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A manual of military surgery - Chapter VI: Amputations and resections

CHAPTER VI.

AMPUTATIONS AND RESECTIONS.

In endeavoring to decide so important a question as the loss of a limb, various circumstances are to be considered, as the age, habits and previous health of the patient, the kinds of injury, and the number, nature, and importance of the tissues involved. In military practice amputation must often be performed in cases where in civil practice it might be avoided.

It may be assumed, as a rule, that young adults bear up under severe accidents and operations, other things being equal, much better than children and elderly subjects; the strong than the feeble; the temperate than the intemperate; the residents of the country than the inhabitants of the crowded city.

The following circumstances may be enumerated as justifying, if not imperatively demanding, amputation in cases of wounds, whatever may be their nature:—

1st. When a limb has been struck by a cannon ball or run over by a railroad car, fracturing the bones, and tearing open the soft parts, amputation should, as a general rule, be performed, even when the injury done to the skin and vessels is apparently very slight, experience having shown that such accidents seldom do well, if an attempt is made to save the limb, the patient soon dying of gangrene, pyemia, or typhoid irritation. The danger of an unfavorable termination in such a case is always greater when the lesion affects the lower extremity than when it involves the superior.

2d. No attempt should be made to save a limb when, in addition to serious injury done to the integuments, muscles, or bones, its principal artery, vein, or nerve has been extensively lacerated, or violently contused, as the result will be likely to be gangrene, followed by death.

3d. A lacerated or gunshot wound penetrating a large joint, as that of the knee or ankle, and accompanied by comminuted fracture, or extensive laceration of the ligaments of the articulation, will, if left to itself, be

very prone to terminate in mortification, and is therefore a proper case for early amputation.

4th. Gunshot wounds attended with severe comminution of the bones, the fragments being sent widely around among the soft parts, lacerating and bruising them severely, generally require amputation, especially in naval and military practice.

5th. Extensive laceration, contusion, and stripping off of the integuments, conjoined with fracture, dislocation, or compression and pulpification of the muscles, will, in general, be a proper cause for the removal of a limb.*

Amputation is not to be performed, in any case, until sufficient reaction has taken place to enable the patient to bear the additional shock and loss of blood. As long as he is deadly pale, the pulse small and thready, the surface cold, and the thirst, restlessness, and jactitation excessive, it is obvious that recourse to the knife must be wholly out of the question. The proper treatment is recumbency, with mild stimulants, sinapisms to the extremities, and other means calculated to re-excite the

* Gross's Surgery, vol. i. p. 395.

action of the heart and brain. Power being restored, the operation, if deemed necessary, is proceeded with, due regard being had to the prevention of shock and hemorrhage, the two things now mainly to be dreaded.

One of the great obstacles about immediate amputation is the difficulty which the surgeon so often experiences in respect to the cases demanding the operation, and the uncertainty that none of the internal organs have sustained fatal injury; a circumstance which would, of course, contra-indicate the propriety of such interference.

Cases occur, although rarely, where, notwithstanding the most violent injury, or perhaps, even the loss of a limb, there is hardly any appreciable shock, and, in such an event, the operation should be performed on the spot.

The results of the military surgery in the Crimea show that the success of amputations was very fair when performed early, but most unfortunate when they were put off for any length of time. This was the case, it would seem, both in the English and French armies.

Should amputation ever be performed in spreading gangrene? The answer to this

question must depend upon circumstances. We may give our sanction when the disease, although rapid, is still limited, and when the patient, comparatively stout and robust, has a good pulse, with no serious lesion of a vital organ and no despair of his recovery, but a cheerful, buoyant mind, hopeful of a favorable issue. No operation is to be done when the reverse is the case; if it be, the patient will either perish on the table, from shock and hemorrhage, or from a recurrence of mortification in the stump.

Lacerated, contused, and gunshot wounds are often of so frightful a nature as to render it perfectly certain, even at a glance, that the limb will be obliged to be sacrificed in order that a better chance may be afforded for preserving the patient's life. At other times, the injury, although severe, may yet, apparently, not be so desperate as to preclude, in the opinion of the practitioner, the possibility of saving the parts, or, at all events, the propriety of making an attempt to that effect. The cases which may reasonably require and those which may not require interference with the knife are not always so clearly and dis-

tinctly defined as not to give rise, in very many instances, to the most serious and unpleasant apprehension, lest we should be guilty, on the one hand, of the sin of commission, and, on the other, of that of omission; or, in other, and more comprehensive terms, that, while the surgeon endeavors to avoid Scylla, he may not unwittingly run into Charybdis, mutilating a limb that might have been saved, and endangering life by the retention of one that should have been promptly amputated. It is not every man, however large his skill and experience, that is always able to satisfy himself, even after the most profound deliberation, what line of conduct should be pursued in these trying circumstances; hence the safest plan for him generally is to procure the best counsel that the emergencies of the case may admit of. But in doing this, he must be careful to guard against procrastination; the case must be met promptly and courageously; delay even of a few hours may be fatal, or, at all events, place limb and life in imminent jeopardy. Above all, let proper caution be used if the patient is obliged to be transported to some hospital,

or to a distant home, that he may not be subjected to unnecessary pain, exposed to loss of blood, or carried in a position incompatible with his exhausted condition. Vast injury is often done in this way, by ignorant persons having charge of the case, and occasionally even by practitioners whose education and common sense should be a sufficient guarantee against such conduct.

Little need be said here about the *methods* of amputation. In cases of emergency, where time is precious, and the number of surgeons inadequate, the flap operation deserves, in my opinion, a decided preference over the circular, and, in fact, over every other. The rapidity with which it may be executed, the abundant covering which it affords for the bone, and the facility with which the parts unite are qualities which strongly recommend it to the judgment of the military surgeon. The flaps should be long and well shaped, and care taken to cut off the larger nerves on a level with the bone, in order to guard against the occurrence of neuralgia after the wound is healed. Whatever method be adopted, a long stump should be aimed at, that it may afford a good lever-

age for the artificial substitute. No blood should be lost during or after the operation, and hence the main artery of the limb should always be thoroughly compressed by a tourniquet, not by the fingers of assistants, who are seldom, if ever, trustworthy on such occasions.

Anæsthetics should be given only in the event of thorough reaction; so long as the vital powers are depressed and the mind is bewildered by shock, or loss of blood, their administration will hardly be safe, unless the greatest vigilance be employed, and this is not always possible on the field of battle, or even in the hospital. Moreover, it is astonishing what little suffering the patient generally experiences, when in this condition, even from a severe wound or operation.

In the war in the Crimea, the British used chloroform almost universally in their operations; the French also exhibited it very extensively, and Baudens, one of their leading military surgical authorities, declares that they did not meet with one fatal accident from it, although it was given by them, during the Eastern campaign, thirty thousand times at least. The administration of chloroform is stated

by Macleod to have contributed immensely to the success of primary amputations.

The *dressings* should be applied according to the principles laid down under the head of wounds. The sutures, made with silver wire or fine silk, should not be too numerous, and the adhesive strips must be so arranged as to admit of thorough drainage. A bandage should be applied from above downward, to control muscular action and afford support to the vessels; the stump rest upon a pillow covered with oil-cloth, and the water-dressing be used if there is danger of over-action. Pain and spasm are allayed by anodynes; traumatic fever, by mild diaphoretics. Copious purging is avoided; the drink is cooling; and the diet must be in strict conformity with the condition of the patient's system. The first dressings are removed about the end of the third day; after that once or even twice a day, according to the nature and quantity of the discharges, accumulation and bagging being faithfully guarded against.

The following *statistics* of amputations, both in the continuity of the limbs and of the

articulations, possesses peculiar interest for the military surgeon. They are derived chiefly from a review which I published of Mr. Macleod's "Notes of the Surgery in the Crimea" in the North American Medico-Chirurgical Review for January, 1860.

The number of cases given by Macleod is 732, with a mortality of 201. Of these, 654 were primary, with 165 deaths, or 26·22 per cent.; and 78 secondary, with 36 deaths, or in the ratio of 46·1. The mortality of the greater amputations—as those of the shoulder, arm, and forearm, and the hip, thigh, knee, and leg—was 39·8 per cent. for the primary operations, and 60 per cent. for the secondary.

The increase of mortality from amputations as we approach the trunk, has long been familiar to surgeons, and the results in the Crimea have not changed our previous knowledge. Thus the ratio of mortality of amputations of the fingers was 0·5; of the forearm and wrist, 1·8; of the arm, 22·9; of the shoulder, 27·2; of the tarsus, 14·2; of the ankle-joint, 22·2; of the leg, 30·3; of the knee-joint, 50·0; and of the thigh, in its lower third, 50·0, at its middle, 55·3, at the

upper part, 86·8, and at the hip, 100·0. The limb was removed at the latter joint in 10 cases, all of which rapidly proved fatal. The French had 13 cases, primary and secondary, with no better luck.

Legouest has published a table of most of the recorded cases of amputation at the *hip-joint*, for gunshot wounds. Of these 30 were primary, and all ended fatally; of 11 intermediate, or early secondary, 3 recovered; and of 3 remote, 1 recovered. "Thus," says Macleod, "if we sum up the whole, we have 4 recoveries in 44 cases, or a mortality of 90·9 per cent." Some of the primary cases died on the table; and all the rest, except two, before the tenth day. In the Schleswig-Holstein war, amputation at the hip-joint was performed seven times, with one cure. Mr. Sands Cox, recording the experience of civil and military hospitals up to 1846, gives 84 cases, most of them for injury, with 26 recoveries. Dr. Stephen Smith, of New York, has published tables of 98 cases, showing a ratio of mortality of 1 in $2\frac{2}{3}$. In 62 of these cases, the operation was performed in 30 for injury, with a mortality of 60 per cent.

Amputation in the upper third of the *thigh* was performed 39 times, with a fatal result in 34. Of these cases only one was secondary, and that perished. Amputation of the middle third of the limb was performed in 65 cases, of which 38 died. Of these cases 56 were primary, with 31 deaths, giving thus a mortality of 53·3 per cent.; 9 cases were operated upon at a later period, and of these, 7 died, or 77·7 per cent. Amputation of the lower third of the thigh was performed 60 times, 46 being primary, with a mortality of 50 per cent., and 14 secondary, with a mortality of 71·4 per cent.

Amputation at the *knee* was performed primarily in 6 cases, of which 3 died, and once secondarily, with a fatal result. Chelius refers to 37 cases of amputation of the knee, collected by Jæger, of which 22 were favorable; and of 18 cases recorded by Dr. Markoe, of New York, as having occurred in the practice of American surgeons, 13 got well. These cases, added together, afford an aggregate of 61, with a mortality of 21, or 34·4 per cent.

The *leg* was amputated 101 times, with 36

deaths, or a mortality of 35·6 per cent. Of these cases 89 were primary, with 28 deaths, and 12 secondary, with 8 deaths.

Amputation at the *ankle-joint* was performed in 12 cases, death following in 2. Of these cases 3 were secondary, and all favorable.

The arm was removed at the *shoulder-joint* in 39 cases, with a fatal issue in 13, or 33·3 per cent., 33 being primary, with 9 deaths, and 6 secondary, with a fatal issue in 4. If we couple these cases with 21 that occurred during the previous period of the war, we shall have an aggregate of 60 cases, with 19 deaths, or a mortality of 31·6 per cent. The advantage of primary over secondary amputation of the shoulder has long been known to military surgeons. Thus, of 19 primary cases mentioned by Mr. Guthrie as having occurred between June and September, 1813, 18 recovered, while of 19 secondary cases 15 died. The experience of the late Dr. Thomson, in Belgium, is equally decisive.

Amputation of the upper *arm* was performed 102 times, with death in 25 cases, or a mortality of 24·5; 96 of the cases being

primary. Of the 6 secondary cases one-half proved fatal.

The *forearm* was amputated primarily 52 times, and the hand at the wrist once, with only 1 death; while of 7 secondary operations upon the same parts, 2 died.

Resection is one of the aids of conservative surgery, and military practice affords numerous occasions for its employment. The operation, however, is not equally applicable to all the articulations. Resection of the *shoulder-joint* has hitherto afforded the most flattering results. It is more especially applicable in cases of gunshot injuries, unattended by serious lesion of the vessels and nerves of the limb, or severe laceration of the muscles and integuments. A portion of the humerus, embracing, if necessary, from four to five inches in length, together with a part or even the whole of the glenoid cavity of the scapula, may be safely and expeditiously removed under such circumstances, and yet the patient have an excellent use of his arm.

Williams mentions 19 cases of gunshot

wounds of the shoulder-joint in which resection was performed, of which 3 proved fatal. Baudens saved 13 out of 14 cases, and the British surgeons in the Crimea lost 2 patients only out of 27.

Resection of the *elbow* has of late engaged much attention among military men, and although the results are less flattering than in the operation upon the shoulder, they are, nevertheless, highly encouraging. Of 82 cases which occurred in the Schleswig-Holstein and in the Crimean campaigns, only 16 died, or 1 in about 5.

The *wrist-joint* has seldom been the subject of excision; doubtless, cases not unfrequently occur in which it might be resorted to with advantage.

Dr. George Williams has collected the history of 11 cases of excision of the *hip-joint* for gunshot injury, 6 of which occurred in the Crimea. Of this number 10 died. Of 23 amputations at the hip-joint by the English and French surgeons in the East all died.

Excision of the *knee-joint* for gunshot injury holds out no prospect of advantage, experience having shown that, when the ar-

ticulating extremities of the femur and tibia are fractured by a ball, the proper remedy is amputation.

The *ankle-joint* has been resected in a few instances only for gunshot injuries, and the results have thus far been by no means flattering. When the joint is seriously implicated, amputation will undoubtedly be the more judicious procedure.

Resection of the bones in their continuity is seldom practiced in this class of injuries, and experience has offered nothing in its favor. The operation was performed several times in the Crimea, but proved invariably fatal.

The *after-treatment* in resection must be conducted upon the same principles as in amputation. The measures must, for the most part, be of a corroborating nature. The limb must be placed in an easy position, and be well supported by a splint or fracture-box, to prevent motion. The operation is liable to be followed by the same bad effects as amputations.