



## **Beware: compartment syndrome of the hand**

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Compartment syndrome of the forearm or leg, is a well-known postoperative complication. However, compartment syndrome of the hand is not common and is not easy to diagnose. Various aetiologies been reported<sup>1-3</sup>—and when diagnosis is missed, it results in ischaemic contractures and permanent disability.

The occurrence of compartment syndrome in the hand after radial osteotomy (or any other elective osteotomy of the forearm bones requiring fasciotomy) has not been described. This article presents a case of interosseous muscle compartment syndrome as a complication of this procedure and highlights difficulty in diagnosing such a problem.

### **Case report**

A 30-year-old gentleman presented with a malunited fracture of his left distal radius. He underwent corrective osteotomy of the distal radius, bone grafting, and Kirschner wire fixation. Two days after surgery he was complaining of worsening pain in his hand. As he could not fully straighten his fingers, his cast was changed and he was discharged from the hospital on oral analgesics.

The next day he presented to the emergency department of a different hospital with worsening pain in his left hand. On examination, there was gross swelling of the hand. Blisters were present on both the radial and ulnar borders at the level of the wrist. The wire sites were clean and there was no sign of infection at the operation site. He could not actively straighten without worsening of pain. The pain was most severe on trying to make a fist. Finger movements were limited with only 15° to 30° degrees at metacarpophalangeal and interphalangeal joints. Passive flexing his interphalangeal joints with metacarpophalangeal joint in extension caused severe pain. Forearm muscles were soft and non-tender. Sensation was intact in median, ulnar, and radial nerve distributions; and capillary return as well as radial and ulnar arterial pulses were normal.

Compartment syndrome of the hand was diagnosed, and the patient underwent fasciotomy. Through double dorsal incisions along second and fourth metacarpals, all four dorsal interosseous spaces (as well as three palmar spaces) were released. This was followed by a carpal tunnel, and thenar compartment release.

Upon fascial release, the interosseous muscles were found to be swollen, but there was no evidence of necrosis. A delayed closure of wounds was carried out. Postoperatively the patient did well. There was dramatic improvement in his symptoms. At last follow-up, patient regained full motor control and there was no deformity.

### **Discussion**

There are 10 compartments in the hand: the thenar, hypothenar, adductor, 3 palmar, and the 4 dorsal interosseous compartments.<sup>8</sup> It has been suggested that the muscles

situated on the radial side of the hand are more prone to compartment syndrome than those on the ulnar side (as they are supplied by more end-arteries).<sup>1</sup> Decompression should include fasciotomy of all compartments of the hand.

Compartment syndrome is caused by an increase in pressure within a closed compartment that increases to a level causing vascular perfusion to be compromised. This can be secondary to swelling or external compression.<sup>3,4</sup> When this ischaemia is unrecognised, it can greatly impair normal hand function.

A variety of causes of hand compartment syndrome have been reported such as fractures, suction injuries, crush injuries, metacarpal fractures, arterial injuries, and injection of intravenous fluids and contrast material.<sup>2-8</sup> Ouellette and Kelly<sup>2</sup> reviewed 19 patients with compartment syndrome of the hand and had had only 1 related to surgery following an arthrodesis of the wrist.

**Figure 1. Test for compartment syndrome of the forearm: extension of finger from flexed position**



Our case illustrates several important points. Compartment syndrome in the postoperative patient should always be in the differential diagnosis. Presence of hand sensation, a normal capillary return and ability to straighten fingers (diagnostic of compartment syndrome of the forearm; Figure 1), may all be normal in compartment syndrome of the hand. It is a diagnosis that requires a high index of clinical suspicion. The main symptoms are a tense swollen hand with severe pain that is out of proportion to the clinical situation.

The definitive test<sup>6</sup> for compartment syndrome of the hand is a positive stretch test for intrinsic muscles of the hand. This is carried out by flexing the interphalangeal joints of the fingers while the metacarpal joints are held in neutral (Figure 2).

**Figure 2. Test for compartment syndrome of the hand: flexion of interphalangeal joint with metacarpophalangeal joint in extension**



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**References:**

1. Halpern AA, Greene R and Nichols T. Compartment syndrome of the interosseus muscles. *Clin Orthop.* 1979;140,23.
2. Ouellette EA, Kelly R. Compartment syndromes of the hand. *J Bone Joint Surg.* 1996;78A:1515-22.
3. Spinner M, Aiache A, Silver L, Barsky AJ. Impending ischemic contracture of the hand. Early diagnosis and management. *Plast Reconstr. Surg.* 1972;50:341-9.
4. Lee D, Stiehl JB. Open tibial fractures with compartment syndrome. *Clin Orthop.* 1981;160:175-84.
5. Stein DA, Lee S, Raskin KB. Compartment syndrome of the hand caused by computed tomography contrast infiltration. *Orthopedics.* 2003;26:333-4.
6. Pai VS. Compartment syndrome of the hand. *Injury.* 1997;28:411-12.

7. Shin AY, Chambers H, Wilkins KE, Bucknell A. Suction injuries in children leading to compartment syndrome of the interosseous muscles of the hand: case reports. *J Hand Surg.* 1996;21A:675-8.
8. DiFelice A, Seiler III JG, Whitesides TE. The compartments of the hand: An anatomic study. *J Hand Surg.* 1998;23A:682-6.
9. Mubarak SJ, Carroll NC. Volkmann's contracture in children: etiology and prevention. *J Bone Joint Surg.* 1979;61(B):285-93.
10. Seiler JG III, Valadie AL III, Drvaric DM, et al. Perioperative compartment syndrome. A report of four cases. *J Bone Joint Surg Am.* 1996;78:600-2.