FRACTURES OF THE CARPAL BONES

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The interesting analysis of "Fracture of the Carpal Scaphoid" by Robertson and Wilkins (1944) permits the mere anatomist to call attention to the need for still further sorting. In their series of 158 wrist-joint injuries in young adults, 100 cases of fractured scaphoid occurred. There is one enigma in their analysis, for, of 100 cases of fractured scaphoid, they state that 70 united but 72 resumed full duty. What was the nature of the full duty in the two who resumed with ununited fractures? This is important, for in most cases of ununited fracture of any bone of the carpus in man and domestic animals the end-result is a generalized osteo-arthritis of the wrist. Yet another omission in the analysis is the failure to ascertain with certainty how many of the remaining 58 cases of "sprain" of the wrist really had a fracture of some bone other than the scaphoid.

Fracture of the styloid process of the ulna often complicates Colles's fracture, and sometimes accompanies fracture of the scaphoid. It is, however, the flake fracture of the dorsum of the cuneiform (triquetrum) and os magnum (capitatum) which is so often missed radiographically. The fracture usually occurs during a fall, or recovery from a fall, with the wrist in full pronation and extreme flexion. The detached flake is torn off during extreme tension on the dorsal radio-carpal ligament, which runs downwards and medially from the radius to the dorsal surfaces of the scaphoid, lunate, and cuneiform bones. The deeper fibres of the ligament, on the ulnar side, run to the cuneiform bone and blend with the articular disk of the ulno-carpal joint. The flake fracture probably occurs more frequently in the cuneiform than in the os magnum. This flake fracture is easily missed on both antero-posterior and lateral radiographs. It is rendered visible only on that lateral view which places the area of maximal pain as near the periphery as possible (see Fig.).

Lateral radiograph showing flake fracture of the cuneiform (triquetrum) bone.

Another rare type of fracture is that of the pisiform bone. The fracture involves a flake on the distal tubercle, at the attachment of the piso-hamate and piso-metacarpal ligaments, which are often wrongly regarded as continuations of the tendon of the flexor carpi ulnaris.

Multiple injuries at the wrist are a common feature in falls by women laden with shopping baskets and in stokers and coal-miners who "catch a crab," such as a bolt-head or nut when using a shovel on a steel floor. One case showed this series of complications in a manner not to be forgotten. The patient had fallen while carrying a parcel in each hand. The first doctor recognized the obvious Colles's fracture, the surgeon at the hospital also saw the fractured styloid process of the ulna, his radiographer spotted the fractured scaphoid, and a certain anatomist discovered the flake fracture of the cuneiform. All were eventually very pleased with themselves, and the patient was put up in a magnificent plaster cast. Two days later he returned stating that the maximal pain was not in the wrist but in the chest. Two fractured ribs were recognized—but essentially by the patient. Thus, in any fall involving an injury to the wrist, not only must multiple fractures in the neighbourhood of the wrist be considered, but it is also worth while giving the patient's chest a gentle squeeze from front to back and from side to side—a manoeuvre which uncovers a fractured rib much more rapidly than a radiograph.

A comparison of the wrist of man with that of a reptile, such as a crocodile, shows that in the lower forms the ulna is much stouter than the radius, whereas in the primates generally, and man in particular, the radius is much stouter at its distal extremity than is the ulna. The strength of construction of the hand in man is concentrated in the radius, thumb, and index and middle fingers. In the reptile the strength of construction is centred on the ulna and the third and fourth metacarpals. Conversely, however, the carpus in man has signally failed to respond to this change, and the narrow-waisted scaphoid is too delicately formed for the load which is thrown upon it, especially in radial abduction. Moreover, one radial carpal element, the os centrale, is missing in man, gorilla, and chimpanzee, thus further reducing the bony architecture of the radial side of the carpus. On the other hand, the reptilian carpus has a strong, solid, rod-like scaphoid. If one could transpose the reptilian scaphoid to the human hand the wrist might be rendered much more stable, but at the cost of those movements of adduction and abduction, as well as supination, so essential in cutting up food on the plate and transferring it to the mouth.

The scaphoid is the most irregular and variable of bones in the carpus, both from the point of view of comparative anatomy and from that of individual variation in man and the primates. The scaphoid may be absent, as reported by Botreau-Roussel (1922), or only partially developed, as in the case recently reported by Hodgson (1944). It is the most variable in the child as regards the time of appearance of the centre of ossification, and it may occasionally precede or more usually follow the appearance of ossification in the trapezium and trapezoid. Again, in the individual it varies considerably as regards dimensions in association with a heavy or a slender wrist, and it varies in particular in its proximo-distal thickness. It varies also as regards the development of the anterior tubercle and the posterior transverse ridge, and this in turn decides whether the waist of the bone is more or less marked. The anterior tubercle develops in proportion to the thickness of the anterior annular ligament (flexor retinaculum) of the wrist and the bulk of the short abductor pollicis muscle. The posterior transverse ridge varies essentially with the development of the radio-scaphoid and dorsal carpal ligaments, as these ligaments sometimes form a transverse gutter rather than a rough ridge on the bone, between the proximal articular surface for the radius and the distal surface for articulation with the trapezium and the trapezoid. One might almost say that there is a particular anthropological type in which fracture of the scaphoid is more apt to occur.

Fractures of all the other bones in the carpus are occasionally seen, but the frequency of flake fractures in the cuneiform and os magnum, and their omission in most modern textbooks, is such as to justify the application of a good comfortable plaster cast to any sprain of the wrist accompanied with pain on movement.

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