Dislocation of the Carpometacarpal Joint of the Thumb Associated with Trapezium and Bennett's Fractures

A. El Ibrahimi · F. Amar · B. Chbani · A. Daoudi ·
A. Elmrini · F. Boutayeb

Received: 23 July 2008 / Accepted: 22 December 2008 / Published online: 21 January 2009
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Abstract We report a case of a 30-year-old man with a carpometacarpal joint dislocation of the thumb associated with trapezium and Bennett's fractures. This combined injury pattern appears to be very rare. Since, to our knowledge a similar case was not found in the literature. The lesion was managed with closed reduction and percutaneous pinning, resulting in good functional outcome.

Keywords Carpometacarpal joint dislocation · The thumb · Trapezium fracture · Bennett's fracture

Introduction

Dislocation of the carpometacarpal (CMC) joint is a rare injury in the thumb. Therefore, any associated lesion with dislocation of the CMC joint in the thumb is very rare and, thus, worth to be reported. We report a case of a dislocation of the CMC joint of the thumb associated with trapezium and Bennett's fractures. This combined injury pattern appears to be very rare; since, to our knowledge, a similar case was not found in the literature. We try to explain the anatomopathology of this complex trauma which allowed us to prove our therapeutic attitude.

Case Report

A 30-year-old man, who was hurt in a road accident, presented with pain, tenderness, and swelling of the base of his right thumb. X-ray showed a dorsal dislocation of the CMC joint of his right thumb combined with trapezium and Bennett's fractures (Fig. 1). Using axillary nerve block, closed reduction of the CMC joint dislocation was done. A repeated X-ray showed a perfect reduction of the CMC joint, the trapezium, and the metacarpal base fractures, without any incongruity in the joint. The reduction was maintained by percutaneous pinning through the metacarpal base of the thumb and trapezium (Fig. 2). The thumb was immobilized with cast.

After 6 weeks, the cast and the pin were removed. Then, the motion of the thumb CMC joint was started. At the 8-month follow-up, clinical examination showed an unrestricted, painless range of motion of the thumb: palmar abduction 75°, radial abduction 55°, complete and symmetrical opposition and retropulsion. Grip strength was 38 kg against 40 kg on the uninjured right side; the pinch power was 8 kg on both sides. An excellent radiological (Fig. 3) and functional result was noted with the patient performing normally at his job, having no limitation of his activities of daily living, and reporting no pain or instability symptoms.

Discussion

Fractures of the trapezium are usually associated with other hand or wrist injuries. They are rare, representing about 3% of all carpal bone fractures [6]. The trapezium is probably injured by compression between the radial styloid process and the thumb metacarpal base. A trapezium fracture can be

A. El Ibrahimi · F. Amar · B. Chbani · A. Daoudi · A. Elmrini ·
F. Boutayeb
Department of Orthopedic Surgery, University Hospital of Fez,
Fez, Morocco

A. El Ibrahimi (✉)
Al Ghassani Hospital, University Hospital Hassan II of Fez,
Fez 30000, Morocco
e-mail: halimibrahimi@yahoo.fr

Figure 1 X-ray of the right wrist joint illustrating the dislocation of the CMC joint of the thumb associated with trapezium and Bennett's fractures.

missed on plain radiographs. Occult injuries of this bone can be identified using special wrist views and computed tomography (CT) scan [9]. A true anteroposterior radiograph taken with the hand in full pronation is excellent for outlining the trapezium and the metacarpal base.

Dislocation of the trapeziometacarpal joint, in association with a fracture of the trapezium, is rare. The first who had described this injury was Brunelli in 1989 [4]. Vertical

fractures typically result from a cleavage through the midsagittal axis accompanied by proximal radial subluxation of the dorsal fragment with attached metacarpal and exacerbated by the pull of the abductor pollicis longus tendon.

In our case, we have a dislocation of the trapeziometacarpal joint, in association with a fracture of the trapezium and Bennett's fractures. This combined injury pattern

Figure 2 Postoperative radiographs showing the fixation of fractures and the good restoration of the articular surface.

Figure 3 An anteroposterior view of the trapezium and the CMC joint at 8 weeks.

appears to be very rare; since, to our knowledge, a similar case was not found in the literature.

About anatomopathology, there are four ligaments that stabilize the thumb CMC joint. These include the intermetacarpal ligament, the anterior oblique ligament, the dorsoradial ligament, and the posterior oblique ligament. Eaton and Littler believed that the anterior oblique ligament was the key structure in stabilizing the joint [2]. Strauch found that the dorsoradial ligament is the main restraint to dorsal dislocation of the joint [9].

If all ligaments are disrupted, the joint will be completely unstable and early open ligament reconstruction is recommended. If ligament reconstruction is undertaken, the function of the dorsoradial ligament and the anterior oblique ligament should be restored [7–9].

There are evidences that, in dislocation of the CMC joint of the thumb, after rupture of the dorsoradial ligament, the anterior oblique ligament, though intact, is stripped subperiosteally. Extension and pronation of the thumb tightens the stripped anterior oblique ligament [2, 9, 10].

In our patient, instead of the ligament rupture, a part of the trapezium attached to the dorsoradial ligament was fractured, and with association of the stripped anterior oblique ligament, caused dislocation of the thumb CMC joint and a partial fracture of the metacarpal base. After reduction, the stripped anterior oblique ligament was brought to its position. The dorsal capsular ligament might have been intact, presumably explaining why the trapezio-metacarpal joint was stable after just bone fixation.

Therefore, if the dorsolateral ligament heals in an appropriate position, the thumb CMC joint becomes stable. We agree with Afshar [1] that this experience is in agreement with the findings of Strauch who assert that the dorsoradial ligament is the main restraint to dorsal dislocation of the thumb CMC joint. Ligament reconstruction has been recommended following isolated dislocation in order to prevent or decrease the progression of the degenerative process [4, 5].

Fixation with Kirschner wires, compression screws, may be required in these unstable, displaced fractures. Reconstruction of the intermetacarpal and capsular structures, such as an intermetacarpal abductor pollicis longus ligamentoplasty, as described by Brunelli [6], may be required, especially in isolated dislocations. This may not be necessary in fracture–luxations where the metacarpal base and dorsal trapezial fragment remain connected by the dorsal capsule. A temporary additional stabilizing Kirschner wire will ensure intermetacarpal orientation and relationship.

Afshar [1] report a case with CMC joint dislocation of the thumb and fracture of the trapezium. The lesion was managed with closed reduction and percutaneous insertion

of pin, resulting in good functional outcome. Garavaglia [3] also report a case of CMC dislocation associated with an isolated horizontal fracture of the trapezium. A stable osteosynthesis was achieved by internal screw fixation, and at follow-up, there was an unrestricted, painless range of motion of the thumb. However, in these cases, no Bennett's fracture has been noted; this is the particularity of our case.

Conclusion

Combined dislocation of the CMC joint of the thumb with trapezium and Bennett's fractures are rare. Oblique X-rays and, occasionally, CT scan are required for an accurate diagnosis. If these injuries are not accurately diagnosed and treated, they may cause pain and limitation of motion. Ligamentar and capsular reconstruction may not be necessary in fracture–luxations of the CMC joint where the metacarpal base and dorsal trapezial fragment remain connected by the dorsal capsule. A percutaneous stabilization by pins or screws compression will ensure a good outcome.

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