CASE OF
**COMPLICATED GUN-SHOT WOUND OF THE
LEFT ARM AND SHOULDER,**

FOLLOWED BY SECONDARY HÆMORRHAGE FROM THE AXILLARY
ARTERY, AND THE SUCCESSFUL APPLICATION OF A LIGATURE TO
THE LEFT SUBCLAVIAN ARTERY.

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(Concluded from p. 439.)

Remarks.—The foregoing case of severe gun-shot wound was one in which the injury inflicted was of such a character as to fall clearly within the rules established for immediate amputation. However, after maturely weighing the peculiarities of the case, which appeared at the moment to discourage the expectation of a favourable result after operation, as well as some few circumstances which seemed to justify the attempt to save the arm, I inclined to the latter line of proceeding; and although in pursuing this course of treatment a great amount of suffering was incurred, and the life of the patient only preserved by the prompt performance of a most hazardous surgical operation, yet, from the nature of the cause which led to this latter necessity, I cannot but entertain the belief, that a similar train of occurrences would have as likely been induced, even had amputation at the shoulder-joint been performed in the first instance. The reasons which induced me to adopt the above line of treatment, and to abstain from immediate amputation, upon my first seeing the patient, were as follow:—

1st.—Five clear days had elapsed since the receipt of the injury, and the parts above and around the joint were consequently very much inflamed and swollen.

2nd.—The patient was in a state of so great debility from the previous loss of blood, and there was so much constitutional irritation, that I had reason to fear he would have sunk under the shock of so formidable an operation as amputation at the shoulder-joint.

3rd, and most particularly. The shot had passed up, and lodged so high above the joint both in front and behind, that amputation at the articulation would not have completely removed the foreign body; and from the small volume and scattered positions of the shot, it did not appear to me justifiable to attempt cutting after them.

4th.—The parts of which the greater portion of the flaps must have been formed were so contused and lacerated, that it appeared to me hopeless to expect to obtain union by the first intention; thus a much larger secreting surface would have been ultimately formed, which might, in all probability, have worn out the patient by the discharge.

5th.—As the flaps would not have healed kindly, it appeared to me that the chances of secondary hæmorrhage from the axillary artery would have been very much increased by the operation.

6th.—There was no other surgeon present to assist me, and the two hospital assistants being unacquainted with anatomy, were not to be depended upon. This circumstance, however, would not have deterred me had I considered the operation admissible and imperatively necessary.

Such were the reasons forbidding the operation. Then came the condition of the arm itself, which was found to present appearances in some degree encouraging the attempt to save it. The main artery of the limb was safe; there were no fissures to be found in the long axis of the bone; the median nerve could not have been injured; the arm below the wound was of the natural temperature, and there was no appearance of gangrene. Besides, the patient was a young man, and from the nature of his profession it was of almost vital importance to him to preserve him ever so imperfect an arm. Connected with this, the season of the year was favourable; he was lodged in a clean, comfortable, and well-ventilated room, and had the advantage of good care and excellent nursing, as well as an adequate supply of all surgical appliances. Actuated by the above considerations, I adopted the line of procedure given in my report of the case; and although in its progress I was placed in an arduous and anxious position, yet I feel that I have been repaid for my exertions by the favourable result of the practice.

In perusing the detail of the treatment, it will be observed that I had entertained the idea of amputating the arm upon the third morning after the application of the ligature to the subclavian. Believing now, as I did then, that this practice would have been bold, if not indeed unjustifiable, I am induced

to state here the grounds upon which I reasoned at the moment, in the hope that such of my seniors as may see this case, may consider this point worthy of their consideration. They were as follow:—

1st.—As the flow of blood through the main artery of the limb was now quite obstructed, the case resolved itself into a gun-shot wound, attended with a bad compound fracture, considerable loss of the soft parts, and wound of the artery—a state of parts, which, according to the authority of the first military surgeons, demands immediate amputation.

2nd.—From the reduced diameter of the soft parts, in consequence of their previous destruction, through which the collateral circulation to the limb was to be carried on, it appeared almost certain that gangrene of the limb must set in at an early period.

3rd.—As the supply of blood to the lower fragment would now be much diminished, it appeared to me that it would thus be incapacitated for performing its necessary part in the process of ossific union.

4th.—By the previous inflammation and suppuration beneath the clavicle, in the axilla, and around the shoulder-joint, a large number of the capillaries and small vessels must have been destroyed, and others obstructed. Thus a further obstacle to a free collateral circulation would be presented, and the probability of gangrene enhanced in the same degree.

5th.—If from gangrene, or other cause, it became essentially requisite to remove the arm at any period before the separation of the ligature, and the expiration of such time as would ensure perfect security against hæmorrhage from the subclavian at the seat of ligature, I conceived it would be more safe to proceed before the fibrous coat of the artery had to any extent taken on its ulcerative process, whilst the seat of the ligature was surrounded internally and externally by coagulable lymph, and the cavity of the vessel was occupied by a firm coagulum of blood—a condition of parts which appeared to me more likely to resist the impulse of the blood, and the excited state of the circulation induced by so formidable an amputation, than if sufficient time were allowed for the ligature to have progressed in the production of ulceration.

6th.—As in the very reduced and debilitated state of the patient it was of vital importance that not one drop of blood should be lost that could be avoided in the operation, I considered I should be more likely to achieve this object by operating before the collateral branches had time to become enlarged.

7th.—If the operation were for any time deferred, the circulation might be again established in the axillary by the thoraco-acromialis and other branches of that vessel, and so lead to a repetition of the hæmorrhage from the same opening in the artery.

8th.—I should have been enabled in the progress of the operation to have searched high up upon the inner flap in the axilla, and if unsuccessful in discovering the exact seat of the hæmorrhage from the axillary artery, passed a ligature around the vessel above and below the opening, and have thus been secured from a return of bleeding from the distal end of the artery, or from a flow of the blood carried by the collateral circulation into that portion of the artery between its opening, and the seat of ligature upon the subclavian.

9th.—It also occurred to me that if I deferred the operation, the continued drain of the old wound would so increase the debility of the patient as to reduce to a considerable degree the chance of a healthy separation of the ligature from the subclavian, and thus promote the probability of secondary hæmorrhage at that point.

10th.—To defer the operation for a fortnight or three weeks in a patient already confined one month to bed, who was much reduced by previous suppuration, and two violent attacks of secondary hæmorrhage, not to speak of the almost fatal loss of blood upon the occasion of the accident, and for whom there was the almost certain prospect of rapid gangrene, appeared to me to be consigning him to an almost inevitable fate.

Such were the reasons that guided me in entertaining this idea, in referring to which it must be borne in mind, that the case at the time was almost a forlorn hope, and I conceived that it was only by a bold *coup de main*, that success was to be attained. It may possibly appear that a more favourable moment for amputation would have been immediately upon securing the subclavian; but then the patient was so reduced by the hæmorrhage, as well as the pain of the previous operation, that he could not possibly have endured a further shock at the time. Indeed, though the hæmorrhage had been so completely arrested, the patient for the succeeding two hours appeared almost *in articulo mortis*, and my hopes of his surviving were very faint indeed. Orit might have been considered

practicable to have proceeded with amputation at once, and in the process of securing the vessels have included the bleeding axillary artery in a ligature; but I can scarcely entertain a doubt that, unassisted as I was, such a mode of proceeding must have been attended with fatal consequences.

There may be some difficulty in comprehending how a spherical body like a shot could, in its descent, produce an opening in an artery possessed of such thick coats as the axillary; but by referring to the observation of the 16th of February, it will be seen that all the shot extracted then, as well as those after, were altered in shape in a remarkable manner. Some were flattened, with an edge like a knife, some were pointed like a spear, others angular, and all more or less changed in form. This effect was produced by the force with which they struck against the hard and resisting body of the humerus. It is very easy to conceive, therefore, how soon one of these spear-pointed bodies resting on the surface of a pulsating tube would produce an opening in its parietes. It appeared to me peculiar also how the profunda artery had been lacerated so close to the brachial without the latter receiving injury; this, however, I conceived, was not produced by the shot, but by the sudden stretching of the artery, near the point where it reaches the humerus, consequent upon the rapid displacement of the ends of the bone.

With respect to the site of operation in this case, it may be said that it is always more safe and satisfactory in cases of hæmorrhage from arteries, to cut down upon the vessel at the bleeding point, and secure it in a ligature above and below the opening; but the difficulties which here presented themselves in effecting this object seemed to me insuperable.

During the progress of the case my attention was often attracted by the tingling, burning sensation along the arm, but especially in the palm of the hand and fingers, and which appeared to be a warning symptom of the approach of hæmorrhage.

A very interesting feature in the history of this case is the facility with which the circulation was continued in the affected arm after the application of the ligature, and that under circumstances which must be considered very unfavourable for that purpose—viz., a large portion of the soft parts had been carried away in the first instance; afterwards many of the capillaries and minute vessels around the shoulder and in the axilla must have been destroyed by the suppuration which ensued, as well as a large number thickened and obliterated by the swelling and inflammation; moreover, the propelling power of the heart and force of the general circulation had been much reduced by the previous losses of blood, and protracted confinement to bed. Yet, notwithstanding these disadvantageous circumstances, we find that the temperature of the arm still continued unabated; no appearance of gangrene presented itself, and in thirty-six hours after the operation, a slight purr or thrill was perceptible in the radial pulse, which, on the third day after the operation, amounted to an occasional indistinct, though faint and irregular pulsation. The old wound below the seat of ligature also progressed favourably, presented healthy granulations, secreted a laudable pus, and evinced no appearances of a deficient circulation. It thus forms a marked exception to the general experience, that gangrene more frequently occurs after the tying of arteries for wounds than for aneurism, and would also offer an argument against the supposed advantage in the latter disease of deferring the operation until the aneurismal tumour had attained a certain size, and such period had elapsed as would allow time for the collateral circulation to have become developed. It must be borne in mind, however, that the patient in the present instance was a young man, though I cannot say that his constitution was otherwise the most favourable.

In considering further what practical deduction might be drawn from this case, it has occurred to me, whether in some compound comminuted fractures of the arm or thigh, attended even with destruction of soft parts, it might not encourage, *under favourable circumstances, and in eligible cases*, the more frequent attempt to preserve the member. Suppose an example of this kind occurring in the thigh or arm. If it were found that the bone above and below the seat of injury was perfect, with no fissures, no joint implicated, and the comminuted portion of bone not occupying more than an inch and a half of the length of the bone, might it not be admissible to make a transverse section with the saw in sound bone above and below the seat of fracture, completely remove the injured portion of bone, and, approximating the ends and retaining them in position, promote a union of the fracture, as well as the injured soft parts? One of the advantages attending this practice, as in the case before us, would be, that by the shortening so produced the loss of soft parts would, in some

degree, be counteracted by approximating the upper and lower margins of the wound, and the process of granulation and healing be expedited accordingly. In support of this suggestion I might also adduce the different cases of successful excision of the knee and elbow-joints, and in the case just reported, we see that after the removal of five-eighths of an inch of the whole cylinder of the bone, and the subsequent section of a very large wedge-shaped portion, attended, too, with great destruction of soft parts, and other disadvantageous circumstances, nevertheless the success was such as to exceed the most sanguine expectations. This practice, for obvious reasons, would be more desirable, and frequently more admissible in injuries of the arm than in those of the lower extremity. In offering this suggestion, however, I am disposed to make many reservations, fully impressed as I am with the great responsibility incurred, and profound judgment requisite in discriminating such cases as might be considered suitable for such a line of practice.

Aden, 1851.

THE USE OF THE LONG FORCEPS IN LABOUR.

By WILLIAM DALTON, Esq., M.R.C.S., L.S.A., &c.

AT one o'clock in the morning of the 24th of September, I was called upon by a practitioner of about twenty years' standing in this neighbourhood. He requested me to accompany him to the residence of Mrs. S—, in the parish of Withington, about seven miles off, on the Cotswold hills. He informed me that labour had commenced on the 20th Sept., and that the liquor amnii had escaped in gushes on that and the following day. The os uteri had been fully dilated for many hours, the pains were strong and frequent, yet the head remained fixed above the brim of the pelvis. I was requested to provide myself with instruments for perforating the child's head, Mr. — being fully impressed that nothing short of craniotomy could save his patient.

I visited Mrs. S— about three o'clock in the morning. On examination, I found that the bulk of the child's head was above the brim of the pelvis, being firmly wedged therein. The soft parts were rigid, the pains strong, and the bladder and rectum empty.

I now feared that recourse must have been taken to the repulsive operation of destroying the child to save the mother, but determined upon making an effort to preserve both.

I requested Mr. — to continue the application of chloroform to the nostrils of our patient, which she had commenced inhaling, by my direction, for some minutes before I examined her, she being in a state of great nervous excitement.

When the chloroform had produced its soothing effects, short of unconsciousness, I passed one blade of a thin pair of curved, long forceps, and with great caution, added to much perseverance, succeeded in passing the second blade, and then locked them. Having now applied gentle extension, during the pains, in the axis of the outlet, without producing any effect on the position of the head, I therefore more firmly compressed it, by approximating the handles of the forceps, and then using stronger efforts of extension. The head was now brought down to the perinaeum, the occiput protruding through the os externum. The forceps were withdrawn, and at the end of half an hour labour was completed by the natural efforts, and I had the satisfaction of seeing a remarkably fine living female child born.

The placenta was speedily thrown off, and I left Mrs. S—, at eight A.M., with a favourable pulse, and other symptoms which promised well.

I visited her on the 29th Sept., and found both herself and infant doing admirably. She had suffered for a few days from retention of urine, but was relieved daily by the use of the catheter.

Mrs. S— is twenty-eight years of age, and formerly had been subject to severe attacks of rheumatism in the joints of the pelvis and its vicinity. It is her first child.

I have long since formed an opinion that the operation of craniotomy is often prematurely and unnecessarily performed. Let it be understood, that I protest most emphatically against the use of the forceps or lever in natural labour, where the time of the practitioner is the only object considered. It is also my firm belief, that the use of the forceps is frequently too long delayed, in the hands of some practitioners, to the increased and protracted sufferings of the mother, and sometimes ending in rupture of the uterus, but more frequently causing the death of the child, particularly in such cases as have been here narrated.

Cheltenham, November, 1851.