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Irreducible fracture of the wrist in a child

Entrapment of the extensor tendons

A previously undescribed fracture-separation of the distal radial and ulnar physis is presented. A Salter-Harris Type II phys-metaphyseal fracture of both radius and ulna, with volar displacement, was found irreducible by closed means. At operation the extensor tendons were found entrapped between the metaphysis and epiphysis of both radius and ulna, which prevented reduction. Reduction was possible only after this entrapment was released.

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Introduction

The distal end of the radius is the most common site of epihyseal-plate injury, usually of Salter-Harris Type II, in children above 10 years of age (Salter & Harris 1963). Closed reduction can almost always be obtained, and residual deformities are rare because remodelling at the site of the fracture is usually satisfactory (Aitken 1935, Friberg 1979, Salter & Harris 1963, Stühmer 1980).

We report a previously undescribed epiphyseal-plate fracture-dislocation of the distal radius and ulna in which interposition of extensor tendons prevented reduction.

Case report

A 16-year-old boy was admitted to the hospital after a motorcycle accident. He had an open comminuted fracture of the left tibia and a severely displaced phys-metaphyseal Salter-Harris Type II fracture of the left distal radius and ulna (Figure 1); the displacement was in a volar direction. Peripheral circulation was normal and there was no evidence of nerve injury. However, he was unable to extend his fingers.

After closed reduction had failed, an open reduction was performed. The distal radial metaphysis was found directly beneath the skin on the dorsal side of the wrist, caught in a button-hole perforation of the extensor retinaculum. The extensor pollicis longus tendon was lying between the radial metaphysis and the displaced epiphysis (Figure 2), having probably passed through the radioulnar joint. After reposition of this tendon, the radial fracture could be satisfactorily reduced, but was unstable. The ulnar fracture was still irreducible due to interposition of the tendons of the extensor digitorum communis, extensor indicis proprius, and extensor digiti minimi muscles (Figure 2); these tendons had probably passed through the disrupted radioulnar joint. After reposition of these tendons through a dorsal approach, the radial fracture was fixed with a T-shaped AO-plate (Figure 3), whereupon also the ulnar fracture became

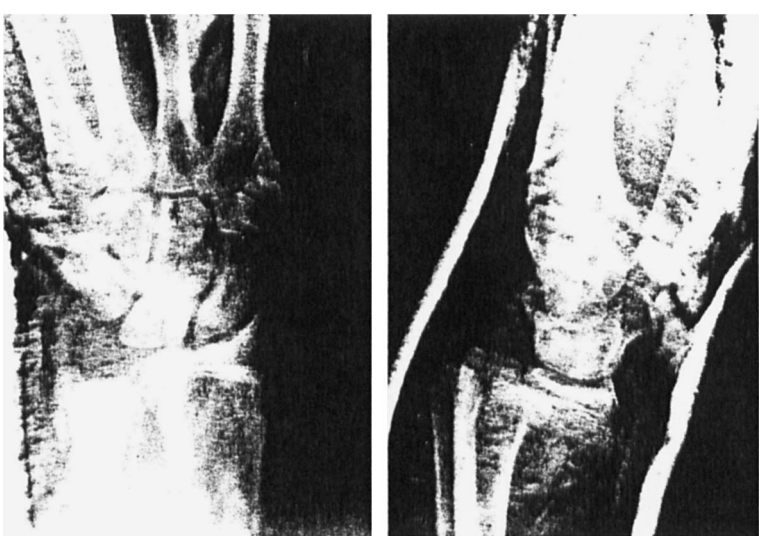

Figure 1. Phys-metaphyseal fracture of the distal radius and ulna, Salter-Harris Type II.

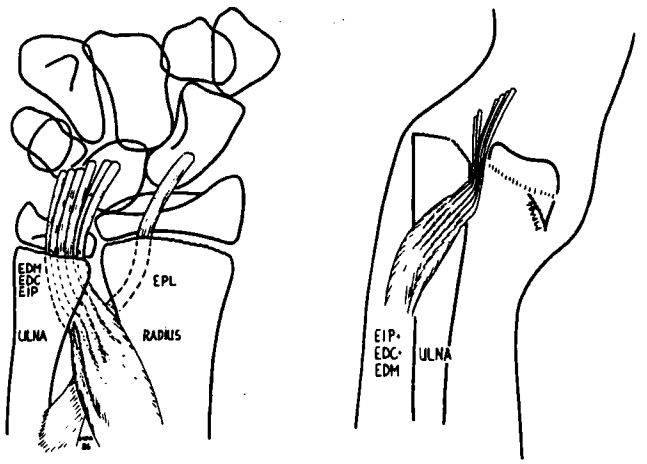

Figure 2. Entrapment of the extensor tendons between the metaphysis and the displaced epiphysis.

EDC Extensor digitorum communis, EIP Extensor indicis proprius,
EDM Extensor digiti minimi, EPL Extensor pollicis longus.

Figure 3. After reduction and internal fixation with a T-shaped AO plate.

stable in a good position. The ligaments of the distal radioulnar joint were repaired.

The arm was supported by a plaster cast above the elbow for 5 weeks, with the arm in supination and the wrist in extension.

The patient made an uneventful recovery. Six months after the injury, the fractures were healed and the function of the wrist and hand were restored to normal, except for 15 degrees restriction of pronation.

Discussion

Closed reduction of phys-metaphyseal fractures of the distal forearm gives almost always satisfactory results (Salter & Harris 1963), but open reduction may occasionally be indicated in older children with a displaced fracture that is irreducible by manipulation (Stühmer 1980, Manoli 1982). Manoli (1982) reported on an irreducible fracture-separation of the distal radial epiphysis with interposition of the volar structures. Open reduction was carried out with good results. Stühmer (1980) has described interposition of the pronator quadratus muscle in 3 older children. In all of these cases, it was necessary to perform an open reduction. Stühmer has also described prevention of reduction by trapping a periosteal flap in the fracture.

The mechanism of injury in our case was a fall on the hand with hyperflexion of the wrist and most probably forced pronation of the forearm with disruption of the distal radioulnar joint so that the extensor tendons could slip through the joint to be locked on the volar aspect of the distal radial and ulnar metaphysis.

If closed reduction of phys-metaphyseal fracture fails, open reduction should be performed without delay because further attempts with closed methods may damage the entrapped structures.

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