

Prevention of chronic entrapment of the ring finger flexor profundus muscle in ulnar shaft fractures in children—a case report

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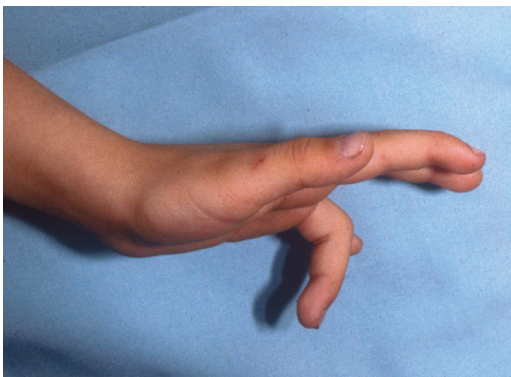
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Submitted 03-09-24. Accepted 03-12-01

Two children with a passive extension lag of the ring finger following forearm fracture have been treated in our clinic during the last 10 years, one with acute entrapment and the second with chronic entrapment. We have also treated 8 children with imminent entrapment. A description of the acute case was published in 1992 (Hendel and Aner 1992).

The chronic case involved a previously healthy 16-year-old boy who presented with passive extension lag of the ring finger. The lag was more remarkable in the ring finger, but was also noticeable to a lesser extent in the little and middle fingers. The lag was more pronounced when the wrist was placed in extension and neutral position and less obvious when flexed (Figure). 9 years previously, the boy had had a forearm fracture which was treated by closed reduction and plaster. A ring finger extension lag gradually developed a few weeks after plaster removal. Plain radiographs revealed healed fractures of the radius and ulna. Exploration of the origin of the flexor muscles was

performed, reaching the proximal ulna through a volar approach. The FDP of the ring finger was seen to be adherent to fibrous tissue around the ulna at the junction of the muscle belly and the tendon. The entrapped muscle was carefully released from the ulna. Full range of motion of the digits was achieved immediately. After surgery, the patient wore a volar splint for 1 month, with the wrist in neutral position and the fingers fully extended, and underwent physical therapy. At the last follow-up, 2 years after surgery, the patient had full active and passive range of motion of the digits.

Following the chronic case of entrapment, we started to follow all our cases of forearm fracture during plaster treatment and after plaster removal, by performing a passive stretch test of the ring finger every week for 6 weeks after plaster removal. In this test, the wrist and metacarpophalangeal joint are at maximum extension and the ring finger is passively extended to hyperextension. If stiffness or pain appeared during finger stretching, the child was sent for intensive physiotherapy to ensure gradual stretching of the flexors at full wrist extension. Approximately 20 cases of forearm fracture in children are treated every year in our clinic. 8 children have been found to have a positive passive stretch test during the past 10 years. All fractures were on the dominant hand. 6 fractures were at the junction of the upper third and mid-third of the forearm, and 2 were at the mid-third. All fractures were treated by closed reduction and plaster under general anesthesia. The children received physiotherapy, and full range of motion with no pain or stiffness was obtained after 4–6 weeks. This was confirmed at the follow-up examination, 1 year after the fracture.



Extension lag of the ulnar fingers 9 years after forearm ulnar fracture, which is more pronounced with wrist extension.

Discussion

15 cases of entrapment of the FDP have been reported (Jeffrey 1976, Ryan and Hayes 1986, Hendel and Aner 1992, Littlefield et al. 1992, Shaw and Murphy 1996, Denney and Kay 1998). Reviewing these reports, it seems that entrapment is most common before puberty. The origin of the FDP is on the upper three-quarters of the volar and ulnar surfaces of the shaft of the ulna, and the adjoining part of the interosseous membrane. Jeffrey (1976) emphasized that the ring finger muscle belly of the FDP is in close proximity to the ulna, thus explaining why the deformity occurred mostly in the ring finger. Comparing the frequency of occurrence of forearm fractures in children, Shaw and Murphy (1996) raised the question of how rare the complication is. We believe, as Jeffrey (1976) first suggested, that there are two mechanisms behind entrapment. One is acute entrapment of the ring finger FDP muscle belly, occurring at the fracture site, or tethering of the tendon on a bone spike. The second mechanism is chronic, when fibrosis and scar tissue develop at the fracture site between the FDP muscle belly and the ulna, and is secondary to injury of the muscle belly during the fracture. The extension lag in this case develops over a few weeks following fracture.

Treatment of acute entrapment should consist of remanipulation with extension of the fingers or open reduction and release of the muscle belly (Denney and Kay 1998). We suggest a close

follow-up of all forearm fractures, especially in the proximal third, even if the deformity is not present directly after the trauma. The follow-up should consist of weekly performance of passive stretch tests of the ring finger. If stiffness or pain appears, intensive physiotherapy is recommended with finger extension to prevent extension lag caused by the chronic mechanism. We treated 8 such cases who tested positive, and although a few might have resolved spontaneously, we believe that this simple test will prevent complications by detecting those at imminent risk.

No competing interests declared.

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