REMOVAL OF THE ENTIRE UPPER EXTREMITY FOR RECURRENT CARCINOMA

AFTER REMOVAL OF THE BREAST

BY

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IN 1890, Mr. T. F. Chavasse read a paper¹ before this Society on "Successful Removal of the Entire Upper Extremity for Osteochondroma." The operation, however, has so very rarely been performed for recurrent carcinoma after removal of the breast, and involves such different questions, that I venture to bring the following case under the notice of the Fellows.

S. T—, aged 53, single, a nurse, was admitted to St. George's Hospital in December, 1894. For about two years she had noticed in the left breast a lump which gradually increased and was painless. About June, 1894,

¹ 'Med.-Chir. Trans.,' vol. lxxiii, p. 81.

the skin over the tumour became adherent to it, and the growth commenced to increase rapidly. A week before admission ulceration commenced over the adherent patch. When admitted there was a well-marked scirrhus tumour occupying the centre and outer part of the breast. The nipple was not retracted; the growth was freely moveable over the deeper parts; the skin was ulcerated at the outer part, and infiltrated for some little distance around the ulcer. The glands in the axilla were found to be involved.

The breast and superjacent skin were freely removed. The fascia was dissected off the pectoralis major, and all diseased structures cleared out of the axilla. Under the microscope the growth presented the appearance of a carcinoma.¹ The patient made a rapid recovery, and left the hospital about a month after admission.

In September, 1896, *i. e.* two years subsequently, she was again admitted with a nodule about the size of a walnut situated just above the middle of the cicatrix. There was considerable pain in the growth and pain at times down the arm, with occasional swelling of the arm. The nodule was freely removed, together with a considerable portion of skin; and she again made a rapid recovery. Dr. Rolleston reported that the growth consisted of a carcinoma showing a transition from columnar-celled (or duct cancer) to a spheroidal-celled type.

Early in October, 1897, I received a communication from Dr. Maidlow, of Ilminster, informing me that the patient was suffering from recurrence of the growth high up in the axilla, associated with much pain and swelling of the arm. He suggested to me that the case might very probably be suitable for amputation. It is to his prompt recognition of the only kind of treatment likely to be of real benefit to the patient, before the

¹ In view of the subsequent history I regret that I cannot furnish a more detailed description of the specimen. Unfortunately, though preserved, it cannot now be positively identified. It was, almost certainly, a duct carcinoma.

disease had spread too far to render any operative interference justifiable, that the success of the case, so far as it has progressed, is largely to be attributed.

The patient, whose age was now fifty-six, seemed in fairly good condition. At the apex of the axilla, just over the main vessels, was an ulcerated surface with a hole in the middle large enough to admit the little finger. The skin about this point and the deeper structures seemed welded together. The skin around was a little infiltrated, rigid and shiny, as in commencing cancer *en cuirasse*, this condition extending some little way down along the thoracic wall. There was much pain in this situation and down the arm, with numbness of the fingers. The arm was greatly swollen, as can be judged from the illustration.

There was the usual distressing sensation of weight in the limb; still, though painful and swollen, she could use her hand to a limited extent. The scars of the previous operations were healthy. The skin over the pectoral muscle and clavicle as well as over the scapular and deltoid regions was sound. The clavicle appeared to be unaffected, but the disease extended right up to the scapula. There was no evidence of malignant growth in the mediastinum or elsewhere.¹ The soft parts, too, above the clavicle appeared to me to be free from disease; and, indeed, subsequently at the operation I could not discover that the supra-clavicular glands were affected. The case appeared to me to be one eminently suited to the removal of the entire upper extremity by what is commonly known as Paul Berger's operation.

On October 22nd I carried out this operation, following, save in certain details to be mentioned presently, the method advocated by Berger. The clavicle was some-

¹ In view of the subsequent history of the patient (see Table A, *infra*) I may note that there was no evidence of abdominal disease. Very probably there was really some malignant deposit in the liver at this time; but there was no symptom, physical or other, pointing to its existence. Hepatic cancer at times develops with astonishing rapidity.

what prominent, and I was able to cut down on this bone and saw it through, just external to the attachment of the sterno-mastoid muscle, very easily, an elevator having previously been pushed under the bone to protect the deeper parts. The clavicle was then forcibly lifted and cut through with bone nippers a little internal to the coracoid process. A greatly dilated vein at once came into view, almost of the size that one would expect the subclavian to be; it proved, however, to be the supra-scapular. This was tied in two places and divided, as were also the supra-scapular artery and the transverse cervical vessels. Some difficulty was experienced in securing the subclavian artery. This vessel was ligatured in two places with kangaroo tendon, and divided between the ligatures. I expected, as had happened to others, to have trouble with the subclavian vein, but the chief difficulty was to recognise the vein at all, for it was exceedingly small; evidently the greater part of the blood from the limb had to return through the supra-scapular. Scarcely any blood was lost during this part of the operation. Owing to the condition of the skin on the thoracic wall of the axilla, I had to make the anterior flap much smaller than is usually recommended, for it was judged advisable to remove a triangular portion of the skin directly below the axilla some four inches in length, and about the same width above at its base. The incision for the anterior flap, therefore, was not carried down to the inferior angle of the scapula, but stopped short on the thoracic wall vertically below the apex of the axilla. The flap was dissected up and the pectoralis major divided well internal to the pectoralis minor. This part of the operation was almost bloodless. The brachial plexus was cut high up, and the arm, on being rotated outwards, fell well away from the side. Next the posterior flap was made. This extended well over the deltoid region and posterior fold of the axilla, and joined the terminal incision of the anterior flap on the thoracic wall. The

scapular muscles were very easily divided; in fact, to some extent they seemed to tear away. The whole limb was drawn directly backwards during this part of the operation, so that the anterior surface of the scapula was entirely exposed to view just before the limb was actually detached. I had been prepared for hæmorrhage during this part of the operation, but the bleeding was most insignificant. Throughout the operation the greatest precautions had been taken to keep the patient warm, and especially to keep the wound warm. The moment the anterior flap was made, the exposed surfaces were covered over with hot sterilised towels, and the same precaution was observed with the posterior flap. There was little delay in securing the few vessels which it was thought prudent to tie. At no time during the operation did the patient present any symptom in the least degree alarming, and Dr. Dickson, who gave the anæsthetic, assured me that from first to last he had not a moment's anxiety. Probably not more than two or three ounces of blood were lost.

The patient was removed from the operating theatre in excellent condition; but, as so often happens after extensive operations, some five or six hours later the temperature dropped, the pulse became feeble, and for an hour or two she showed symptoms which are best described under the name of "shock." The condition, at no time at all alarming, rapidly passed off, and she slept well. The progress of the case was quite uneventful. A drainage-tube which had been inserted into the lower part of the wound was found lying loose in the dressings when these were removed on the fifth day. There had been a little oozing of blood. Nearly the whole of the wound healed by first intention, but from the upper part there was a slight discharge which commenced a week after the operation. The patient had disturbed her dressings here, and the wound might very easily have got septic. In all probability, however, the discharge

was due to a little sloughing of the end of one of the cut muscles.

On the sixteenth day she was able to get up, and she left for a convalescent hospital with the wound healed on the twenty-sixth day.

My colleague, Dr. Rolleston, has kindly furnished me with the following details of the dissection of the limb and the microscopical appearances.

"After removal, dissection showed that the ulcerated surface was continuous with a hard mass of growth which encircled and compressed the brachial vessels together with the median, ulnar, musculo-spiral, and musculo-cutaneous nerves. The brachial artery, however, was quite pervious. Microscopically the base of the ulcer was seen to be composed of carcinoma, in parts columnar-celled but in parts becoming spheroidal-celled; the growth showed some extravasation of blood into its substance. The coracoid process of the scapula was softened and infiltrated by white growth. Microscopic sections showed that the bone was completely invaded by a columnar-celled carcinoma, there being no transition, as in the ulcer, towards a spheroidal-celled growth.

"There were no growths in the clavicle or on the remaining part of the scapula, and there was no evidence that any growth abutted on the line of the amputation incision, so presumably all the growth had been removed.

"The arm was very oedematous, but there was no sign of any gangrene or necrosis.

"The chief points of interest from a pathological point of view are—

"(1) The free recurrence of duct carcinoma. In this case the growth recurred twice, and on the second occasion it infiltrated the coracoid process. Mr. Bowlby ('St. Bartholomew's Hospital Reports,' vol. xxiv, p. 272) concludes from an examination of seven cases, in none of which were the axillary lymphatic glands affected, 'that the axillary glands are not usually affected,' and that though the tumours are liable to recur locally they

are not so prone to affect the glands or disseminate as are the spheroidal-celled carcinomata. Secondary growth in bone has very seldom been recorded; Mr. Shattock ('Path. Soc. Trans.,' vol. xxxix, p. 324) has described a secondary growth of duct carcinoma in a rib.

"(2) The transition of type from columnar-celled to spheroidal-celled carcinoma, and the association of this structural character with free recurrence; in other words, as the histological characters passed into those of ordinary spheroidal carcinoma, the clinical features of duct carcinoma became replaced by those of ordinary spheroidal-celled carcinoma of the breast. This transition is commonly seen in duct cancer, and was well shown in Mr. Lunn's case of duct cancer in a man aged ninety-one ('Path. Soc. Trans.,' vol. xlviii, p. 247)."

So far as I have been able to ascertain, this is the fourth case in which this "interscapulo-thoracic amputation" has been carried out for recurrence of malignant growth after removal of the breast. Previous cases are one by Domenico Morisani and two by Mr. Treves.¹

There are but few points that I need draw attention to as regards the details of the operation, for little can really be added to M. Berger's admirable description.² The most important point is to guard against any serious hæmorrhage; and this can best be effected by deliberation in the first stage of the operation. Not only is hæmorrhage prevented by tying and dividing the branches of the thyroid axis as soon as recognised, but by this step access to the subclavian artery is rendered much more easy. With regard to these smaller arteries I believe it to be better, for the sake of saving time, not to use the aneurism needle, but to clip them in two places, and then, after dividing the vessels between the two clips, to tie on the proximal side of the one and the distal of the other.

¹ See Tables, *infra*.

² Berger, Paul, 'L'amputation du Membre supérieur dans la contiguïté du Tronc,' Paris, 1887.

In the same way, if the cords of the brachial plexus get in the way they are best divided at once, so as to expose more readily the subclavian artery. Moreover, after division of the pectoralis major, as the limb is rotated outwards the cords of the brachial plexus are put very forcibly on the stretch. Now stretching nerve-trunks of such a size unduly will, as is well evidenced in the case of the sciatic nerve, often produce a very marked lowering of the pulse, and I think on that account that the earlier the cords are divided the better for the patient. I made no attempt to divide the clavicle subperiosteally. This appeared to me to be unnecessary, as the vessels beneath were not endangered and the proceeding must occupy some time without having very distinct advantage.

In my case there were special reasons for absence of hæmorrhage. In the first place, at the previous operation many vessels had been tied in the axilla, though as these came off chiefly from the axillary artery the fact was not of much importance. Owing to the weight and pain of the limb, too, the patient had kept her arm at rest, and so lessened the supply of blood. The mass of cancer high up in the axilla had entirely encircled the axillary vein and materially diminished the calibre of the vessel, thus explaining the difficulty we experienced in recognising the subclavian vein, and also accounting for the dilatation of the supra-scapular. The operation, then, in cases of the kind I have described, is infinitely less formidable than for the conditions in which, in the great majority of recorded instances, it has been undertaken. Apart from primary amputations for injury, nearly all the cases have been for chondroma or for some form of sarcoma involving the bones of the shoulder-joint.

As regards the likelihood of hæmorrhage and shock and the prospect of recovery from the mere effects of the operation, patients with recurrent carcinoma in the axilla are in much better condition than those in whom the operation is undertaken for sarcoma. In the latter the subclavian vessels may be displaced and the vein may

very easily be injured. The vessels cut, too, are likely to be numerous and enlarged. If the growth is accidentally cut into or lacerated in manipulating the limb, the bleeding will be serious and difficult to control. The skin is stretched and thin over a large sarcoma, so that it is difficult to preserve the right amount. In cases of recurrent scirrhus, on the other hand, the flaps can be fashioned to a nicety; and, as good pressure can be easily applied, the ready union of the deep parts can be almost certainly secured—a point, of course, of far greater moment than the primary linear union of the cut edges of skin.

The superficial area of the wound, when the operation is performed for extensive sarcoma, must be very great, and there is serious liability to shock owing to chill. In my case the wound was as limited in extent as it is ever likely to be in this operation, and yet I estimated that the area of the moist cut surfaces from which evaporation and consequent chilling could take place, measured some 200 square inches. The absence of bleeding enabled us to keep the whole of this area warm throughout, a practical point of the first importance. Not only does the maintaining of the normal temperature of the tissues exposed in an extensive wound obviate the immediate shock, but it also prevents the serous exudation which, coming on a few hours after an operation, so exhausts the patient.

As regards the severity of the operation and the immediate risk to life, I consider removal of the entire upper extremity (implying by this removal of arm, scapula, and some part of clavicle) for recurrent scirrhus as less serious than disarticulation at the shoulder-joint for malignant growth of the humerus, and, *a fortiori*, far less formidable than the complete operation for sarcoma involving scapula and humerus.

Amputation through the shoulder-joint has been performed pretty frequently for recurrent scirrhus, though but few recorded cases can be found. The object has

been to relieve the patient of the heavy, swollen, and painful limb. In this object the proceeding may have a large measure of success, as the following case shows. The patient was under the care of Mr. T. R. Jessop, who has most kindly permitted me to mention the case. I give the account in Mr. Jessop's words:—"The woman, aged 56, came under observation in October, 1887, with extensive scirrhus in the left breast and a mass of axillary glands. I removed the whole. In August, 1888, I removed other glands from beneath the pectoral muscle. In January, 1890, I again removed diseased glands from the axillary and subpectoral regions, and in doing so the axillary vein was wounded and tied. In March, 1890, I amputated the arm (which was largely cedematous, livid, and brawny) at the shoulder-joint, obtaining good cover from the deltoid region, and at the same time I removed most of both pectoral muscles and subjacent tissue, all largely infiltrated with cancer. The scapula and clavicle were left. The amputation healed, and the patient remained in a satisfactory condition for about two years, after which she became bedridden and too ill to come here from her distant home, and finally died within three years of the amputation, presumably from return within the chest, seeing that she was reported to be 'very short of breath and unable to move in bed.'"

I am not concerned now either with advocating or criticising amputation through the shoulder-joint as a palliative measure in recurrent carcinoma. Cases in which this proceeding is indicated must be rare. My patient certainly did not fall into this class. Had I adopted this operation I should probably have cut into the growth while leaving untouched the source of pain, viz. the compression of the nerves. The removal of the heavy limb would have given no relief, for the pain would still have been felt in the arm and would have got worse. The complete removal rendered it possible to take away the whole of the obvious disease while cutting wide of its apparent limits. It was not merely a pallia-

tive measure. The reasonableness or, if the term be preferred, the justifiability of the operation was really identical with that of the original removal of the breast. Against recurrence no guarantee could be given then, nor can any be given now. But if operation was reasonable and proper in the original disease, it was also reasonable and proper in the condition of recurrence.

In defending the operation I am not anticipating but answering criticism. M. Paul Berger in his admirable monograph speaks very strongly, and considers that the operation should only be undertaken for suitable cases of malignant growth about the shoulder. Apart from traumatic cases, M. Berger enumerates but two in which the amputation was performed for other pathological conditions. In one the patient suffered from caries of the scapula, destruction of the shoulder-joint, and osteomyelitis of the humerus.¹ The man (aged twenty-three) recovered, and eight months later was reported entirely healed. In the second case the operation was undertaken for cancer of the breast.² M. Berger comments very severely on this case, not, it must be admitted, unjustly. The operation included removal of the breast and part of the second, third, and fourth ribs. The thoracic cavity was opened, and the patient died from shock in five hours. Possibly this case has done much to discredit the operation. At any rate, M. Berger does not contemplate the operation he describes for any such condition as that from which my patient suffered.³ M. Berger seems

¹ M. Bérenger-Féraud's case, 'Bull. de Thérap.,' Nos. 11 and 12, 1885. Quoted in Mr. Chavasse's tables, 'Med.-Chir. Trans.,' vol. lxxiii, p. 95. The clavicle was left in this case.

² Morisani's case, 'Il Morgagni,' Agosto, Ottobre, 1885. Quoted fully by Berger. Quoted in Chavasse's tables, 'Med.-Chir. Trans.,' vol. lxxiii, p. 96.

³ "Nous ne trouvons plus guère d'autre affection pathologique qui puisse devenir pour l'amputation interscapulo-thoracique une cause raisonnable d'indication, . . . peut-être l'ablation d'un cancroïde fort étendu situé au moignon de l'épaule pourraient-elles conduire le chirurgien à cette extrémité. Nous ne pensons pas qu'il soit sage d'envisager sérieusement de pareilles hypothèses." Berger, *op. cit.*, p. 228.

scarcely to appreciate the excellence of his own work. By improving and rendering precise the details of the operation, he so reduced its immediate risk as to render it a recognised surgical procedure. Surely it is a little arbitrary to argue that the operation should be restricted to a single class of disease.

The objection to the operation on the ground of liability to recurrence in cases of carcinoma of the breast, loses much of its force if we contemplate the results of removal of the upper extremity for sarcoma. Mr. Chavasse tabulates forty-two cases of this nature.¹ Nine of these patients died from the immediate effects of the operation. Fourteen of the remaining thirty-three died from secondary deposits, eleven of them within a year of the operation. The liability to secondary growth in cases where carcinoma of the breast has recurred will almost certainly be larger, and the prospect of "cure" smaller. Against this consideration may be set the facts that the two classes of cases are not exactly parallel; that in recurrent scirrhus the relief from pain is likely to be the chief advantage secured; and that this relief is likely to be permanent. Mr. Treves unfortunately lost sight of his two patients after a few months, but both of them declared that the relief given by the operation made it well worth doing. My patient was of the same opinion.

Extensive operations such as the one under consideration have been denounced as "mutilations."² This form of criticism is rather like giving the method a bad name, and then condemning it. By "mutilation" is really meant, I suppose, disfigurement. The term conveys a reproach, and implies surgical wantonness. But the choice of the word is not happy when it is used to designate

¹ 'Med.-Chir. Trans.,' vol. lxxiii, p. 87, pp. 91 *et seq.*

² Thus M. Michon, in commenting on a case of removal of the scapula, communicated to the Académie de Médecine by M. Michaux, remarked, "J'aurais voulu que M. Michaux jugeât plus sévèrement ces mutilations que la chirurgie française proscribit absolument." Quoted by Berger, *op. cit.*, p. 189.

the removal of parts diseased, dangerous, painful, and in themselves disfiguring. The patient herself, unable to realise the relentless progress of carcinoma, will regard amputation of the breast for an apparently insignificant tumour as a greater "mutilation" than the removal of the whole upper extremity when the pain is acute, the limb swollen and useless, and the certain prospect of a slow and painful death looms large before her.

The disfigurement can be so completely concealed by an easily made appliance that it need hardly be taken into account. The shape of the shoulder can be restored more effectively than after amputation at the shoulder-joint, for in the latter cases the scapula and clavicle are drawn up, and the two sides of the body do not correspond.

It was perhaps unnecessary in my case to take away the whole of the scapula, for rough examination seemed to show that the growth had invaded only the coracoid process. There is little advantage in leaving part of the scapula, and it was judged safer to remove the whole bone. It seemed very probable that the disease had extended into the supra-spinous fossa. The arguments as to possible loss of blood did not apply, for there was no hæmorrhage from the posterior scapular vessels. Sawing through the neck of the bone protracts the operation, and would have been more than useless in my case, as the coracoid process was diseased. Moreover partial removal of the scapula is likely to lead to laceration of the muscles attached to the bone. Even if left the muscles are useless.

In the same way it might have sufficed to remove rather less of the clavicle. It seemed essential to remove some of the clavicle, considering the close relation of the outer part to the diseased scapula. Free access is wanted to the parts behind the clavicle. Further, the deformity will be less, and the flap more effectively adjusted if the clavicle is divided at the outer border of the sterno-mastoid muscle.

Although cases of recurrent carcinoma in which the

indications are favorable for this operation will but rarely be met with, I cannot but think that they will occasionally occur, and that the operation in such cases should be recognised as a very proper one to adopt.

Favorable indications would be—

(1) Previous removal of the breast with dissection of all the lymphatic tissue and fascia off the pectoralis major. The likelihood of mediastinal growth is greatly lessened if this method has been adopted, and if the cicatrix is healthy.

(2) Slow growth of the original tumour.

(3) Slow growth of the recurrent disease. The term "recurrence" is, of course, in many instances not scientifically accurate, but may imply only development and extension of disease that had not been detected at previous operations.

(4) Microscopic evidence that the carcinoma is of the columnar-celled or "duct" variety.

(5) Limitation of the recurrent growth, so that the incisions may be carried at least as wide of the disease as in removal of the breast and axillary glands for carcinoma of the mamma.

(6) The certainty of relieving pain. Unless the pain were severe, indeed the predominant symptom, the operation would hardly be taken into serious consideration.

The existence of a foul cancerous ulcer high up in the axilla might be taken as an additional argument in favour of the operation.

Contra-indications would be—

(1) The probability of leaving in the wound the cut surface of any part of the carcinoma. Rapid increase and fungation would be likely to take place.

(2) The involvement of the thoracic wall. Either the affected ribs would have to be left or the pleural cavity opened.

(3) The presence of an extensive degree of cancer *en cuirasse*. Although the existence of this condition does not signify that the whole of the hide-bound skin is

infiltrated with carcinoma, it furnishes strong evidence that the deeper parts, and very probably the pleura, are invaded. The skin flaps, too, would be likely to slough.

The more obvious contra-indications, such as the existence of cancerous deposits in other bones or in the spinal column, need hardly be enumerated.

As to the time for operation, the main indications that should guide the surgeon are the amount of pain and the degree of swelling of the limb. The surgeon would hesitate to recommend, and the patient would hardly give her consent to the removal of the limb so long as it was moderately useful. In the vast majority of cases, by the time that the limb has become useless and the pain acute, the propriety of removing the whole upper extremity will be negatived on other grounds.

In some of these patients the division of the brachial plexus high up in the neck might be considered.

Briefly expressed, the operation is a proper one when humanity dictates it, and when the local, surgical, and general conditions do not forbid it.

The following tables represent the result of a tolerably diligent search through medical literature. In addition, I made inquiries of nineteen hospitals, or, in other words, of about 100 surgeons engaged in active hospital work. I have to express my best thanks to the surgical registrars of these hospitals, and especially to Mr. Treves, who, as will be seen by the tables, has furnished me with three unpublished cases. For invaluable assistance in compiling the tables I am indebted to Miss A. M. le Pelley, M.B.

TABLE A.—*Removal of the whole Upper Extremity for Scirrhus of Breast or Recurrent Scirrhus.*

No.	Operator.	Sex and age.	Disease.	Date.	Method.	Result.	Reference.	Remarks.
1	Morisani, Domenico	F., 54	Carcinoma of breast, thoracic wall, axillary lymphatics, &c.	March, 1885	Removal of outer two thirds of clavicle, scapula, arm, and surrounding soft parts, and several inches of second, third, and fourth ribs; thoracic cavity opened	Death from shock in 5 hours	Il Morgagni, Agosto, Ottobre, 1885	Quoted at length by Berger. Case included in his and also in Chavasse's tables.
2	Treves	F., 57	Recurrent scirrhus; severe pain and swelling of limb. Breast removed Aug., 1889	July 3rd, 1891	Berger's	Recovery in 3 weeks; great relief	Lancet, 1891, p. 1158	Patient lost sight of after a few months; ultimate result unknown.
3	Treves	F.	Recurrent scirrhus; severe pain and swelling of arm.	—	Berger's	Rapid recovery; great relief	—	Case not previously published. Patient lost sight of after a few months; ultimate result unknown.
4	Dent	F., 56	Recurrent duct carcinoma; cancerous ulcer in axilla; severe pain and swelling of limb. Breast removed Dec., 1894, for carcinoma of two years' growth; axilla cleared out. Recurrent nodule in cietrix removed Sept., 1896	22nd Oct., 1897	Berger's	Left for a convalescent hospital in 26 days; wound healed; great relief	—	April, 1898. Evidence of abdominal growth, probably carcinoma of liver; wound and its neighbourhood healthy. Died April 10th, 1898.

Although not strictly germane to my subject, I have thought it useful to tabulate the following cases, as a continuation of the list furnished by Mr. Chavasse ('Med.-Chir. Trans.,' vol. lxxiii, p. 91). M. Paul Berger (op. cit.) gives a list of twenty-two cases in which the upper extremity was removed for disease. He gives another list of "amputations consécutifs," and of amputations for injury. Twenty of the twenty-two cases are quoted also by Mr. Chavasse in his table of forty-four cases. In a paper read before the Clinical Society on March 25th, 1898, Mr. Barling mentioned nineteen cases in which the operation had been performed since 1890. The mortality is evidently now very small, though it may reasonably be doubted whether the percentage of recoveries is quite so great as the records of published cases appear to indicate.

TABLE B.—*Removal of the entire Upper Extremity for Sarcoma, &c.*

No.	Operator.	Sex and age.	Disease.	Date.	Method.	Result.	Reference.	Remarks.
1	Delorme	M.	Sarcoma	March, 1892	Subperiosteal section of middle half of clavicle; double ligation of artery and vein with division; removal of scapula, half of clavicle, and arm	Patientable to go about in 3 weeks	Bull. de la Soc. de Chir. de Paris, 1892, p. 448	—
2	Dubar	M., 27	Osteo-sarcoma	July 11th, 1894	Section of outer third of clavicle; ligation of vessels; ablation of scapula and arm	Got up on 10th day; recovery unimpeded	Bull. de l'Acad. de Méd., t. 31, 32, 1894	—
3	M'Leod	F., 15	Sarcoma	March 23rd, 1891	"Skewer" operation; a stout packing needle 8 inches long passed from below upwards through cavity of axilla; a second needle of same size was passed transversely behind the scapula; an india-rubber cord was wound figure-of-8 fashion round projecting ends; clavicle divided at outer third; scapula and arm removed	April 8th, wound granulating up well	Lancet, 1891, vol. ii, p. 117, and Indian Med. Gaz., 1894	M'Leod mentions two other cases which died of hæmorrhage and shock, and attributes the success of his case to the use of the skewers.
4	Hall	—	Sarcoma	Reported Jan., 1896	Posterior skin flap; removal of scapula; tying of vessels; disarticulation of clavicle; removal of limb and tumour	Recovery in 5 weeks	Indian Med. Rec., 1896	—
5	Keen	F., 20	Myeloid sarcoma	Nov. 20th, 1893	Resection of middle third of clavicle; ligation of vessels; removal of scapula and arm	Sent home healed in 3 weeks	Trans. Amer. Surg. Ass., 1894	—

	Treves	F., 43	Sarcoma	June 5th, 1891	Removal of arm, scapula, and two thirds of clavicle	Sent home in 3 weeks	Lancet, 1891	Mr. Treves writes (Nov., 1897) that this patient is alive and well.
6								
7	Ochsner	F., 19	Osteo-sarcoma	1891	No details found	Recovery	Annals Surg. Phil., 1895 Ibid.	—
8	Ochsner	M., 46	Sarcoma	June 1st, 1894	Followed P. Berger's steps ex- actly	Got up on 5th day ; recovery	In September, 1895, no recurrence.	
9	Chavasse	M., 21	Sarcoma	May 20th, 1892	Middle third of clavicle re- moved ; vessels ligated ; sca- pula and arm removed	Recovery	Lancet, 1892, vol. ii, p. 471	—
10	Chavasse	M., 52	Sarcoma	Feb. 16th, 1892	Amputation at shoulder-joint Aug. 16th, 1891. Scapula and two thirds of clavicle re- moved Feb. 16th, 1892	Died from exhaustion in 2 days	Ibid., p. 473	—
11	Houzel	—	Sarcoma	—	Details not obtainable	—	Arch. Prov. de Chir., Paris, 1896	—
12	Masson	—	Sarcoma	—	Details not obtainable	—	Bull. Soc. Anat. Chir. de Lille, 1893	—
13	Treves	M., 63	Large myeloid sar- coma of left humerus ; shoulder-joint not invaded. Spontaneous fracture of left humerus at junction of upper and middle thirds a year pre- viously	Nov. 10th, 1896	Berger's	Speedy recovery. Patient well Nov. 10th, 1897	—	Case not previously pub- lished. Communicated to me by Mr. Treves.

No.	Operator.	Sex and age.	Disease.	Date.	Method.	Result.	Reference.	Remarks.
14	Treves	F., 19	Myeloid sarcoma of upper end of humerus; shoulder-joint invaded. Disease began with "weakness in the shoulder" in Nov., 1892." Swelling of upper end of humerus noticed Dec., 1893	June 6th, 1894	Berger's	Rapid recovery. Perfectly well and free from recurrence July, 1897	—	Humerus became fractured during operation. Case not previously published. Communicated to me by Mr. Treves.
15	Pearce Gould	M., 36	Round- and spindle-celled sarcoma of humerus	July, 1897.	Berger's	Left for convalescent home on 16th day; wound soundly healed	—	Case not previously published.

(For report of the discussion on this paper, see 'Proceedings of the Royal Medical and Chirurgical Society,' Third Series, vol. x, p. 101.)

DESCRIPTION OF PLATE IV.

Removal of the Entire Upper Extremity for Recurrent Carcinoma
after Removal of the Breast (CLINTON T. DENT, F.R.C.S.).

Recurrent carcinoma mammæ causing swelling of the arm, for
which Berger's operation was performed.

DESCRIPTION OF PLATE V.

Removal of the Entire Upper Extremity for Recurrent Carcinoma
after Removal of the Breast (CLINTON T. DENT, F.R.C.S.).

Result of removal of entire upper extremity (Berger's operation)
for recurrent carcinoma mammæ, three months after operation.