

gical diseases of the extremities, records three cases of his own. Hüter, alone, saw eight cases, most of which were of old standing, unreduced, and probably unrecognised. At v. Dumreicher's clinic I saw three cases, and since then I have seen many more. It is now generally known that these dislocations, formerly unrecognised, frequently occur in children. The dislocation results either in an outward or an inward displacement; that is, toward the radial or ulnar side. Of these, *outward* displacement is by far the more frequent. The position of the bones of the forearm is as follows: the radius is displaced outward from the eminentia capitata, and rests beneath the external epicondyle without producing a marked prominence. The ulna moves with the radius, so that the centre of the sigmoid cavity no longer corresponds to the centre of the trochlea. In almost every case the internal lateral ligament has torn away part of the internal epicondyle. It is just



FIG. 12.—Right arm.

this small fractured surface, felt upon the internal condyle, which is misleading. The first case I saw caused me some misgivings. The joint was obscured by swelling. Shortening was absent; flexion beyond a right angle unimpeded; in fact, the range of flexion was greater upon the diseased than upon the sound side. This definitely excluded backward dislocation of both bones of the forearm, but not fracture of the lower end of the humerus. In isolated cases flexion has been found impossible. In these, absence of shortening still suffices

to exclude backward dislocation. In my case I suspected fracture of the lower end of the humerus, as I felt a sharp fragment of bone. How was the lack of shortening to be accounted for? Transverse or slightly oblique fractures at the lower end of the humerus

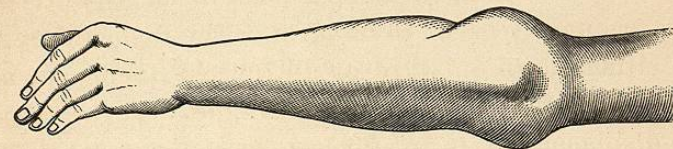


FIG. 13.—Left arm from without.

may occur without shortening. I have seen a few in which the line of fracture traversed the internal epicondyle. Displacement is then not necessarily *ad longitudinem*, but rather *ad latus*. The lower fragment accompanies the forearm outward; the lower end of the upper fragment protrudes inward. This lateral displacement produces a relation of the axes of the limb like that seen in incomplete outward dislocation. The resemblance of the signs, on inspection, is great; palpation alone can decide. In incomplete dislocation we recognise by palpation the inner half of the tro-

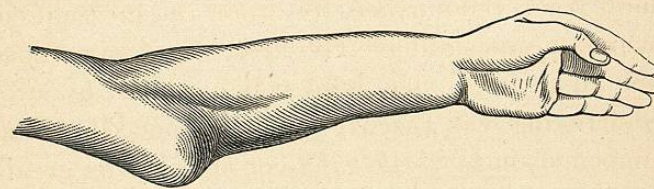


FIG. 14.—Left arm from within.

chlea, either below the fractured edge of the base of the epicondyle, if this has been torn away, or beneath the epicondyle itself, if this has not been fractured.



Even if the swelling is extensive, the steep inner edge of the trochlea can be plainly felt, and, what is even more important, is found immovable. Beneath it is a hollow, which opposes no resistance to pressure because it is no longer occupied by the coronoid process. The very fact that the piece of bone felt *below* the line of fracture is *immovable* shows the fallacy of assuming that a fracture of the lower end of the humerus has occurred, and further palpation shows that this fixed piece is the empty trochlea. Such was my experience.

In *incomplete* dislocations toward the *ulnar side*, the articular surface of the coronoid process has surmounted the sharp internal edge of the trochlea; the radius has left the capitellum, and lies in contact with the trochlea, deeply hidden by the soft parts. Shortening is absent and flexion unimpeded. The characteris-



FIG. 15.—Right arm.

tic symptom is the exposed portion of the internal edge of the sigmoid fossa of the ulna, which can be felt beneath the internal epicondyle (Fig. 15).

We might say that by emphasizing these characteristic signs, other symptoms being taken for granted, palpation below the internal epicondyle will suffice to show whether an incomplete outward or inward dislocation has taken place. In outward dislocation the trochlea can be felt; in inward displacement, the fossa sigmoidea. The free border of the trochlea forms an edge *convex* anteriorly; the free border of the sigmoid,

an edge *concave* anteriorly. A study of the bones entering into the formation of the elbow-joint will illustrate these remarks.

Fluoroscopic examination of both recent and old cases tends to prove that these dislocations rarely occur in children in an *uncomplicated form*. As a rule, some fracture is present, so that the condition may be called a fracture-dislocation. We have already discovered a great variety of combinations. In one case the ulna was displaced downward (distally). Our knowledge of these conditions will surely be increased by further observations.

As has been previously stated, backward dislocation of both bones of the forearm, although of frequent occurrence, is an often unrecognised injury. Two other conditions which bear some resemblance to it have not yet been discussed.

In children, *separation of the lower epiphysis of the humerus* takes place. The line of separation runs below the epicondyles; the lower fragment consists only of trochlea and capitellum. It is evident that the forearm, in company with the lower fragment, can be displaced backward. The olecranon is then prominent posteriorly, and is displaced upward; the radius has left its normal position, and the forearm is shortened. The symptom-complex resembles that produced by a dislocation. Palpation discloses the tip of the olecranon above a line drawn between the epicondyles, and as the relative position of the olecranon to the epicondyles is altered, we are led to assume that a dislocation exists. But, on testing flexion beyond a right angle, no resistance is encountered. This seeming incongruity—viz., relation of the anatomical points as in



dislocation—combined with unimpaired flexion, is characteristic of epiphyseal separation.

In other instances, the opposite displacement, of both forearm and lower fragment, occurs, namely, displacement *forward*. The olecranon has left the back of the joint; the line of separation passes below the epicondyles. Correction of the deformity is very easy.

The second form of injury, which resembles dislocation, is *fracture of the coronoid process of the ulna*. But few cases are on record; I have seen one case myself. In no instance was this injury found alone, some other complication always existed, although the fracture of the coronoid was the most noticeable feature. The striking symptom is the prominence of the olecranon, which is found above the intercondyloid line. If this injury is thought of, palpation beneath the external epicondyle shows that the radius is not displaced. Dis-

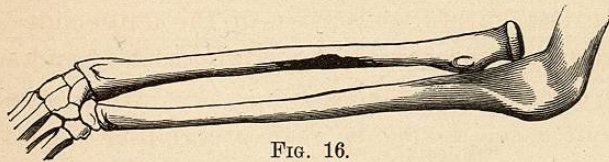


FIG. 16.

location backward of the ulna, alone, will then account for the symptoms. As a matter of fact, the ulna is dislocated because the coronoid process, which grasps the trochlea, has been broken off. Compared to uncomplicated dislocation of the ulna, there is some difference in the position of the forearm, which is more adducted (ulnar adduction) in simple dislocation. If the torn and often movable coronoid process can be palpated in the bicipital fossa, it would be conclusive; but, as Pitha remarks, extreme delicacy of touch is required

to elicit this symptom. Another symptom, however, is quite as valuable. By downward traction of the ulna the olecranon grows less prominent, but as soon as the

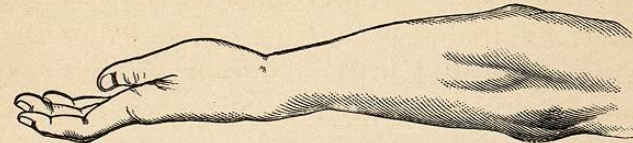


FIG. 17.—Anterior dislocation of radius.

traction is discontinued, and slight attempts at flexion are made, the deformity promptly recurs.

Dislocations of the *radius alone* demand further mention. Absence of shortening distinguishes them from dislocation of both bones of the forearm, even if the extent of the swelling obscures the joint and the dislocation of the radius hinders flexion beyond a right angle (by no means a constant occurrence). If the swelling is great, careful palpation of the outer side of the joint must be practised; for, if felt, the head of the radius can not be mistaken for any other structure. In recent cases it may be seen protruding beneath the skin (in external and posterior dislocations), or the contour of the external condyle is abnormally distinct (forward dislocation). One point, however, may be overlooked: this is fracture of the ulna, especially of the middle third, which often accompanies dislocation of the head of the radius. The fracture may escape unnoticed or may catch our eye, while the dislocation escapes observation. By remembering that these injuries often occur together, mistakes will be avoided.

*Fracture of either condyle of the humerus* causes no pathognomonic posture, no shortening, and no limitation of motion. In these cases careful palpation is an



essential to correct diagnosis. The same holds true of *fracture of the head of the radius*, for absence of rotation of the head in pronation and supination is a very deceptive symptom, especially if the dislocation is slight. As a rule, displacement is marked, and the upper fragment lies almost transversely with its sharp fractured end toward the ulna.

Let us now briefly review the question of *fracture versus dislocation*. The preceding paragraphs have shown that several of these injuries are to be recognised at the first glance, while others require careful examination. In this examination, the discovery of an exposed joint surface or of a protruding process—i. e., recognition of the head of the radius, the edge of the sigmoid fossa of the ulna, exposed trochlea, or capitellum—prove that a dislocation has occurred. In determining whether the commonest variety—namely, backward dislocation of both bones of the forearm—has taken place or not, the depression on the head of the radius can always be felt, no matter how great the swelling, and the sigmoid fossa is found empty, even if its whole articular surface can not be explored.

Finally, there is a condition which can be demonstrated with the aid of the X-ray. This is the ossification of isolated structures in the neighbourhood, after fracture in the vicinity of the elbow-joint. For instance, the insertion of the brachialis anticus or the biceps may become ossified. Formerly these were mistaken for bony fragments.

## CHAPTER XVII

### INFLAMMATORY PROCESSES OF THE ELBOW

WHEN the elbow-joint is distended by a fluid exudate, it assumes a position of flexion at an angle of about  $120^{\circ}$ . The anteroposterior diameter, measured from the crease of the elbow to the tip of the olecranon, is the only one which is noticeably increased. This is due to the fluid which raises the anterior part of the capsule from the trochlea and capitellum. The most marked changes in outline take place posteriorly. Normally furrows are to be seen on either side of the olecranon; these are now not only obliterated, but replaced by swellings. The capsule in this situation is thin and not tense; it can, therefore, be distended by the effusion, and in chronic cases is stretched. A sharp eye will notice that the bony outline in the vicinity of the radio-humeral articulation (a finger's breadth below the external epicondyle) is masked by the effusion which surrounds the head of the radius. All these signs can be studied on the cadaver by boring through the olecranon, and distending the joint through this opening by means of a cannula.

The *fluid* nature of the exudate is recognised by the fluctuation, which can be felt in the swellings found on either side of the olecranon. In those cases in which the effusion is considerable, direct communication be-