Case Report

Acute flexor tendon injury following midshaft radius and ulna fractures in a paediatric patient

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ABSTRACT

Delayed rupture of the extensor and flexor tendons are recognised complications of distal radius fractures. However, acute flexor tendon rupture in the context of forearm fractures is rare. A twelve-year-old female sustained midshaft fractures of the radius and ulna. Intra-operatively the flexor pollicis longus (FPL) was found to be stripped from its musculotendinous junction at the level of the fracture fragment. The ruptured tendon was repaired using a modified Krackow technique at the time of fracture fixation. The repair was protected in plaster of Paris prior to referral to the paediatric hand clinic. The patient made a full recovery. Flexor tendon injury is a rare but potentially devastating consequence of acute forearm fractures. High energy trauma, significant volar angulation of the fracture fragment and clinical signs of flexor tendon injury should raise suspicion of this injury. A high index of suspicion in conjunction with repeat clinical examination of flexor tendon function should be performed before opting for closed management or intramedullary nailing in paediatric patients.

Introduction

Delayed extensor tendon ruptures are a well-recognised complication of distal radius fractures [1,2]. Similarly, delayed flexor tendon ruptures caused by attritional wear against volar plating or the bony protuberance of mal-union are documented in the literature [3,4]. However, acute flexor tendon injury in the context of a midshaft forearm fracture is very rare. There are five cases of acute flexor tendon injury due to distal radius fractures documented in the literature to date [5–9]. We present the first case of an acute flexor tendon rupture following a midshaft forearm fracture in a paediatric patient.

A twelve-year-old right-hand dominant medically well female presented to the Emergency Department following a fall onto her left arm whilst on a trampoline. On examination, the left arm was clinically deformed with no neurovascular compromise. Clinical examination did not elicit any gross functional deficit of the flexor tendons. Plain radiographs of the forearm revealed closed fractures of the mid-shaft of the left radius and ulna (Fig. 1). She was placed in a resting backslab and proceeded to open reduction the following day.

At the time of surgery the radius was approached using a volar Henry approach. The FPL tendon was found to have been stripped from its musculotendinous junction at the level of the displaced radial fracture. The muscle belly of FPL had been pulled through a split in the fibres of flexor digitorum superficialis (FDS) by the fracture fragments, and the median nerve had been pulled into the...
fracture site, but was intact on exploration. The radius and ulna were fixed using small fragment AO one-third tubular plates (Fig. 2) as dynamic compression plates were felt to be bulky for this child, and would cause irritation. The FPL muscle belly was approximated to its stripped tendon using a modified Krackow technique. The repair was protected with plaster of Paris. The patient was referred to the local paediatric hand service who rested the repair for six weeks before beginning passive range of movement exercises. At the time of discharge six months postoperatively the fractures were clinically and radiologically united and the FPL repair was intact, with a normal resting posture and range of movement at the interphalangeal joint.

Discussion

A comprehensive literature review using the OVID and PubMed databases was performed to identify other cases of acute flexor
tendon injury following forearm fractures. Southmayd et al. first described acute loss of flexor tendon function immediately following a closed distal radius fracture in 1975. Delayed surgery was performed after closed management due to persisting functional deficit and the flexor digitorum profundus of the index finger was found to be ruptured at the level of the fracture. Since then four further cases of acute flexor tendon injury following distal radius fractures have been reported in the literature [5–7,9].

The injuries were typically associated with high-energy trauma. Interestingly, only Erickson et al. described the injury with an open fracture, the remainder occurred with closed distal radius fractures. The most commonly involved tendon was flexor carpi radialis. Injuries to FPL, flexor digitorum profundus (FDP) and FDS were also described. Based on intra-operative findings of a divided tendon at the level of the displaced fracture with frayed ends and no signs of healing the suggested mechanism of injury was direct trauma from a sharp bony fragment [5,7]. This theory would be consistent with the sharp bony fragment of the radius at the level of the torn musculotendinous junction of FPL in this case.

The rarity of this injury may be due to the volar protection offered by the anatomical barrier of pronator quadratus in distal fractures [6–8], in addition to the higher tensile strength of the flexor tendons which lie within a less constrained flexor canal compared to their extensor counterparts [4,10]. These lie in crowded compartments in close proximity to the distal radius. It is also suggested that as volar plating becomes more common these injuries are being recognised more frequently [7] as functional deficit from tendon injury is not always apparent on initial examination [9].

Suspicion of flexor tendon injury should be raised in high energy trauma with significant volar displacement of the fracture fragment and clinical signs of flexor tendon damage. Clinicians are advised to assess flexion at the interphalangeal joint of the thumb separately to neurovascular assessment to rule out this potentially devastating consequence. This will determine whether the fracture can be safely managed closed, or mandates open reduction and internal fixation. Many surgeons prefer flexible nailing for internal fixation in children's forearm fractures. It is imperative that flexor tendon function should be fully assessed prior to use of flexible nailing or closed management to avoid missing serious tendon injuries in children in whom the clinical assessment is often difficult due to pain. Repeated clinical examination after immobilisation may elicit clearer clinical signs if the diagnosis is uncertain. If open reduction is required then a volar approach with flexor compartment exploration is recommended. Ruptured tendons should be repaired at the time of fracture fixation.

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Conflict of interests

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Statement of human and animal rights

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