

A CASE OF CONTUSION OF THE AXILLARY ARTERY.

BY LIEUTENANT-COLONEL J. F. DOBSON, R.A.M.C. (T),
AND CAPTAIN W. R. HIGGINS, R.A.M.C. (T.)

THE case described below is an illustration of a type of arterial injury which is not often noted, but which is perhaps more common than is thought.

Pte. C. J. was wounded on Aug. 17, 1917, by a rifle bullet. He was admitted to a general hospital in France on Aug. 18, having received no active treatment.

The wound of entry was one inch below the middle of the left clavicle; the exit at the axillary border of the scapula, about the junction of the middle and lower third. Wrist-drop was present. The left radial pulse was smaller than the right. There was no swelling in the axilla; no bruit or thrill; no pulsation; no hæmorrhage. The entrance wound was clean, and the exit wound ragged. He bled freely when wounded, but did not faint. He noticed wrist-drop, and weakness and numbness of the hand immediately. Anæsthesia was incomplete in the ulnar and radial areas; the median was unaffected. Motor paralysis was present in the extensors of wrist and fingers; there was complete paralysis of the intrinsic muscles of the hand supplied by the ulnar, and weakness of those supplied by the median.

It was thought that the axillary artery had been damaged, if not severed, and that the inner and posterior cords of the brachial plexus had been lacerated.

Operation, Aug. 19.—The wounds of entrance and exit were excised. Some tearing of the scapular muscles was found.

A curved incision (*Fig. 1*) was made from below the clavicle over the inner part of the pectoral muscles to the anterior fold of the axilla, thence passing outwards along the fold to the arm. A flap of skin was turned back. The pectoralis major muscle was divided close to its origin and turned outwards, exposing the pectoralis minor. This muscle was also divided close to the chest wall, and reflected. The axillary contents were now clearly exposed. Some extravasated blood was wiped away.

Axillary Artery.—At a point immediately above the crossing of the inner head of the median

nerve, the artery presented a slight bulging, and appeared to be bruised. The artery was pulsating below this point, but on palpation of the damaged portion, the wall of the vessel felt thin, and after it had been handled a very slight weeping of blood occurred. The artery was ligatured above and below, and the damaged portion excised.

Brachial Plexus.—The inner cord, just above the point of division, had been partially divided by the missile. The posterior cord had been perforated by the missile, and was practically completely divided, the continuity of the nerve being maintained in part by the sheath. Both cords were repaired by suture of the sheath (00 catgut). The suture lines were covered with fatty fascial flaps taken from the lower part of the axilla.

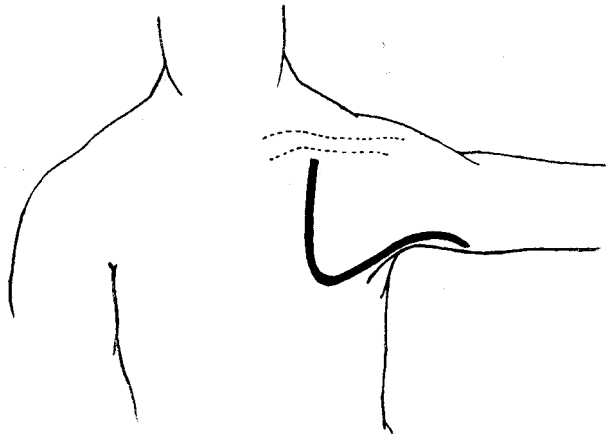


FIG. 1.—Diagram showing incision.

The pectoral muscles were sutured, the axilla and exit wound were drained, and the entrance wound was left open. Both the wounds were swabbed with eusol, the axilla with saline.

Aug. 19.—Evening temperature 101° . Pulse felt at wrist.

Aug. 20.—Morning temperature 100° ; evening temperature 101° . Pulse stronger.

Aug. 21.—Morning temperature 100° ; evening temperature 100° .

Aug. 22.—Morning temperature 98.4° .



FIG. 2.—Open end of the resected portion of the artery, showing the laceration



FIG. 3.—Appearance of the tear after slitting up the artery.

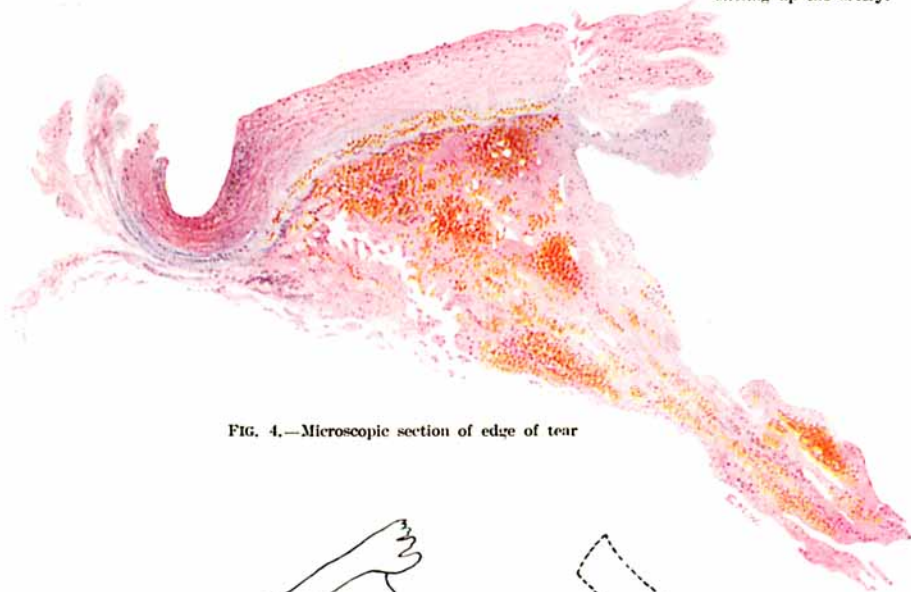


FIG. 4.—Microscopic section of edge of tear

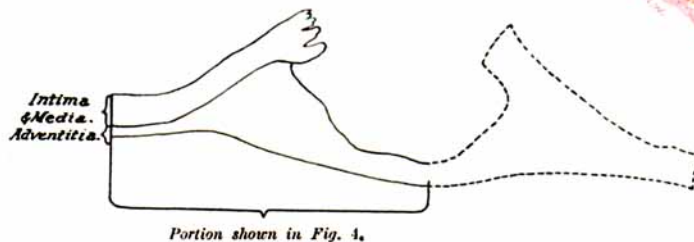


FIG. 5.—Section taken transversely across the tear in the vessel wall.

The patient made an uninterrupted recovery, and was evacuated to England on Aug. 31. There was already some return of power in the extensors of the wrist. We have since heard that he is making good progress.

Specimen.—On examination, the specimen was seen to consist of three-quarters of an inch of the axillary artery, which was patent. On looking into the open end of the artery a tear of the inner coats could be seen, with the turned-up edges of the tear projecting into the lumen of the vessel and partially occluding it. After slitting up the vessel, the laceration was seen to involve about three-quarters of its inner circumference, and to extend through the inner and middle coats. The outer coat of the vessel was exposed in the floor of the laceration, covered with a thin layer of clot (*Figs. 2, 3*). *Figs. 4 and 5* show a longitudinal section taken across the torn part of the vessel.

Captain M. J. Stewart made a section of the artery and gave the following histological report :—

Microscopically, the tear is found to extend completely through the inner and middle coats of the vessel, the 'floor' being composed of the tunica adventitia, together with a certain amount of adherent thrombus. The torn edges of the tunica media and tunica intima project inwards into the lumen of the vessel, while the 'floor' of the tear bulges slightly outwards.

There is a certain amount of separation of the media and adventitia at each side, and the angle thus formed is occupied by a mixture of recent blood-clot and fairly dense thrombus. The process is similar to that of a dissecting aneurysm in an early stage. The adventitial floor of the tear is much disorganized and infiltrated with blood, and altogether looks very insecure.

It is evident that the bullet had passed obliquely through the axilla, just damaging the inner cord of the brachial plexus, pushing the artery aside—the impact causing the fracture of the inner and middle coats—and then severing the posterior cord. Free bleeding occurred immediately after the injury, but it quickly ceased, and one cannot say with certainty whether it came from the main artery or from the damaged vessels of the scapular muscles.

Examples of partial laceration of the large vessels are not commonly seen. Delorme (quoted by Sencert¹) described three degrees of contusions of arteries. In the first degree the inner coat only is damaged, and on opening the vessel fine linear scratches are seen such as might be produced by the point of a pin. In the second degree the inner and middle coats are torn, though the tear does not extend around the whole circumference of the vessel. In the third degree there is a circular tear through the inner and middle coats, with retraction of these layers. The specimen described above is an example of an injury of the second degree.

In considering whether the right procedure was followed in operating on this case so soon after the wound and on apparently somewhat insufficient grounds, one has to consider what would have happened to the damaged artery.

It is certain that some thrombosis would have taken place. This might have been partial, and it is conceivable that the tear would have healed without occluding the lumen of the artery, leaving a scar at the point of injury; at some later date this might have occasioned the formation of an aneurysm. Fragments of the clot might have become detached and caused embolism in the vessels below. The artery might have been completely occluded with clot at the seat of injury; in the absence of sepsis this would have organized and the vessel would have become obliterated; one of us (J. F. D.) has met with an obliterated axillary artery twice during operations undertaken many months after the injury for lesions of the brachial plexus. It is possible that thrombosis might have spread upwards and downwards, obliterating the collateral channels, and giving rise to gangrene, as described by Sir George Makins.²

These do not seem, however, to be the most likely occurrences. Secondary hæmorrhage, or the formation of an arterial hæmatoma, is more probable. In this case the wound of entry was clean, but the wound of exit was rather ragged and dirty, and there was some laceration of the scapular muscles. Some degree of sepsis was very likely to occur, and if this had spread to the neighbourhood of the damaged vessel it would eventually have given way. If hæmorrhage or a rapidly increasing hæmatoma had resulted, an urgent operation would have been required, and it is unlikely that the immediate repair of the divided nerves would have been possible, particularly if the patient had lost any quantity

of blood. Even in the absence of sepsis, any rise in blood-pressure might easily have determined a hæmorrhage. The gentlest manipulation of the exposed artery during the operation provoked a little weeping of blood.

It may be asked why the damaged artery was not repaired by suture. In the first place, it was thought that the vessel might be contused for some distance, and that it would therefore be unsuitable for suture; secondly, ligature and excision of the damaged portion of the artery gave easy access to the divided posterior cord. The need for suture of the axillary artery does not seem to be demonstrated in such a case as this. Gangrene is practically an unknown event after ligature, in the absence of serious infection or gross injury to the tissues of the limb.

If it is conceded that similar cases to this should be explored, on what grounds can the injury be diagnosed? It will be noted that the patient was said to have bled freely immediately he was wounded. It is difficult to know whether this arose from the axillary artery itself or from other vessels. It seems almost inconceivable that the artery could have bled very freely and still have presented the appearance it did when exposed. On the other hand, though there was little internal clot, there was some extra-arterial clot, and the pressure of this may have checked the hæmorrhage. The only other symptom of arterial injury was a slight but definite diminution in the pulse on the affected side.

The nerve injury in this case was an additional reason for interfering, though it is usually not wise to repair nerves until the original wounds are healed.

The incision used is one which gives admirable access to all the structures in the axilla, with a minimum of damage to the pectoral muscles and their nerve supply. It is most useful in cases of injury to the brachial plexus when an operation is undertaken some months after the wound.

We desire to express our thanks to Colonel T. Gowans for permission to publish the record, and to Colonel Sir Alexander McCormick, A.M.S., for his advice and for the interest which he took in the case; also to Captain M. J. Stewart for the microscopic specimens.

REFERENCES.

¹ SENCERT, *Les Blessures des Vaisseaux*, 121.

² MAKINS, *Brit. Jour. Surg.*, 1916, iii, No. 11, 353.