PROVINCIAL MEDICAL & SURGICAL JOURNAL.

CLINICAL LECTURES ON DISLOCATIONS, DELIVERED AT THE CHARING - CROSS HOSPITAL.

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LECTURE X.

FRACTURE THROUGH THE NECK OF THE HUMERUS.

Sir Astley Cooper confines fracture of the head and neck of the humerus to three varieties :—

First. Dislocation into the axilla, with fracture and detachment of the head of the bone, which is thrown on the under side of the inferior costa of the scapula.

Secondly. Fractures through the neck of the bone, at the tubercles, in which the head of the humerus is broken off, but remains in the glenoid cavity. This fracture occurs at the epiphysis or anatomical neck of the bone.

Thirdly. Fractures below the articulation, between it and the insertion of the pectoralis, latissimus dorsi, teres major, coraco-brachialis, and deltoid muscles, or surgical neck.

But it will appear from the cases I shall have to relate to you, that other fractures will sometimes happen, which, from their situation, and the appearances presented, bear a great resemblance to dislocation, with which, in point of fact, they are always more or less complicated. These fractures take place in a longitudinal direction, through the bicipital groove, separating the greater tubercle, with more or less of the shaft, from the rest of the bone.

The first of Sir Astley Cooper's divisions belongs to the subject of complicated dislocations, and we will not, therefore, treat of it at present, but proceed to the consideration of fracture occurring through the neck of the bone, or at what is usually denominated its true anatomical neck. Sir Astley Cooper has seen this accident both in old and young people, but it is, he says, very rare in the middle-aged. In the young it occurs at the junction of the epiphysis, where the cartilage is situated; and in the old, it arises from the greater softness of this part of the bone. Reichel, in his paper, entitled "De Epiphysium ab Ossium diaphysi diductione," contained in "Sandifort's Thesaurus Dissertationum," gives the drawings of two preparations which he considers, and states to be, separation of the epiphysis, but he does not furnish us with any history of the cases, and I quite agree with M. Delpech that they appear to represent a fracture of bone rather than a separation of epiphysis; although I by no means agree with him in his observation that these accidents cannot possibly occur; or with other writers, who give as

reason for their scepticism, that in order for the epiphysis to be separated, the accident must occur when the child is too young to be exposed to such mischief. From the hour of our birth, to that of our death, we are all of us more or less liable to meet with this accident. It never occurs from muscular efforts, however powerful, but from direct violence referred to the part. A careless nurse lets an infant fall from her lap to the floor; its shoulder first strikes the ground, and a separation of the epiphysis may be the result. An elderly person is knocked down by the pole of a carriage striking the shoulder, or he falls from a height upon that part; in either case the humerus may be fractured at its anatomical neck. That which is a fracture in advanced age, is, from the nature of the parts, a disjunction or separation of the epiphysis in infancy and early life. In both these instances the accident is the same, produced by the same cause, requiring the same mode of treatment, and therefore admitting of one description. There can be no doubt that the older authors, in their classification of accidents, have described many cases of fracture at the anatomical neck, as separation of the epiphysis; but that is no reason why we should go to the opposite extreme, and deny the probability of such mischief taking place, and reject these accidents altogether.

The head of the bone remains in the glenoid cavity, and consequently there is not so great a depression below the acromion process, neither does the latter project so much; the shaft of the bone is drawn upwards and forwards to the coracoid process, where its extremity forms a considerable projection, rendered much more prominent if the elbow be raised and drawn forwards. This altered position of the shaft of the bone, depends upon the altered relations of the biceps tendon, the latter being deprived of the support of the head of the humerus. If you take hold of the elbow, and draw the arm downwards and backwards, you will restore the shaft to its natural position, and the tumour on the end of the coracoid process will disappear, but relax your hold on the arm, and the abnormal relations and appearances will quickly return. The patient cannot raise his arm to his head, and complains of great pain in the shoulder upon any attempt to move the limb, which he endeavours to support as much as possible by the opposite hand. This has sometimes been mistaken for dislocation, but if you remember the distinctive signs of the latter accident, you will have but little difficulty in ascertaining that it is one of dislocation, although, when there is much tumefaction present, you may perhaps be puzzled as to what it really is. Mr. Allan, of Edinburgh, who distinctly

recognizes a separation of the epiphysis, remarks, that there is a marked distinction between separation as well as fractures and luxation, that in the two former the limb is always free, and may be moved in every direction; whilst, in the latter, it is immovable. He also points out, that if the surgeon runs his fingers along the spine of the scapula, until he arrives at the point of the acromion, and then inserts them under that process, he will be enabled to feel the head of the bone in its place, and if he then move the limb with the other hand, the head of the humerus, if separated from the shaft at the intervening cartilage, will not be felt to roll in the glenoid cavity, but rubbing as if upon a hard body, whilst, if fractured, a crepitus will be felt. Besides, in these cases, no tumour can be felt in the axilla as in dislocation. The principal diagnostic signs are the tumour at the end of the coracoid process; the subsidence of the swelling or tumour, when the arm is drawn downwards and backwards, and its return when the arm is let go; the mobility of the limb; the head of the bone not obeying the motions of the shaft when the elbow is rotated; and when the arm is drawn down, the crepitus, or sensation of rubbing, as described by Mr. Allan. Sir Astley Cooper has pointed out the true nature of these accidents, as ascertained from actual dissection, and also the process by which nature effects a reparation of the injury. He says, that upon dissection, in young persons, the head of the bone is found broken off at the tubercle, but remains in the glenoid cavity; that to remedy this mischief a great quantity of ossific matter is thrown out from the periosteum and fractured neck of the broken bone, but very little from the head. A cup of bone is formed upon the fractured neck of the shaft in one of his preparations, which supports the head of the bone so as to prevent the neck separating from it; a slight union is produced by the cancellated structure, the principal callus being formed by the outer surface, and it incases the bone. In one case which Sir Astley Cooper dissected, the fracture occurred within the capsular ligament, no bony union had occurred, the fragments being joined together by means of a ligamentous substance.

Sir Astley Cooper also relates the following case of this accident, in a person of very advanced age, at which period of life, he observes, it very rarely occurs:—

A Commander in the Royal Navy, aged 77, a strong and muscular man, was thrown out of a street cab in the month of December, 1835, falling upon his left shoulder and the left side of his forehead; he immediately lost the use of his arm, his shoulder was very much swollen, and its rotundity diminished. There was an evident depression in the situation of the belly of the deltoid muscle, and a hard tumour, which appeared to be the head of the humerus, was felt under the clavicle, and just on the edge of the glenoid cavity, close under the coracoid process. An obscure crepitus could be distinguished, the arm was an inch shorter than the other; and by extension the bone returned to its situation without difficulty. Bandages were applied and the hand placed in a sling; considerable inflammation succeeded, and in about two months the patient recovered the motion of the limb to a great extent, although the arm could not be raised to a level with the shoulder, nor could it be brought forward across

the chest. He was one day seized with apoplexy, and died in a few minutes.

Post-mortem. The parts about the joint were absolutely comminuted; the acromion had been broken off, and had formed a ligamentous union with the spine of the scapula, from which it had been separated. The coracoid process was broken off at its root, but was again becoming united by ligament to the scapula. The head of the bone had been broken through at the tubercles or anatomical neck, and the periosteum of the neck of the bone, below the tubercles, had thrown out a considerable quantity of ossific matter, and had united the broken shaft or neck to the head of the bone, whilst the cancellated structure of the neck of the bone was beginning to unite the fractured head of the os humeri to the shaft of the bone.

In the quarto edition of his Treatise on Dislocations, he relates the following:—

“A man, aged 72, during the severe frost in 1823, fell down upon his shoulder, three days after which he was admitted into Guy's Hospital. The arm and shoulder were much swollen; there was also acute pain and discolouration of the integuments. Crepitus could not be felt, and from the degree of swelling it was impossible to ascertain the precise nature of the accident. Leeches and evaporating lotions were applied. The shoulder was again examined on the second day after the swelling had somewhat subsided, and a fracture of the neck of the humerus was discovered. The pain and swelling again became greater, and gradually increased; the integuments inflamed, having the appearance of erysipelas; the skin became discoloured and gangrenous. He was feverish and irritable, then delirious, and gradually sunk on the tenth day from the accident.

Post-mortem. The integuments and cellular membrane, on the inner part of the shoulder, over the clavicle, were considerably thickened, having a sloughy appearance; and on cutting through the deltoid muscle a large quantity of bloody matter, mixed with serum, was effused. The capsular ligament was extensively lacerated; the humerus was fractured through the cervix, also obliquely through the head, and a small spicula of bone was separated from the cervix.”

Mr. Samuel Cooper, in his Dictionary, states, “That M. C. Larbaud showed Bichat the humerus of a young man, aged 17, the head of which bone was accurately detached from its body by a division which had passed obliquely through the upper part of the tuberosities. And also that he thinks an instance of the kind was pointed out to him in 1821, at St. Bartholemew's Hospital. The patient was a boy who had injured his shoulder. His elbow had been strongly kept up on the supposition that the case was a fracture of the neck of the scapula, and consequently the irregular end of the humerus formed a remarkable projection in front of the acromion, yet capable of being pushed back, where, however, it would not remain.”

Van Swieten also speaks of separation of the epiphysis of the upper end of the humerus in a person who was suddenly and violently thrown on to the ground.

Sir Astley Cooper, recommends, in a young subject, treating this case by binding a splint on the front and back part of the arm with a roller, placing a pad in the axilla, and using a clavicle bandage, the hand, but

not the arm, being supported in a sling; and that, in old persons, as the injury is more severe, leeches, evaporating lotions, and quietude, are to precede the application of mechanical means.

It may be considered presumption to impugn the practice of so great a surgeon as the late Sir Astley Cooper, but the recommendations above quoted certainly do not appear to me by any means capable of effecting a perfect cure in these cases. We have already observed that the upper end of the humerus is drawn upwards and forwards under the coracoid process, there forming a hard projection; that, by drawing down the arm, the tumour is removed, but that, when the extension is discontinued, it immediately re-appears. How are these signs to be accounted for?

I believe, that in these accidents the long tendon of the biceps is either ruptured, or that by the fracture of the head of the humerus, it is deprived of the fulcrum, which it naturally desires in passing over that process, and is thus unable to antagonize the capsular muscles.

Thus the upper end of the bone is drawn upwards and forwards, by the supra-spinatus and subscapularis muscles. If I am right as to the cause of the displacement, it is very evident that the back and front splints of Sir Astley Cooper can present very little, if any resistance, and that we must have recourse to other methods, if we are to hope for a cure.

In Sir Astley Cooper's case we learn, that although at the end of two months the patient had recovered considerable degree of motion in the limb, still he could not raise it to a level with his shoulder, nor carry it across his chest; the upper end of the bone had not been prevented resuming its unnatural situation. You should recollect that these fractures are unlike those which occur transversely in the shaft of a long bone, where, if the broken ends are placed in apposition, that very apposition presents a most efficient resistance to muscular contraction. But in fractures of the anatomical neck the fractured portions oppose no resistance to displacement. Hence, the back and front splint, with bandages, are at best insufficient to effect anything more than prevention of lateral motion; they cannot keep up extension, as they have no fixed point to extend from, and consequently, when the muscles contract they cannot prevent the upper end of the bone being drawn up out of its proper place.

Sir Astley Cooper advised that the patient's hand should be supported, but not his elbow, that the weight of the arm might in some degree oppose this tendency to displacement; but the same power which drew the upper end of the bone upwards and forwards, would keep it there notwithstanding the weight of the arm, as it had to overcome that in the first instance, and therefore, if we are to hope for a cure in these accidents, it must be by keeping up due extension, with suitable apparatus.

Place a pad in the axilla, and apply an angular splint along the inner or palmar side of the arm, extending from the axilla to the tips of the fingers; it should have a hinge and thumb-screw to enable you to bend the bone to any angle you please; let the arm-piece be the exact length of the patient's arm from his axilla to his elbow, as upon this part of your apparatus depends your power of resistance. In order to be

accurate, adapt it first to the patient's sound arm, and be very careful that it is neither too long nor too short, for an error either way will be prejudicial. The remainder of the splint, or that for the forearm, should extend to the tip of the fingers, to keep the hand perfectly quiet; fix this splint firmly with a roller commencing at the hand; and next apply these splints to the arm, one in front, one behind, and one on the outside, by straps and buckles or by another roller if you please; place the hand in a sling bearing the elbow unsupported.

According to Sir Astley Cooper, passive motion is to be employed for the young in a month, and for the old, at the expiration of two months or twenty weeks.

LONGITUDINAL FRACTURE THROUGH THE HEAD OF THE HUMERUS.

On the 22nd of October, 1837, Mr. Hale Thomson related a case at the Westminster Medical Society, of a man who had received a blow upon his arm. Upon examination, the signs appeared those of dislocation forwards, under the pectoral muscles. Extension was applied, and the bone apparently reduced. The next day all the symptoms had returned, and upon further examination it was considered that the head of the bone was split, the fracture extending one-third down the shaft of the bone, one piece lying in the glenoid cavity, the other under the pectoralis muscle.

FRACTURE BELOW THE TUBERCLE OF THE HUMERUS, OR AT THE SURGICAL NECK.

This accident may be mistaken for dislocation into the cavity of the axilla, but an attentive observer will readily ascertain the true nature of the case. The fracture occurs below the insertions of the supra-spinatus, infra-spinatus, teres minor, and subscapularis muscles, and above the insertion of the deltoid, pectoralis major, latissimus dorsi, and teres major muscles; and we accordingly find the separated portions of bone assuming certain situations in accordance with the action of those muscles which are attached to them. Mr. Burn, in his surgical works, pointed out the influence exercised by the muscles upon the broken pieces. As the subscapularis and teres minor pretty equally oppose each other, they act with equal power upon the head of the bone, press and retain it in the glenoid cavity, whilst the supra and infra-spinati, but more especially the latter, roll the head and turn the neck of the bone a little out; on the other hand, the teres major, latissimus dorsi, pectoralis major, and deltoid, remain attached to the lower portion of the humerus, the upper end of which, the first two, or teres major and latissimus dorsi, draw inwards towards the axilla, and the third or pectoralis major, upwards, forwards, and inwards, under the coracoid process of the scapula. The deltoid muscle co-operates with the preceding muscles in turning the end of the shaft towards the axilla. Being inserted lower down it draws the middle and lower portions of the bone outward, and unless resisted by some of the fractured surfaces of the neck, will also draw the shaft upwards. The biceps, coraco-brachialis, and triceps muscles, also draw the bone up, the last backwards, and the second inwards. These accidents are usually the result of direct violence to the part; falls or blows upon the outer part of the shoulder are liable to duce them, but they rarely occur unless under circumstances, and, consequently, the manner in v

the accident happens will be one guide towards your diagnosis.

A man falls violently upon his shoulder, experiences great pain at the moment, and discovers that he has lost the use of his limb. He may also have experienced a sensation of snapping, or something giving way at the moment of the accident, but this does not always occur. He consults you, and you will usually find upon examination the shoulder somewhat flattened, a sinking of the deltoid muscle, but not so marked as in dislocation, and always lower down. The elbow is thrown somewhat backward, and more or less separated from the side. The patient supports the arm, and endeavours to keep it as quiet as he can, any motion giving him great pain.

From what I have just told you of the action of the muscles, you will understand that the head, tubercles, and a small portion of the shaft of the bone, remain in their natural position, the head of the bone in the glenoid cavity. The upper extremity of the shaft of the bone, on the contrary, is drawn upwards, forwards, and inwards, under the pectoralis major muscle. If you push the arm upwards, this end of the bone projects considerably in the latter situation, and internal to the coracoid process; let the arm go, and the limb dropping, the projection disappears. Place your left hand upon the head of the bone, and with your right take hold of the patient's elbow, and draw the arm gently downwards and backwards, rotating the limb. You will now discover crepitus, and moreover, that although the shaft of the bone moves, the head does not obey its motions, remaining stationary under your left hand. The limb is shorter than natural, and the patient frequently complains of pain and tingling in his hand and fingers, and occasionally down the course of the arm; and Sir Astley Cooper has pointed out, that in these accidents the patient will sometimes have one or more of his fingers contracted, evidently caused by injury to some of the nerves of the axilla.

Although the patient is unable himself to move the limb, you can, in any direction, but in so doing you cause great suffering, and having once ascertained the nature of the accident, you had better abstain from moving the arm more than is absolutely necessary to replace the bone in its proper position, as otherwise, you are liable to cause considerable mischief by rubbing the rough end of the bone against the nerves and soft parts of the axilla, &c.

Mr. Samuel Cooper, in his Dictionary, says, that sometimes there is no displacement, and consequently no shortening, and, moreover, that the displacement is not usually very perceptible as regards the length, unless the fracture be oblique, and the sharp end of the bone irritate the muscles, and make them contract with unusual powers. Petit observes, that commonly the weight of the limb so powerfully resists the action of the muscles, that the displacement of the fracture is more liable to be transverse, and that in these circumstances the lower end of the fracture is displaced outward or inward, and rarely in any other direction. According to Sir Astley Cooper, the upper end of the lower portion of the humerus is drawn down under the pectoralis muscle, and may be felt in that situation. Cases certainly do occur where, the fracture being transverse without displacement, the limb remains of its natural and proper length, but in

the generality of instances which I have met with, there has been evident shortening, and the upper end of the shaft has been drawn upwards and forwards under the coracoid process.

I confess I do not agree with Mr. Samuel Cooper's assertion in the last edition of his *First Lines upon Surgery*, "that the lower fragment is sometimes not displaced upwards, so as to produce a shortening of the limb, but, on the contrary, drawn a little downward by the weight of the part, so as to put the deltoid on the stretch, and thus produce a resemblance to dislocation." The flattening and stretching of the deltoid does not depend upon the elongation of the limb, but upon the altered relation of the lower portion of the shaft of the bone. This being drawn inwards into the axilla, and the head and tubercles remaining in situ, the fibres of the deltoid are thus stretched over the latter, and not by the dropping of the limb. What is there in this accident to make it differ from fracture of any other long bone in the body? If the fracture occurs in the middle of the shaft of the humerus, we have to keep up a certain extension to prevent the bones riding, or, in other words, the limb becoming shorter; and is the difference in weight of the arm so great between these cases, that in fractures of the surgical neck of the humerus, a phenomenon at variance with what obtains in fracture of every other long bone in the body, occurs an elongation of the limb, instead of the riding and drawing up the lower end of the bone usually met with? If the limb be paralysed, or the muscles excessively attenuated, they might not be able to support the weight of the arm, but unless the result of disease, I cannot imagine that the deltoid, biceps, triceps, coraco-brachialis, pectoralis major, and teres minor, would allow any elongation of the limb, which must ensue, were the cause of the flattening and extension of the deltoid, that assigned by Mr. S. Cooper.

MEDICAL JURISPRUDENCE.

TO THE EDITOR OF THE PROVINCIAL MEDICAL AND SURGICAL JOURNAL.

Sir,

Considering the numerous and useful reports which are furnished in every other department, it seems strange that so few in direct connexion with that important branch of our science termed Medical Jurisprudence, should appear in the pages of your own or any other Medical Journal. Not that there is any actual deficiency in the amount of medico-legal information supplied, but it is in the records illustrating the practical application of this information to cases as they occur, that a scarcity appears.

This can hardly arise from an indifference on the part of the profession to the subject, or from a belief that such reports would be devoid of interest; for surely no man can be indifferent to, or fail to find an interest in, a matter which meeting him some one time unexpectedly in the enjoyment of a high reputation, to which his skill and acquirements shall have fully entitled him, might be the means of placing him in a painful and ridiculous position, and tend to depreciate him in the eyes of the public and his friends. To the medical man appearing in his forensic character the chance of adding to his laurels is by no means in