CASE REPORT

Floating Index Metacarpal Associated with Multiple Carpometacarpal Fracture-Dislocations: a Case Report

Saeed Reza Mehrpour¹ · Mohammadreza Kargar¹ · Alireza Mobasseri¹

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Abstract The floating metacarpal bone is a result of simultaneous fracture-dislocation of both carpometacarpal and metacarpophalangeal joints. This rare entity may be associated with other hand injuries. Here we present a floating index metacarpal with concomitant 3rd–5th carpometacarpal fracture-dislocations. Excellent functional short-term result was achieved after open metacarpophalangeal reduction and closed carpometacarpal reduction and percutaneous pinning.

Introduction

Metacarpal (MC) fracture-dislocations are among the most common hand injuries treated by orthopedic surgeons. These injuries are mostly a result of crush or falling [1, 2]. Synchronous metacarpal base and head fracture-dislocation would result in carpometacarpal (CMC) and metacarpophalangeal (MP) joint instability, known as the floating MC [3]. The entity has already been described in the thumb, the index, and the fifth MC [4–6]. However, to the best of our knowledge, association of a floating MC with other CMC joint fracture-dislocations is rarely reported.

We present a floating index MC with concurrent the 3rd, 4th and the 5th CMC joint fracture-dislocations.

Case Report

A 26 year-old right handed worker was admitted to the emergency department after falling from a 4 meter-height ladder. On arrival, he complained of pain, swelling and limited range of motion in the fingers of his left hand. Physical examination revealed tenderness and severe swelling on the dorsum of the hand with intact skin. Neuro-vascular examination was unremarkable.

Radiographic examination demonstrated dislocation of both CMC and MCP joints of 2nd finger. Fracture-dislocation of the 3rd–5th CMC joints was also revealed (Fig. 1). According to Lüninghake et al.[7] who classified CMC fracture-dislocations, type III (3rd CMC) and type II (4th & 5th CMCs) were recognized.

Initial treatment included analgesia, hand splinting and ice-packing. No attempt was made for close reduction in the emergency department. The patient was transferred to the OR at the same day.

At the time of surgery, for the 2nd metacarpophalangeal dislocation, a small incision was made on the dorsal aspect of the joint, gentle traction and flexion on the finger was maintained while levering a small Bennett for reduction. Reduction of all CMC joints was achieved by close manipulation of fractured fragments while inserting a 1.2 mm Kirschner wire from distal to proximal part of the MC. Stability and biplanar-anatomical positions were controlled under fluoroscopy. Following primary surgery, the hand was immobilized in neutral position by a dorsal splint for 1 week (Fig. 2).

Patient initiated hand rehabilitation including active ROM and nightly splinting 1 week post-intervention and continued

✉ Mohammadreza Kargar
dehloran2000@yahoo.com

Saeed Reza Mehrpour
mehrpour_saeed@yahoo.com

Alireza Mobasseri
dr.mobasseri@yahoo.com

¹ Shariati Hospital, Tehran University of Medical Sciences, No. 6, Jalal-Ale-Ahmad St., Tehran, Iran

Fig. 1 from left to right: PA, oblique, lateral radiographs and CT scan of the initial injury representing floating 2nd metacarpus and the 3rd–5th CMC joints fracture-dislocation

for the following 2 months. Control radiographs were obtained confirming bony union and stable metacarpal reposition every 2 weeks (Fig. 2).

Patient was pain-free on the subsequent visits. The K-wires were removed in outpatient clinic 6 weeks postoperatively. Sufficient anatomical reposition was documented in the follow-up radiographies. Full ROM of all fingers was achieved at 3 months post-injury without any rotational deformity.

Discussion

Floating MC is a rare entity mostly due to strong interosseous ligaments at the CMC and MCP joints. The index finger has the longest and the most stable metacarpus with very restricted motion at its CMC joint. This rigidity decreases from the index to the small finger. At the MCP joint, deep transverse ligaments and the volar plates add stability to this architecture [8, 9].

Hyperextension of the MCP joint with simultaneous CMC flexion while high-energy axial loading is the proposed mechanism of the floating MC. Both operative and non-operative

interventions have been suggested for the floating MC with good outcomes [5, 10]. In our case, the floating index finger at MCP joint was openly reduced while other CMC joints were treated by closed reduction and percutaneous pinning. This approach was associated with an excellent short-term functional outcome.

Conflict of Interest None.

Compliance with Ethical Standards A written consent form was obtained from the patient before publishing the results. Our Institutional Research Ethics Board approved the ethical considerations of the report.

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Fig. 2 left: ORIF of the index finger. Middle: Early post-operative radiographies. Right: 3 months post-injury radiographies

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