had frequent shivering and sweating fits; pulse quick and weak. To have wine instead of porter. Mr S. laid open the sinus in the hip, the discharge from which

was profuse. Dry caddis and bandage applied. The elbow is improving, the discharge is not nearly so great; and a distinct groove can be felt on the ulna between the dead and living bone.

"20th, He thinks himself stronger; the rigors are not so frequent. To have sulphate of quina, a grain and a-half three times a-day, and a glass of port wine every three hours.

"24th, He had rigors twice yesterday afternoon. About two o'clock this morning, when at stool, there was considerable hemorrhage from the hip. He is weaker than yesterday, and complains of great pain in his right groin, which is a little swelled.

"25th, He is no better, pain in the groin is still much complained of.

"26th, His pulse is much weaker, the pain in the groin is excessive; obscure fluctuation can be felt on the iliac side of the vessels.

"27th, He complains of embarrassment

in his breathing, with pain of chest. Pulse 160.

"29th, He has been slightly delirious; other symptoms as before; he is much weaker.

"30th, Cold cloths applied to his forehead at his own desire. Pulse can hardly be felt.

"31st, He died."

On dissection the abscess of the hip was found to extend upwards among the muscles, as high as the lumbar region. There was an extensive abscess between the ilium and *iliacus internus* descending into the groin. There were old adhesions between the *pleura pulmonalis* and *costalis* on both sides, but especially on the right. Upon the centre of the anterior surface of the left lung lymph had been recently effused to a considerable extent, and about eight ounces of sero-purulent turbid fluid lay in the pleura of the same side. The lungs in several parts were indurated or hepatized, and in some places suppuration had taken place so as to form deposits of the size

of a walnut. On the surface of the brain the vessels were more turgid than usual, and in some places there were small ecchymoses. Great part of the wound was healed, but the extremities of both the humerus and ulna were exfoliating.

This unfortunate man, whose thin emaciated care-worn appearance indicated an age not less than fifty, though it really was no more than thirty, was certainly, as the result showed, a most unfavourable subject for operation; and I sincerely believe, that any operation, however slight, which had the effect of at all disturbing the constitution, would have given rise to equally disastrous consequences. This extreme tendency to disordered action could of course be learned only when it was too late.

Case XII.

David Forret, aged 28, from Cupar, recommended by Dr Scott, was admitted on the 14th of July 1830 into the Surgical Hospital, on ac-

count of disease in the right elbow. Nine months previously he began to feel gnawing pain in the back part of the joint, attended with little swelling, but some stiffness. In January a small tumour appeared a little above the internal condyle, and opened a fortnight afterwards by an orifice which has continued to discharge ever since. In March, without having suffered any perceptible injury, the joint inflamed, becoming very red, greatly swelled, and excessively painful, especially when subjected to the slightest pressure or motion. He was bled and leeched repeatedly, with the effect of subduing the intensity of the symptoms, but the disease persisted, as was proved by the formation and opening of other abscesses, the orifices of which still remained. The limb had been long entirely useless, and his health had latterly given way so much as to satisfy his friends that he would speedily sink under his complaint, unless some relief was afforded. He was pale and excessively thin; his face exhibited the wrinkles of old age, and his hair was thin and dry.

I performed the operation on the 19th, and

removed the portions of bone represented in Plate II. Fig. 2. The synovial membrane, being very much thickened and gelatinous, was cut away as far as possible, one small artery of the integuments was tied, and the edges of the transverse incision were stitched together. The extreme softness of the diseased integuments rendered it impossible to close the longitudinal incision in this manner, as the threads instantly cut their way out, and compresses of caddis were therefore applied, so as to keep them in their place as nearly as possible. Notwithstanding considerable inflammation, he made, on the whole, a good recovery, and was most attentive in exercising the limb. He was dismissed on the 15th of September. Dr Scott, in reply to my inquiry as to his subsequent progress, writes as follows :—

"CUPAR, *20th Dec.* 1830.

"MY DEAR SIR,—I received your letter in reference to the young man Forret ; but as he lives at some distance from this, some days elapsed before I had an opportunity of seeing him ; he came to me, however, last Sunday, to show me his arm. It is about two inches

shorter than the other. He can perform with it pretty well flexion and extension, particularly the former, pronation and supination, the latter, however, not completely. All swelling and inflammatory action about the joint have subsided. The wounds have almost healed. The joint is very flexible, capable of motion in any direction, resembling in this respect the orbicular joints. He can carry his arm to his head, and consequently feed himself; a matter of some importance, as it is the right arm. He seems much pleased with his condition, and grateful for what has been done to him.—I am yours very truly,

DAVID SCOTT."

CASE XIII.

—— Walker, a boy about 8 or 9 years of age, was recommended to my care last August by Dr Fletcher, of Dunkeld, on account of an injury, the nature of which will appear best from the following extract of that gentleman's letter :—

" About five weeks ago, little Walker went

out with some other boys, who were herding a cow by the road-side close to the town. He tied the rope which was attached to the cow to his side. The cow ran off, and dragged him furiously along the road till it was stopped by the people." Dr F. then mentions some slight injuries he had sustained on different parts of the body. "The left arm was severely injured, the flesh being ground off to the very bone, and the surrounding edges of the wound rough and jagged, as if the injury had been done by a grater. No washing could expose the parts at the bottom of the wound, to enable me to see or feel whether the periosteum was affected, the whole surface being ingrained with mud and dirt, so as to make it impossible to ascertain its real condition. Warm poultices were constantly applied to the wound, and the treatment of the constitutional symptoms was conducted on the usual principles." The injured parts sloughed off, but the wound did not take on a healing aspect, the surface being ash-coloured and spongy, while a copious thin discharge issued from the joint, which was now found to be open. His health was much affected; and it appeared

necessary either to cut out the joint, or amputate the limb.

Though the great destruction of the soft parts and formidable appearance of the wound were somewhat opposed to the former operation, I determined to perform it, and did so a few days after the patient came to town. The ulna was the bone principally affected; but I thought it right to remove the articulating extremities of the others along with it. He made a good recovery, and went home at the end of three weeks, greatly improved in strength, with the wound almost healed, and such command of the arm, that he could use it for many little offices, and even for lifting considerable weights. Wishing to know his present state, I wrote to Dr Fletcher lately, and received the following reply :—

"DUNKELD, 14*th Dec.* 1830.

"DEAR SIR,—I received yours of the 12th this morning, and am happy that it has arrived to hasten my doing what I have intended to do for the last three or four weeks, viz. to let you know the success of little Walker's

case. Until about that time there was always a slight discharge, sometimes with a scab, sometimes without one; but since then the part has completely dried up; and on examining it to-day, I found the whole surface covered with good sound skin, except one place, about the size of half a sixpence, which has a thin scab on it, though there is every appearance of its being like the rest in a few days. But while the cure of the wound has been thus successful, the astonishing part of the case is the utility of the arm; its motions are perfect, and it is daily gaining strength; the degree it possesses already is really surprising. To suppose that it will be equal to the other arm is totally out of the question; but its usefulness is more than I could have expected, and certainly a thousand times greater than that of an unseemly stump.

"If any thing unfavourable should happen in this case hereafter, I shall be sure to write you. I sincerely trust that nothing will go wrong; but if it should, I am confident the cause ought to be ascribed to constitutional fault, and not to the operation.—I am, &c.

"D. Fletcher."

Case XIV.

William Finlay, aged 23, farm-servant from Cockpen, applied at the Surgical Hospital on the 3d of August 1830, on account of a small abscess a little above the inner tuberosity of the left humerus, with considerable pain, stiffness, and swelling of the joint. This complaint had commenced three months previously, and resisted the usual remedies in such cases.

As the abscess seemed to be quite superficial and devoid of a hard basis, I hoped that it was not connected with the joint any farther than as the effect of irritation there; and that the disease had therefore not advanced to its suppurating stage, and might be still within reach of the actual cautery. I accordingly opened the abscess, and made an eschar between the olecranon and external tuberosity of the humerus. A few days afterwards, on examining the sinus, I found that it allowed a probe to pass to the bones. The patient was dismissed,

at his own desire, on the 12th, with directions to go home and apply poultices. He returned on the 26th, and was re-admitted.

His arm was now much worse, being greatly swelled and excessively painful. He was entirely deprived of rest, and could not permit the slightest movement of the limb without suffering the most excruciating agony. Several abscesses formed, and were opened after his admission. The acuteness of his symptoms then became somewhat mitigated, and I cut out the joint on the 6th of September.

The only circumstances observed on this occasion that seem worthy of notice are the following: *First*, the great size and strength of the bone, the patient being a tall and powerful man; *Secondly*, the state of the cartilage of the humerus, which was almost completely detached, though remaining entire, so that it lay within the cavity like a piece of white leather, the subjacent surface of the bone being covered with a soft vascular growth; *Thirdly*, the extreme thickness and gelatinous condi-

tion of the synovial membrane, which seemed to constitute a great part of the swelling, and of which I thought it right to cut away some large portions.

The patient made an excellent recovery, and was dismissed on the 27th of October. He returned lately so much changed in appearance, that I really did not recognize him at first. The thin, dark, and sunken features were now full and florid, his gait was erect, and his appearance altogether that of a man in robust health. His arm is very moveable, and daily acquiring more strength, which is already very considerable.

Case XV.

William Rogers, aged 13, was brought to me at the beginning of last summer, on account of a diseased elbow, which seemed to admit of relief by excision. The parents were dissuaded from submitting to this proposal by the representation of a practitioner adverse to the operation, who strongly recommended am-

putation in its stead. As this proposal was still less acceptable than the former, the patient was sent to the country, and placed under the care of an irregular practitioner. I was asked to see him again about the middle of September, and then found that a change had taken place greatly to the worse. The swelling, instead of being circumscribed and confined to the neighbourhood of the joint, now extended half way both up to the shoulder, and down to the hand. There were numerous sinuses; and, in short, an appearance of greater derangement of structure than I had ever met with, except in the case of Elizabeth Johnstone, above related; but, encouraged by the success experienced in that instance, I still deemed it right to perform the operation.

On the 21st of October I cut into the joint, and removed the olecranon as usual. It then appeared that the ulna was very extensively diseased, the cells of its spongy substance being filled with scrofulous matter. To make as sure as possible of taking away all the affected portion, I insulated the bone quite down to the commencement of the narrow part of its shaft,

and cut it across there. As the boy Wells, who had an equally large portion of the ulna removed, made a perfect recovery, I hoped that the result in this case also would be satisfactory, notwithstanding so great a liberty had been taken with it. For nearly a week this hope promised to be realized. A good deal of inflammation indeed succeeded, but not more than I had frequently seen before. The clots of blood, and sloughs of diseased structure, separated by degrees, and then the swelling and tension subsided. At this stage of the case, I went to the country to perform an operation, and returned the following evening, but did not see the patient till next morning, as I believed him to be doing perfectly well. His appearance then struck me remarkably. He had all along a pale unhealthy aspect, and quick, uneasy way of breathing; but now his countenance was much more thin, pale, and anxious; and his breathing was performed with a sort of catch. He had refused his food both this day and the day before. I believe that the limb should now have been amputated; but previous success made me too confident, and I contented myself with palliat-

ing symptoms, of which a very disagreeable one that next appeared was a tympanitic distension of the abdomen. On the 30th of September, he was evidently sinking under the irritation, and I then removed the arm with the advice of some of my friends, but certainly with very little expectation of preventing the fatal termination, which took place the day following.

The result of this case shows that there are limits determined by the extent of the disease, and the constitution of the patient, beyond which the operation cannot be extended with safety. These limits can be ascertained only by experience; and, therefore, such exceptions should be regarded as beacons, not to warn us against the operation, but rather to guide us to its safe and advantageous performance.

Case XVI.

John Nimmo, aged 12, was admitted into the Surgical Hospital on the 1st of October. This boy had been an inmate of the same in-

stitution as the other. His complaint had commenced about the same time ; and he also had been urgently advised to submit to amputation. The disease was in the left elbow, and presented nearly the same appearance that Rogers's did when I saw him first, which, as already mentioned, was much less formidable than when it was operated on. I performed the excision on the day on which his friend died, since he had come to the Hospital for the purpose of undergoing the operation, and would probably have been discouraged if he had become acquainted with the unfortunate result. Unless my own mind had been well made up as to the advantages of the operation, it would have been no less unpleasant for me to operate than for him to submit. He made a good recovery, though rather difficult to manage in respect to exercising the limb. He was dismissed on the 27th of October ; and, as he resides in town, occasionally calls to show us his progress in regaining the use of his arm, which is already very satisfactory.

Wrist-Joint.

The wrist-joint, though not so subject to caries as the elbow, is nevertheless frequently affected with it; and in such cases there does not seem to be any other remedy than amputation. The operation of excision is liable here to very strong objections, such as the number and situation of the tendons, nerves, and blood-vessels, which can hardly be avoided; the exposure to injury not only of the tendons for moving the wrist, but also those of the fingers and thumb, the consequence of which would render the hand useless even if it were preserved; the difficulty of eradicating the disease owing to the number of bones entering into the formation of the joint, viz. the radius, ulna, scaphoid, lunar, and cuneiform; and lastly, the risk of the disease recurring from the inflammation which must necessarily be excited by the operation, in the complicated structure of spongy bones and synovial membranes composing the carpus. In short, excision of the wrist would appear to be difficult of performance, very apt to be followed by relapse, and very likely

to leave a stiff unserviceable limb. It is fair however, to admit, that these objections are theoretical, and experience may perhaps prove them to be of less importance than they appear before-hand. I, therefore, think it may not be useless to describe what would appear to me the best mode of performing the operation.

Two longitudinal incisions, about an inch and a-half in length, should be made from the extremities of the radius and ulna upwards, along the lateral aspects of these bones. Two shorter cuts may then be carried inwards on the posterior surface of the wrist, from the lower ends of the former ones. The extensors of the thumb will thus, of course, be divided; and great care must be taken to avoid the radial artery where it turns over the end of the radius. The bones, being next exposed as well as possible, ought to be divided with the pliers as high as seems necessary,—their removal will then be easily accomplished, after which the carpal part of the articulation may be readily cut away with the pliers and gouge.

Moreau Junior and Roux have performed this operation, it is said, with good success.

Caries of the Carpus and Metacarpus.

From the number and small size of the carpal bones, as well as their intimate connection with each other, and with the extremities of those of the metacarpus, it is extremely difficult to remove the whole extent of caries occurring in this situation; and the disease must, for the reasons already mentioned, be very apt to return. The only cases in which it is prudent to make an attempt of this kind, are those in which the disease is stationary in its progress, where it seems to be of limited extent, and where there is no thickening in the neighbourhood, indicative of a disposition to fall into the same morbid state.

When the surgeon determines to operate, he ought to give himself plenty of room, by making a free crucial incision; and having raised the flaps so as to expose the bones, may then, by means of the gouge and pliers, take

away the carious portion, which he recognizes by its softness and want of the toughness which characterizes sound bone. It is generally recommended to conclude the operation by applying the actual cautery; but as its effect on bone is confined to a very slight depth, the surgeon will do well not to trust to this subsidiary means, and rather endeavour to make his excision effectual in the first instance.

Caries of the Metacarpo-digital Articulation.

It is by no means unusual to meet with caries of the first joint of the fingers and thumb; and a humane surgeon naturally feels averse to perform amputation for a disease of such limited extent. But, severe as this practice may appear, it is unquestionably the most prudent, since the shrunk and powerless digit which would remain in the event of a successful excision, so far from affording any compensation for the pain, time, and trouble spent in its preservation, could not fail to be a source of perpetual annoyance to the patient.

CHAP. VI.

EXCISION OF THE JOINTS OF THE INFERIOR EXTREMITIES.

The inferior extremities being employed chiefly in supporting the body, and in effecting progressive motion, can be more satisfactorily replaced by an artificial substitute than the superior. Their joints are large, and consequently require severe operations to remove them. And there is reason, on theoretical grounds, to suspect, that the limb which would be saved by this means could hardly be more useful than an artificial one. The objections to the operation, therefore, are greater, while the advantages of it appear to be less considerable than in the superior extremity. It would be wrong, however, to decide hastily against the use of excision in the inferior extremities altogether, the result of this practice, as applied to the arm, having so

much exceeded expectation, and the few instances in which it has been tried in the leg having proved rather favourable to its adoption.

Excision of the Hip-Joint.

It has been proposed to cut out the hip-joint on account of caries, and in the case of gunshot wounds shattering the head of the femur. In respect to the former of these cases there can be no hesitation in regarding the operation as decidedly improper, since it is well known that the acetabulum is with hardly any exception implicated in the disease, and usually suffers from it to a greater extent than the femur. Although, therefore, one out of twenty cases of *morbus coxarius* admitted of an effectual excision, an operator would certainly not be justified in the general employment of a practice which could be of use so very seldom. If it were possible to ascertain, previously to the performance of the operation, whether or not the patient could be freed by it from his disease, there might be some advantage derived from it; but as this is not the case, prudence

and humanity equally forbid excision of the hip-joint.

The inefficacy of surgery in the third stage of the *morbus coxarius* is an additional reason for actively using the means which exert most control over it in the earlier periods of its progress, before the chronic inflammation has terminated in an alteration of structure. Of these unquestionably the most powerful is the actual cautery, and I beg to refer to the Reports of the Surgical Hospital for cases of its good effects in arresting the disease.

It ought to be recollected that the obstinacy of sinuses about the hip is not always owing to disease of the joint, but sometimes depends on exfoliation of the bones of the pelvis, the removal of which is speedily followed by a cure. As this fact has been very much overlooked, I may refer to some cases of it which I have recorded in the 99th number of the Edinburgh Medical and Surgical Journal.

When the head of the thigh-bone has been broken into pieces by a musket bullet, with-

out any injury of the great blood-vessels or nerves, or extensive laceration of the muscles, it would certainly be better to extract the fragments than to perform amputation at the joint, as the patient would thus not only retain a limb that might probably be of use to him, but also avoid the shock necessarily attending the removal of so large a portion of the body.

It has been found in trials on the dead subject that a single perpendicular incision, five or six inches long, commencing a little above the *trochanter major*, affords sufficient room for cutting out the head of the bone, where the parts are sound and free from morbid adhesion. The operation would, of course, be accomplished much more easily in the circumstances under consideration, owing to the comminution of the bone caused by the ball.

CHAP. VII.

EXCISION OF THE KNEE-JOINT.

When the great size of the knee-joint, and consequent severity of the operation which is required for cutting it out, are taken into consideration, there seems reason for surprise that some of the earliest attempts at excision should have been practised on this joint. It was probably the extreme frequency of amputation for disease in this joint that suggested the attempt at preservation, and forced it on attention more strongly than that of the elbow.

In the year 1781, Mr Park, of Liverpool, cut out the patella, together with the articulating extremities of the femur and tibia, in the case of Hector M'Caghen, aged 33, on account of caries of ten years standing. He made a crucial incision on the fore part of the knee, and

found no difficulty in sawing off the ends of the bones. The patient made a tedious recovery, having repeated attacks of inflammation, and also sustaining an injury of the limb by falling when just beginning to use it about six months after the operation ; but at length at the end of a year was dismissed, and subsequently, as Mr Park expresses it, "got a sound limb, and went to sea." The following extracts are important : —"To the history of Hector M'Caghen I have now to add, that he afterwards made several voyages to sea, in which he was able to go aloft with considerable agility, and to perform all the duties of a seaman ; that he was twice shipwrecked, and suffered great hardships without feeling any farther complaint in that limb; but was at last unfortunately drowned by the oversetting of a flat in the river Mersey."— "On the whole, from what I have now seen of this man's limb, I do not hesitate to declare, that it appears to me so much more valuable than any artificial one, that, was I in his situation, I should infinitely prefer the former, at the price which he has obtained it." Mr Park afterwards operated upon another man, aged 38, who had laboured under disease of the knee

for three years; but he died of exhaustion about four months after the operation, which seems to have disheartened Mr Park from making any further attempts to preserve limbs by cutting out the joints. In Great Britain no additional cases of excision of the knee have been put on record previously to those which I am about to relate. In France and Germany there have been one or two attempts of the kind, and a few years ago Mr Crampton of Dublin tried the operation in two cases. The subjects of both were young women, and the disease white-swelling. In one no firm union took place, and the patient died three years and a-half after the operation, exhausted by the discharge and repeated attacks of erysipelatous inflammation. The other made a good recovery, so that in "about six months after the operation the femur and tibia were consolidated by a firm bony union, and the woman, though timid beyond all example, began to lay her foot gently to the ground, supporting the weight of her body, however, on crutches. She now went to the country, and in the month of October 1824, (fourteen months after the operation,) I received a letter from my friend and pupil Mr Rynd,

of which the following is an extract :—"Your old patient, Anne Lynch, *walked* from Kilcork to Johnston House (a distance of nearly five miles) to see me this morning. She is in excellent health, and the limb is perfectly firm, though bowed outwards." Anne Lynch has been frequently in Dublin since that period, and has presented herself for examination at most of the hospitals. She is now in town; and I have this day, November 3, 1826, examined the limb, and find that the femur and tibia are firmly consolidated; the leg and thigh are not in the slightest degree wasted, but the limb is considerably bowed outwards. She wears a shoe with a cork sole four inches thick, and, to use her own expression, "is able to stand or walk the length of a day." *

The objections to excision of the knee-joint seem at first very great, and indeed insurmountable. It may be sufficient to mention the severity and danger of the operation, the tediousness of the cure, and the little difference as to utility between the stiff limb that is preserved and an artificial one. Upon closer exa-

* Dublin Hospital Reports, Vol. iv.

mination, these objections, though they do not altogether vanish, certainly appear of less force. Thus the operation requires comparatively small superficial incisions, and can be accomplished much more quickly and easily than excision of the elbow-joint. It certainly must be regarded as more dangerous than amputation when the patient is very weak or exhausted by previous disease; but if he possesses moderate strength, I think it cannot be maintained, either on the general principles already stated, or from the result of experience, that the risk attending it is more than what proceeds from removing the limb. The recovery was certainly very tedious in Mr Park's case, but there were particular circumstances which in some measure account for this; and the few patients who have since then undergone the operation recovered in a shorter time. It ought here to be recollected, too, that though recovery from amputation of the thigh is usually completed in three or four weeks, it is generally *at least as many months* before the patient can rest the weight of his body on the face of the stump, so as to use it in standing or walking. As to the utility of the limb, we find that it

can be employed freely in progressive motion, and all the patients have declared that they considered themselves extremely fortunate in having preserved their legs such as they were. The advantages of the operation which may be contended for, are, that it preserves the natural support of the body afforded by the bones and joints of the *tarsus*, *metatarsus*, and toes, which, by diffusing the effects of force applied at the extremity of the limb, protects both it and the other parts of the body from concussion; and that it obviates the necessity of resting the whole of the patient's weight on the *face* of a stump, which must be done when amputation is performed above the knee. On the whole, I am not inclined to condemn the excision of the knee-joint altogether; and at the same time cannot venture to recommend it, without more facts to ascertain the correctness of our hypothetical opinions on the subject.

The operation may be performed by different external incisions. Mr Park made a crucial incision, Moreau two longitudinal ones, and another transversely below the patella.

The best plan, I think, is to make two semi-lunar incisions across the fore-part of the joint, extending from one lateral ligament to the other, meeting at their extremities, and including the patella between them. Very free room will thus be afforded, which may be easily enlarged, if required, by cutting longitudinally at the point of union of the transverse incisions.

The patient being laid on his back, the surgeon should rapidly divide the integuments and other parts exterior to the joint, so as to open its cavity, and remove the patella. Having next cut the lateral ligaments, he may readily protrude the extremity of the femur, and saw off as much of it as seems necessary. He has lastly to take away the diseased part of the tibia, which can now be done very easily, by passing the knife round the head of the bone, so as to detach its connections, and then sawing off a slice of the requisite thickness.

During this process, the popliteal vessels may seem to be in danger, but really are not so,—as the insulation of the bones is not performed until the ligaments which connect them to-

gether are divided, and no longer oppose their being separated from each other, so as to be more distant from the vessels. There is not much bleeding, but one or two of the articular branches may require to be tied. After the operation, a great difficulty has been experienced in bringing the limb into a straight position, owing to the contracted state of the flexor muscles, which still prevent extension, notwithstanding the relaxation that is afforded by shortening the bone. In this case, the surgeon must be satisfied with placing the limb on a double inclined plane, in as good a position as can be obtained by moderate force, exerted through the means of pasteboard splints. In a few days it will be found that the tension gradually diminishes, and before long allows the leg to be completely straightened.

During the cure it does not seem proper to insure absolute rest, in order to obtain a true anchylosis or osseous union, since the very long bone that would thus be formed, besides being extremely inconvenient to the patient, by rendering the limb perfectly rigid, could not fail to expose it to a great risk of fracture,

by affording long levers to forces acting at the extremities. A great degree of flexibility, on the other hand, would unfit the limb for support and progressive motion, so that, while perfect immobility and free motion ought to be avoided, a slight degree of flexibility ought to be promoted. The chief difficulty of the cure consists in preventing the tendency to bend outwards, which is always strong, and, if not counteracted, most injurious to the appearance and usefulness of the limb. The best mode of opposing this distortion consists in the careful application of splints.

Case XVII.

John Arnot, aged 8, was admitted into the Surgical Hospital on the 1st of December 1829, on account of disease in his left knee. The joint was much enlarged, and bent at an acute angle. There were two sinuses on the inner side, which allowed a probe to reach the bone. The disease had resulted from a fall on the ice, and was of three years standing. His health was broken, and he seemed likely to

sink soon under his suffering, unless something was done for his relief.

On the 7th of December, I made two incisions across the fore part of the joint, extending from one condyle of the femur to the other, meeting at their extremities, and including the patella between them. The portion of integuments thus insulated having been removed along with the patella, which was very much diseased, I exposed the extremity of the femur, and sawed it off as high as the tuberosities. In doing this the periosteum was separated from the bone, to which it adhered very slightly, for about half an inch, and I therefore thought it right to saw off another portion to this extent. The head of the tibia was next exposed, and removed by means of the saw and cutting-pliers. One of the articular arteries was then tied, after which I proceeded to dress the wound; but here an unexpected difficulty occurred, owing to the hamstring muscles being so much contracted that they still prevented the limb from being straightened, notwithstanding the relaxation they had undergone in consequence of the re-

moval of the joint. I extended the leg as far as was practicable, and secured it in this position by a splint and bandage.

The patient had very little constitutional disturbance, but the wound presented a dry and unpromising appearance, and the tibia, from not resting in opposition to the femur, was drawn upwards behind it, so as to make it press upon the integuments and threaten an extensive exfoliation. After several unsuccessful attempts, I at length succeeded, at the end of several days, in reducing the displaced extremities of the bones, when the limb became quite straight, and the tendency to dislocation almost entirely ceased. The cure afterwards went on most satisfactorily, notwithstanding the restlessness of the patient, who did every thing in his power to retard it.

In the course of four weeks after the operation, the wound was all but healed, and the limb, before the expiration of three months, had regained so much strength that the patient could make some use of it in walking. It has been progressively improving since, and

is still doing well. I have no doubt that ultimately it will be nearly as useful to him as ever; but even at present he would be very sorry to exchange it for a wooden one. He can walk and run, though with a halt, without the constrained appearance of a person with an artificial leg, and merely requires the *heel* of the shoe to be two inches higher than the other. The limb is stout, and well nourished, and though slightly bowed outwards, does not occasion any disagreeable deformity; it allows a slight degree of flexion and extension. This boy lives in town, and can be seen by any one who is interested in the subject.

Case XVIII.

Anne Mackintosh, aged 7, a very thin, weak, unhealthy looking child, entered the Hospital on the 14th of December 1830, on account of a diseased knee-joint. There was a large sinus over the inner condyle, through which I introduced my finger and felt the joint extensively diseased; there was not much swelling, but the leg was retracted upon the thigh so

as to form an acute angle with it. Encouraged by the promising state of the former patient, who seemed a much more unfavourable subject for excision than this one, I performed a similar operation on the 28th of December.

Great difficulty was experienced from the contracted state of the muscles preventing dislocation of the femur, and the surface of this bone, soon after the operation, presented a dry dead-like appearance; but the favourable termination of the former case, notwithstanding a similar and equally threatening aspect, prevented me from abandoning my sanguine expectations of success in this instance also. On the 6th of January, in order to prevent displacement of the bones, which all our efforts had been insufficient to effect completely, I cut away about two inches of the femur with the pliers, and then observed, with much concern, that the bone was denuded beyond the farthest extent to which my finger could reach. The patient began to sink soon afterwards, and died on the 8th.

CHAP. VIII.

EXCISION OF THE ANKLE-JOINT.

Next to the knee-joint the ankle is the most common seat of white-swelling, and the practicability of its excision is therefore an important subject of inquiry. It might be thought that the same objections would apply here as to the wrist-joint, but they hardly do so, at least to an equal extent. Instead of the three carpal bones which are connected with the radius and ulna, there is only one of the tarsus united with the tibia and fibula, viz. the astragalus, and it is of so large a size that the articular surface may be removed without encroaching on its connections with the other tarsal bones; while in the wrist it is impossible to take away any portion of the carpal part of the articulation without opening other joints, and thus laying the foundation of future disease by exciting inflammation in a structure predis-

posed to unhealthy action. In the ankle, too, the tendons are less numerous, and the bones are of a larger size, so that more room can be obtained for their removal. But though excision of the ankle may thus be not so objectionable as that of the wrist, it cannot boast of much advantage. The object to be gained being merely a support for the body, it may be questioned how far the foot that remains after the ankle-joint has been cut out is superior for this purpose to an artificial one. It appears from the experience of Moreau, that anchylosis is very apt to ensue after the operation; and though, as he observes, the other joints acquire an unusual degree of mobility, so as to compensate in some measure for the rigidity which is thus caused, there can be no doubt that the elasticity of the foot will be greatly impaired. The limb, too, must be considerably shortened, and the ankle little calculated for bearing the severe strains to which it is exposed. It may be proper to notice also, that a very large proportion of the diseases usually referred to the ankle-joint are seated in the articulation between the astragalus and *os calcis*.

The best mode of performing the operation

seems to be that practised by Moreau. Two incisions, three inches or more in length, are to be made along the posterior edges of the tibia and fibula, from their inferior extremities upwards; and then two transverse cuts from the lower ends of these, in a direction forwards, as far as the tendon of the *tibialis anticus* on the tibial, and that of the *peroneus tertius* on the fibular side. The flaps thus formed having been raised, the bones of the leg are exposed and divided by means of the saw or pliers as high as may seem necessary, after which the separation of their ligamentous connections is easily effected. The articular surface of the astragalus may lastly be readily removed by the gouge or cutting-pliers.

The limb should be gently moved during the cure, so as to prevent osseous union, since that would prove less convenient than a firm fibrous one, which may in some degree imitate the original joint in diffusing the force of twists or blows sustained by the foot.

CHAP. IX.

CARIES OF THE TARSUS AND METATARSUS.

The spongy osseous tissue composing the tarsus and heads of the metatarsal bones is frequently the seat of caries, and attempts have been made by Mr Dunn of Scarborough, Mr Liston, and others, to cut out the affected portions. Except when the disease is confined to the *os calcis*, so that it may be completely eradicated without opening any of the tarsal articulations, I am sure, so far as I am able to judge from my own experience, as well as the experience of others, that this practice will generally be unsatisfactory. The last case on which I operated, though very extensive, so as to require removal of the whole of the cuboid and part of the neighbouring bones, did well; but this must be regarded as an exception from the general rule.

When the *os calcis* alone is affected, the dis-

ease may be extirpated by making a crucial incision on the fibular side, and then digging out the carious part with the gouge.

If the disease extends to any of the other tarsal or metatarsal bones, there is hardly any remedy but amputation ; and if either the *astragalus* or *os calcis* be affected, of course the whole foot must be removed. It will be well, however, to recollect in such cases, that it is neither necessary nor useful to take away so much of the leg as is usually done. If the amputation is performed in a proper manner at or below the middle, so that a good cushion of muscle and integument is left to protect the extremities of the bones, the patient will retain the use of his knee-joint, and be able to stand or walk with an artificial foot, or short wooden pin, much more conveniently than he could do if obliged to support himself by resting on the knee. As the half of the leg is sufficient for this purpose, the surgeon should not amputate lower than this, since, though it may sometimes be possible to obtain a good stump by doing so, it much more frequently happens that, from the soft parts being too scanty in proportion to the size of the bones, these are badly covered.

When both the *os calcis* and *astragalus* are ascertained to be sound, it is fortunately practicable to save for the patient a useful part of his foot; and as the operation for this purpose has been much neglected in practice, especially in this country, I will describe it in the next chapter.

CHAP. X.

PARTIAL AMPUTATION OF THE FOOT.

It is unnecessary here to consider the original operation of Mr Hey of Leeds, in which the foot was divided between the tarsus and metatarsus; since, though much improved, and, indeed, it may be said perfected, by M. Lisfranc, it can seldom be practised with advantage; for caries, I believe, never. When the disease is seated in the proximal heads of the metatarsal bones, it is obvious that the distal range of the tarsus must in all probability be also affected; in which case amputation between the tarsus and metatarsus could remove only part of the disease; and when the farther extremities of the metatarsal bones are carious, there is seldom more than one affected, so that amputation of it along with the corresponding toe is sufficient. The operation of Chopart, which divides the foot through the

tarsus, separating the *astragalus* from the navicular, and the *os calcis* from the cuboid bone, may be performed more frequently and advantageously.

According to the observations I have been able to make on this point, when caries occurs in the foot, unless it affects all the bones of the tarsus, which is rarely the case, it is confined in general to one of the three following situations: 1. The articulation between the bones of the leg and the *astragalus*, *i. e.* the ankle-joint; 2. The articulation between the *astragalus* and *os calcis*; 3. The farther ranges of tarsal bones, and neighbouring heads of those of the metatarsus. In this last situation, the disease, whether existing in the heads of the metatarsal bones, the cuneiform or the navicular and cuboid, is completely within reach of an amputation, which leaves only the *os calcis* and *astragalus*. Considering the great importance of preserving the heel, in respect both of utility and appearance,—to say nothing of the patient's feelings, who would of course much rather part with the half of his foot than the half of his leg, it seems extraordinary that this

operation should not hitherto have been introduced into the practice of British surgery. As there can be no doubt that this neglect has proceeded from too readily receiving the theoretical objections which have been urged against the operation, I shall endeavour to state them fully, and ascertain what weight they deserve.

It has been said that the operation is difficult and painful,—that the cartilaginous surface which remains is adverse to healing,—that the extensor muscles of the ankle, from want of their usual opponents, the attachments of which must be cut away, will pull up the heel, and point the face of the stump to the ground, —and that even though not prevented in this way from being of use in supporting the body, the part of the foot which is saved cannot be more convenient than an artificial limb.

The difficulty attending Hey's operation, even with all Lisfranc's ingenious devices for discovering the seat of the different articulations and dividing the ligamentous connections, is certainly considerable, and might perplex even a practised operator. But in am-

putating through the tarsus, so as to separate the navicular bone from the *astragalus*, and the cuboid from the *os calcis*, the disarticulation may be performed with ease and certainty, if the simple directions, to be afterwards given, are attended to. The operation can be performed in a few seconds, as the incisions succeed each other without any necessary delay for changing instruments, and is therefore much less painful than amputation of the leg. In regard to the cartilaginous surface, it is now well ascertained that when it is sound, the apprehensions of bad consequences from such a source are either entirely without foundation, or, at all events, greatly exaggerated. After this very operation, I have seen the wound heal kindly by the first intention. The risk of elevation of the heel by the action of the gastrocnemius, and other extensor muscles does seem, at first sight, a very serious objection, which, I confess, weighed so much with myself as to make me hostile to the operation, until I happened to see a patient in the Hospital at Göttingen, on whom Langenbeck had recently operated. In this case there was no distortion, and I was assured that none had

happened in several other cases of the same kind. The reason of this at the same time appeared, viz. the tendons of the *tibialis anticus* and extensors of the toes finding new attachments to the extremity of the stump. *Lastly*, as to the objection that the portion of foot which is saved will be of no more use than an artificial leg, I think if it is recollected that, by the operation in question, there are two joints preserved, which must greatly diffuse the force of any shock sustained by the foot, there can be little hesitation in admitting that the patient's comfort and facility in walking must be very much superior.

When the operation is to be performed, a tourniquet ought to be applied; and as it is always proper to compress vessels as near as possible to the part where they are to be divided, the pad should be placed over the posterior tibial artery, just above the ankle. Various minute directions have been given for determining the position of the joints. But the following very simple observation will, I am sure, be always found quite sufficient for the purpose. If the surgeon casts his eye

upon the space between the outer ankle and head of the metatarsal bone of the little toe, he may easily ascertain the middle distance of these points; and this is the situation of the joint between the *os calcis* and cuboid bone. The other articulation, viz. that of the *astragalus* with the navicular, lies very nearly in the same transverse line; and the projection of the latter bone renders its discovery still more ready and certain. The flaps may be formed either entirely from the sole of the foot, or partly from it, and partly from the integuments of the instep; but the former plan is preferable, as affording a better covering for the bones. In this case it is necessary to make the flap extend fully to the balls of the toes, or farther extremities of the metatarsal bones; and it is here that one is most apt to go wrong, by cutting the parts too short for forming a good stump. In making the incisions, it is recommended to effect the disarticulation before making the flap from below; but I have uniformly found in operating on the dead subject, that it was extremely difficult in this way to cut it smoothly, owing to the relaxation of the parts in the sole of the foot, which

ensues upon the separation of the bones. It is much better, therefore, to transfix the foot from side to side, and complete the section of the flap before opening the joints, while the parts are held steady under the knife. After this analysis of the operation, it may be well to give a connected account of the mode of performing it.

The surgeon, having recognized the position of the joints, should place the points of his thumb and fore-finger upon them, embracing the foot in his hand; then, with a small sharp-pointed amputating knife, blunt on the back, make an incision from the one to the other, slightly curved towards the toes, in order that it may correspond to the flap below; and next, instead of opening the joints, run his knife through from side to side, between the bones and flesh of the sole, and cut forwards close to the bones, until he arrives at the balls of the toes, when he terminates the incision, not abruptly, but gradually, so as to have a smooth edge and surface. Nothing now remains but the disarticulation, which may be effected with extreme facility, as the

surfaces of the joints are nearly straight, and in the same line.

The anterior tibial and external plantar arteries require to be tied; after which the flap being stitched into its place, compresses and a bandage ought to be applied. The limb during the cure ought to be kept bent to relax the gastrocnemius.

Case XIX.

Ann Stewart, 10 years of age, was admitted into the Surgical Hospital on the 4th of June 1829, on account of a disease of the foot, which had existed two years, and assumed so serious an appearance, as to have made amputation of the leg appear necessary. There was considerable thickening in the whole course of the tarso-metatarsal articulation; and an opening over the middle cuneiform bone allowed the probe to pass through this extent, at every part of which the characters of caries were recognized. As the parts seemed quite sound at the first range of tarsal joints, I resolved to

save part of the foot by amputating here. The operation was accordingly performed in the way that has been described, and the result proved most satisfactory. The wound healed by the first intention, and the patient was able to put her foot to the ground in a fortnight, when it was observed that she retained the power of counteracting the extensors of the ancle, owing to the flexors having already acquired new attachments. She has now got a sort of artificial foot, which is extremely simple, and answers the purpose very well. It consists of a boot of the usual form and size, made of stout cotton cloth, reaching a little higher than the ancle, and lacing in front. The sole and instep are rendered unyielding by a thin plate and hoop of iron, and the whole of the cavity is stuffed with some soft material, except the space required for receiving the stump. This boot being put on over the stocking, is worn under an ordinary leather one; and the patient can walk, run, sit, and stand so naturally, that no person unacquainted with the condition of her limb would observe any defect in it.

Case XX.

William Gemble, printer, æt. 24, a tall, thin, unhealthy-looking young man, of a dark complexion, and dissipated appearance, entered the Hospital on the 31st of August, on account of pain and swelling of the foot. The swelling existed chiefly at the inner or tibial side of the instep, where there was an obscure sense of fluctuation, but also extended across, though not so prominently, to the outer edge. He had observed pain and enlargement for eighteen months, and had used blisters and leeches, but did not experience any considerable pain in it until a few weeks before the time of his admission, during which he had been confined to the house, and prevented from following his employment.

In order to check the progress of the disease, I applied the actual cautery, but without success. An abscess formed at the inner side of the foot, and when it was opened, the tarsal bones were found to be extensively diseased. In these circumstances, I proposed the

partial amputation of the foot, but could not prevail upon the patient to submit. He returned home, but came back again on the 1st of September, with his mind made up to undergo the operation.

The foot now presented a much more formidable appearance. Abscesses had opened in the sole, as well as at other parts, and the swelling was greatly increased; still, however, there was no indication that the ankle-joint, or the joint between the *astragalus* and *os calcis* was affected, and I therefore performed the operation, as in Stewart's case. The cartilaginous surfaces were found entire, but, as they were somewhat discoloured, I thought it right to cut them off with the pliers.

The patient did pretty well for two days, with the exception of complaining of pain in the stump, and having a very frequent pulse. A very profuse bleeding then ensued, and was arrested by the application of cold and pressure. Next day there was a return of the hemorrhage, and the stump was not only much inflamed, but beginning to slough at the edge

of the flap. I carefully extracted all the clots, and introduced a piece of caddis between the *os calcis* and flap, which was the part whence the blood issued; graduated compresses and a bandage were then applied, and the case proceeded favourably afterwards, and, though the patient made a tedious recovery, he ultimately got quite well, and was dismissed on the 13th of November.

He is now able to walk with great ease, and with hardly any visible lameness.

APPENDIX.

No. I.

RESULT OF M. ROUX'S PRACTICE IN THE EXCISION OF THE ELBOW-JOINT.

M. Roux is one of the few modern surgeons who have advocated the operation of excision. In 1812, he published an essay on the mode of performing it on the different joints which admit of its application; and he has since then tried it repeatedly in practice. He thinks the elbow-joint is the most proper subject for the operation; and in the Revue Medicale for January 1830, gives the following statement in regard to it, which has already appeared in the Ed. Med. and Surg. Journal, vol. xxxiv. p. 209.

"I have performed the operation of excision of the elbow four times. The first was in 1819, the last a few months ago; one in the right arm, and three in the left. Three

of the patients were males, one of whom was 37, the two others 21 and 22 years of age; and the fourth was a girl of 19. In all, the affection of the elbow was apparently of a scrofulous origin, and had attained a very advanced state of progress; for the joint was greatly swelled and surrounded by many fistulous openings, and the operation exposed an extensive fungous degeneration of the cellular tissue, as well as disease of the articular ends of the bones. I shall not describe the special disease in each case; neither shall I relate the method of operating, which was nearly the same in all, or the ulterior treatment required for accomplishing the healing of the wound and preservation of the movements of the arm. My sole object is to state the definitive results.

"Of the four patients one only died of the accidents immediately connected with the operation. The first dressings had been removed, and the wound several times dressed anew, and suppuration had commenced in the interior of the wound; nay, several of the sutures for preserving the flap in apposition had

been also withdrawn, when hemorrhage took place from beneath the flaps. This returned repeatedly; so that at length it became necessary to think of amputation to save the patient's life. Perhaps I hesitated about it too long: Death ensued in three days. In the three other patients, there was not a single serious circumstance to complicate either the immediate or remote consequences of the operation; life was not for a single moment in danger. The cure, indeed, was not accomplished so quickly as might have been desired; occasionally, too, I dreaded a too abundant suppuration; it was also necessary to take measures against the retention and accumulation of pus in particular spots; and although one of the three was quite well three months after the operation, on the other hand, the two remaining patients did not recover entirely for eight or nine months. But ultimately the arm was preserved in every instance; and in every instance its movements were partially recovered. Unfortunately, the patient I first operated on in 1819, was attacked with phthisis only a few months after recovering the free use of the arm, and died of this disease, the seeds of

which probably lurked in her constitution before the operation was performed. The two others, of whom one had the joint cut out two years, and the second three years ago, are at present alive, and in perfect health, and follow their customary occupation at Paris. One is a grinder, and the other a mantua-maker."

No. II.

CASE OF EXCISION OF THE ELBOW-JOINT, COMMUNICATED TO THE AUTHOR BY MR SPENCE OF OTLEY, YORKSHIRE.

Nancy Fox, aged 36, lives at Tulnec, near Leeds. Thirty years ago she received an injury of the elbow-joint, which from her own account appears to have been a partial dislocation. The injury was followed by inflammation of the joint and permanent rigidity. She became many years ago a patient in a provincial hospital, where amputation was proposed as the only means of affording relief, and, upon her objecting to it, she was dismissed.

The disease in the elbow remained much in the same state until two years ago, at which

time a violent attack of inflammation, terminating in suppuration, took place.

In the beginning of June 1830, (eighteen months after the suppuration commenced,) she applied to me. The joint was now much enlarged, and presented two or three fistulous openings, through which the bones entering into its formation could be felt carious. I determined upon performing the operation of excision, which was accordingly done in the usual manner, and the condyles of the humerus, along with the olecranon, upper extremity of the ulna, and the head of the radius, were removed. The wound healed by granulation. It is now upwards of seven months since the operation was performed. She has a considerable power of flexion and extension in the new articulation, and can go through all the ordinary avocations in her family. There is still a small discharge from an opening on the fore-part of the joint; this is, however, gradually diminishing, and there is every prospect of a complete cure.

THE END.

EXPLANATION OF THE PLATES.

PLATE I.

Representation of a Carious Elbow-Joint, to show the distinction between the truly diseased portion and the new bone, effused in consequence of its irritation.

The Carious part is limited by the lines A, A, and B, B.

PLATE II.

Fig. 1. Portion of the Humerus removed from Christian Laing.—Case I.

Fig. 2. Portions of the Humerus, Radius, and Ulna removed from David Forret.—Case XII.

PLATE III.

Elbow of Elizabeth Johnston, as it appeared when dissected twelve months after the Joint was excised.

PLATE IV.

Fig. 1. The knife which I have found most convenient for the excision of joints.

Fig. 2. A saw which may sometimes be found useful.

Figs. 3 and 4. Show the extent to which John Wells, Case VII. can bend and stretch his arm by its own muscles.

Fig. 5. Anne Stewart's stump after partial amputation of the foot. Case XIX.

PLATE V.

Fig. 1. Shows the incisions for cutting out the Shoulder-Joint.

Fig. 2. Shows the incisions for cutting out the Elbow-Joint.

Fig. 3. Shows the incisions for cutting out the Knee-Joint.

Figs. 4 and 5. Show the incisions for cutting out the Ankle-Joint.

EDINBURGH:
PRINTED BY JOHN STARK,
Old Assembly Close.

PLATE 1.

Robert Harley Del.t

Lizars sc.

PLATE II.

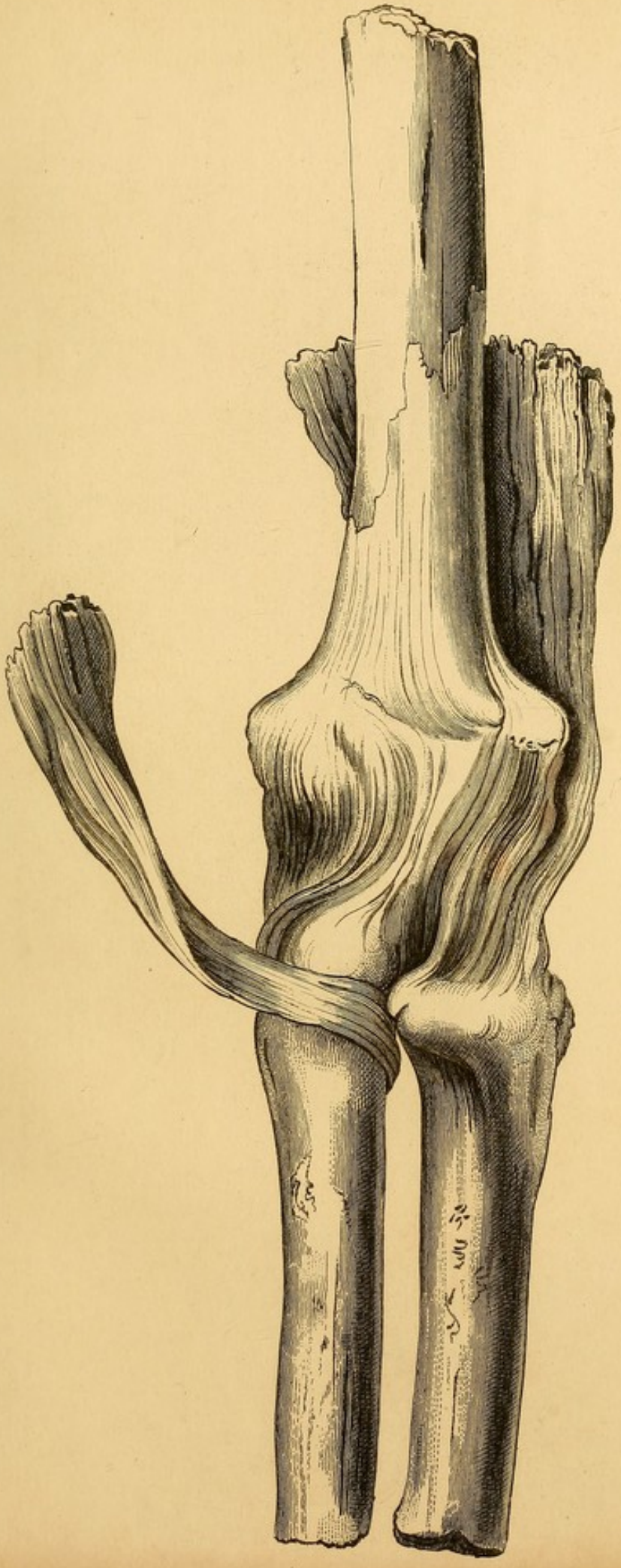
Fig. 1.

Fig. 2.

Robert Harley, Del.

Lizars sc.

PLATE III.



C. Bell, Del.

Lizars sc.

PLATE IV.

Fig. 2.

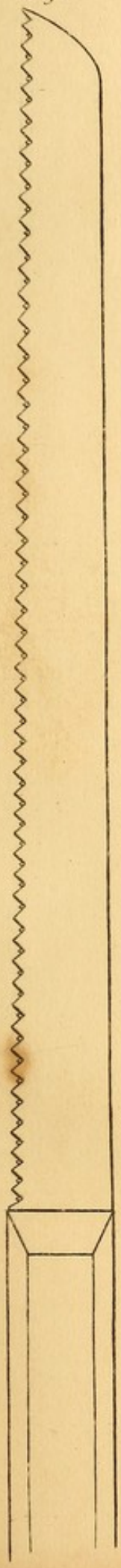


Fig. 1.

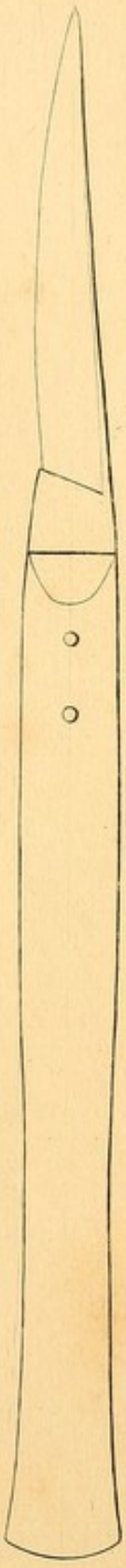


Fig. 3.

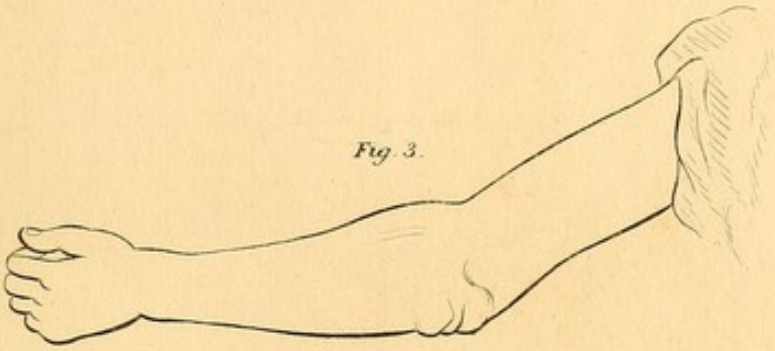


Fig. 4

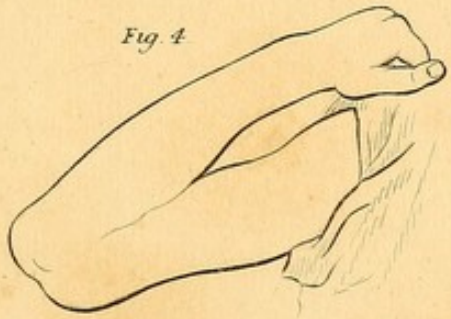


Fig. 5.

Ellis sc.

PLATE V.

Fig. 1.

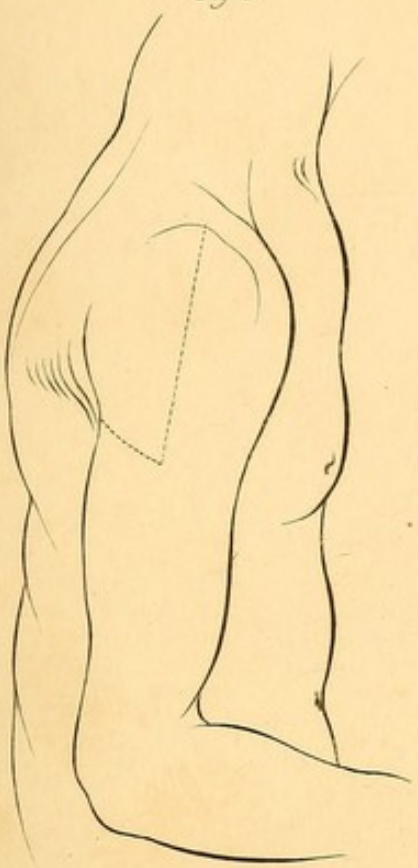


Fig. 2.

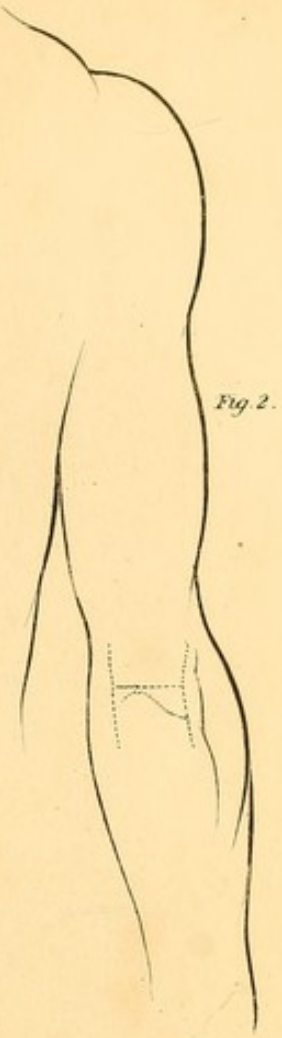


Fig. 3.

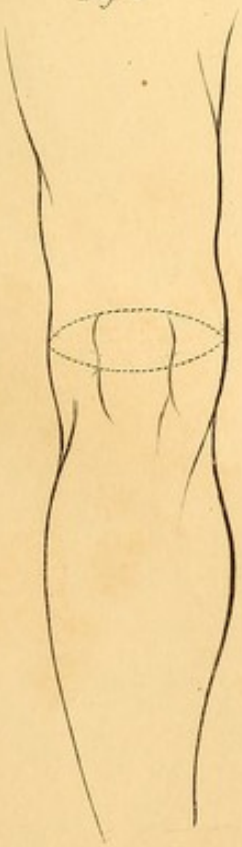


Fig. 4.

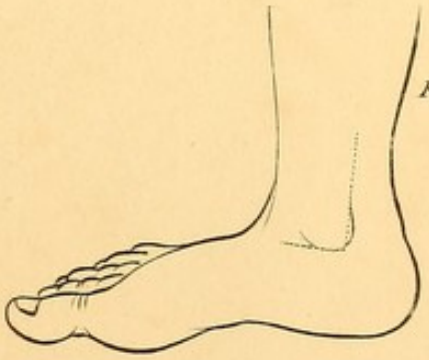
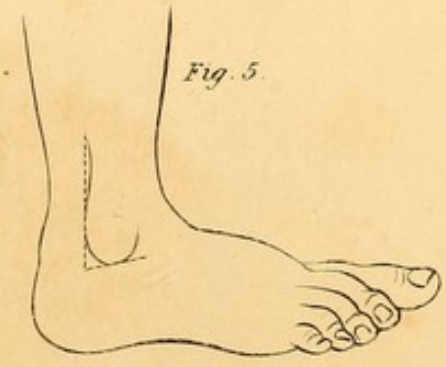


Fig. 5.



Lizars sc.