CASE REPORT

A flexor digitorum longus tendon entrapment in a diaphyseal fracture of the proximal phalanx caused by crushing injury

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There have been some reports of tendon interposition in proximal phalangeal fractures that prevented closed reduction and necessitated open reduction. Most of the reported cases were related to epiphyseal fractures in the paediatric age group.1,3,4 Another case involved the entrapment of a thin dorsal tendon within the fracture of the base of the proximal phalanx.7 Flexor tendons are quite thick as compared with the phalangeal bone, so it is difficult to achieve satisfactory closed reduction when the tendon is interposed between the fractured fragments. We describe a case of entrapment of a deep flexor tendon within a diaphyseal fracture of the proximal phalanx following a crushing injury that went unnoticed at the time of primary closed reduction.

Case history

A 43-year-old patient sustained a crushing injury to his left hand by a heavy metal fragment. The skin and the circulation of the injured hand were intact. Radiographic examination showed transverse diaphyseal fractures of the second, third, and fourth proximal phalangeal bones, with displacement and severe volar angulation (Fig. 1). Under axillary block anaesthesia, we attempted closed reduction of the fractures under fluoroscopic guidance. Reduction was achieved without difficulty and percutaneous Kirschner wires were driven across the fractures (Fig. 2).

Immediately post-operation, we encouraged the patient to move the distal interphalangeal joints freely. But 2 days later, despite absence of pain, the patient could not flex the distal interphalangeal joint of the index finger. The possibility of an unrecognised tendon rupture was entertained prompting immediate exploration. On initial inspection, the deep and superficial flexor appeared undisturbed (Fig. 3), but as the flexor digitorum superficialis was retracted, we found the profundus tendon of the index finger entrapped within the fracture (Fig. 4). We freed the tendon by removing the wires and distracting the fracture fragments. The dorsal surface of the deep flexor was partially penetrated by the spikes of the fractured fragments. We debrided the frayed dorsal side of the tendon and confirmed...
the free gliding of the tendon after reduction of the fracture. The pins were removed 4 weeks later and the fractures healed uneventfully. The patient has returned to his job with a full range of motion of the hand.

**Discussion**

In the closed management of long bone fractures, there is always some concern about soft tissue entrapment, especially when neurovascular struc-
Fibertures are near the fracture site. The interposition of a nerve or vessel usually does not prevent fracture reduction and can go unnoticed by the operator until checked postoperatively. In the case of tendon interposition within the fracture, the entrapped tendon frequently hinders proper reduction of the fracture and necessitates an open approach. So it is very rare to miss a tendon caught in the reduced fracture.

Figure 3  When the flexor tendons were explored, they had a normal appearance except that the flexor digitorum longus had some bruise in the proximal phalangeal joint area.

Figure 4  The superficialis tendon was retracted radially, and the deep flexor (arrow) was found to be entrapped in the fracture.
bone. In distal forearm fractures, there have been some reports of late detection of tendon entrapment following closed reduction. Hussain and Barja\(^5\) reported a case of the interposition of the extensor digitorum tendon within a distal radius fracture after closed reduction, whose presentation mimicked a compartment syndrome after the operation. Stuart and Beckenbaugh\(^8\) reported a flexor digitorum profundus entrapment after closed treatment of a displaced Colles’ fracture.

We believe the crushing type of injury in the present case caused the entrapment of the deep flexor tendon. Following a crushing blow to the hand, the fractured fingers were displaced into a severe volar angulation, partially penetrating the dorsal surface of the tendon with its spiked edges and hooking a portion of it into the fracture during closed reduction. The partially entrapped tendon did not prevent adequate closed manipulation and went unnoticed. A similar mechanism of crushing and the entrapment of bony spikes within the fibrous septa of the pulp in the distal phalangeal fracture has also been reported.\(^2\)

Work-related hand injuries are usually caused by crushing, being caught in machines or struck by metal items or hand tools\(^6\) and this type of injury requires proper judgment and assessment by an experienced surgeon for optimal treatment. In this case, the extent of crushing was not so severe, but the presence of severe volar angulation deformity of the fracture by radiographic examination should have raised the suspicion of a soft tissue entrapment even if no resistance was noted at the time of closed manipulation. Following closed reduction in such instances, it would be necessary to check tendon gliding or motion of the interphalangeal joints using the wrist tenodesis effect under anaesthetic block.

This case calls attention to the possibility of entrapment of flexor tendons in proximal phalangeal shaft fractures, especially when the mechanism of injury is crushing and the radiographic examination shows volar angulation deformity of the fracture fragments.

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References