

Volar radial Carpometacarpal dislocation of the fourth and fifth fingers

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Abstract

carpometacarpal ligaments converge at the base of the metacarpal. Only very violent trauma can cause carpometacarpal dislocation.

We report the case of a 23-year-old patient admitted for volar dislocation of the 4th and 5th finger with radial displacement. We did proceed to a closed reduction maintained by a splint the evolution was satisfactory with the recuperation of grip force.

The mechanism of the injury can be direct or indirect. The displacement can suggest is there or not a complete rupture of the carpometacarpal ligaments.

After closed reduction, the treatment can be surgical (which is preferred) with k-wire fixation or nonsurgical with splint immobilization with a close follow-up to avoid the loss of the reduction.

Keywords: Carpometacarpal; Dislocation; Indirect Mechanism; Volar; Closed Reduction.

1. Introduction

Carpometacarpal joint injuries have an overall frequency of 1-2% among trauma of the wrist and the carpus [1]. Carpometacarpal joints are particularly stable, as the intermetacarpal, carpo-metacarpal and carpo-metacarpal ligaments converge at the base of the metacarpal. Only very violent trauma can cause carpo-metacarpal dislocation [2].

Among these kinds of injuries, the volar dislocation of the metacarpals is much less frequent than the dorsal dislocation [1]. Those of the fourth and fifth metacarpals are more frequent than those of the second and third metacarpals due to the higher range of mobility of the former. The coexistence of a distal carpal row fracture is quite frequent [1]

Up to 70% of carpometacarpal dislocations are missed or misdiagnosed [3]. Failure to diagnose these injuries or inability to maintain an anatomic reduction results in painful hands with reduced grip strength [3].

2. Case presentation

We report the case of a 23-year-old patient with right-handed laterality who was a victim of a motorcycle accident. The patient presented functional impotence of swelling in the left hand and a tumefied limb with scratches on the dorsal

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side of the little finger and the dorsal skin opposing the head of the fourth and fifth metacarpals without any vascular or nervous complications. (Fig. 1)



Figure 1 The clinical aspect of the left hand: swelling/scratches with an aspect of a spide

The X-ray images showed in the AP view an ulnar dislocation of the two bases of the fourth and fifth metacarpals, the existence of a fracture avulsion of the P4-M5 ligament from its attachment on the base of M5 (Fig. 2) in the lateral view, and we objectified an anterior dislocation of the two metacarpals without any fracture of the articular surface. The diagnosis was a volar radial dislocation of the two metacarpals M4 and M5 with fracture avulsion of the inserting site of the P4-M5 ligament.



Figure 2 The X-ray images of the patient with volar radial carpalometacarpal dislocation of M4 and M5

Under anaesthesia, we proceeded to closed reduction, which was judged stable, and the limb was immobilized by a blown elbow splint. Control X-rays objectified a good reduction (Fig. 3). The splint was maintained six weeks after reeducation was started.



Figure 3 Control X-ray images after reduction and immobilization

3. Discussion

Carpometacarpal dislocations are generally dorsal associated with fractures and typically affect young adults following a motorbike accident, causing violent impact of the metacarpals on the handlebars [2].

Isolated CMC dislocations are infrequent and mostly regard the fourth and fifth metacarpals. The majority of them, approximately 70%, are dorsal [6]. Normally, combined fourth and fifth CMC joint dislocations are identified in X-rays due to loss of parallelism, asymmetry, and bone overlapping [4]

A distinction is made between the direct mechanism, where the force is applied on the base of the metacarpals, resulting in dorsal or palmar dorsal or palmar dislocation, depending on the direction of the vector, and the indirect mechanism, when the force is applied opposite the metacarpal head of the metacarpal, causing dislocation of its base [2].

The fifth digit is involved in up to 80% of cases. Occult dislocations of the fifth CMC resulting from fourth metacarpal fractures or hamate fractures occur more commonly than isolated fifth CMC dislocations. Stability at the CMC joints is provided by a system of 4 ligaments, involving a high degree of anatomic variation among dorsal, multiple palmar, and 2 sets of interosseous ligaments. The index and long finger CMC joints are very rigid, allowing only 1 to 3 degrees of motion, while the CMC joints have looser ligamentous attachments that allow for greater mobility [5]

Nalebuff reported two types of volar CMC joint dislocations of the fifth finger: volar radial or volar ulnar, according to the pattern of ligamentous injury (Fig.). The pisometacarpal, carpometacarpal (volar fifth metacarpal hook of the hamate ligament), and metacarpal interosseous ligaments (volar fourth metacarpal ulnar base–fifth metacarpal radial base ligament) are attached to the base of the fifth finger. Volar radial dislocation is accompanied by rupture of all three ligaments, whereas volar ulnar dislocation is accompanied by rupture of the CMC and metacarpal interosseous ligaments, leaving the pisometacarpal ligament intact [6].

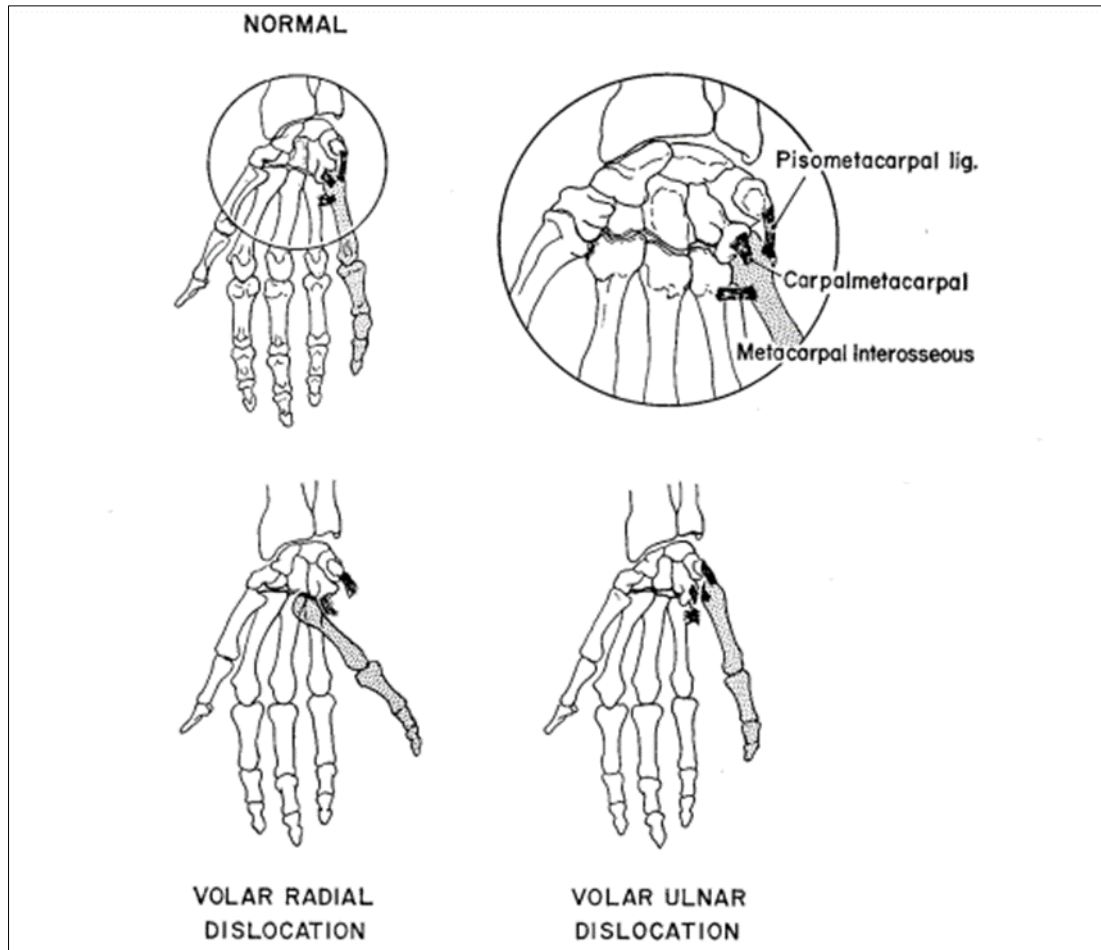


Figure 4 The two variants of dislocation of the fifth metacarpal after NALEBUFF [7]

In the acute state, the hand will often appear grossly swollen. The classic description of this injury came from Waugh and Yancy. They described the deformity of volar CMC dislocations as a “spade” type of deformity [8]

Radiographic evaluation is a crucial step in diagnosing CMC dislocation. Standard anteroposterior, lateral, and oblique views are a basic necessity. Dorsal or volar displacement may be visible on the lateral projection, but displacement is often obscured by the superimposition of the central metacarpals. Further evaluation of the fourth and fifth CMC joints can be performed using special radiographic views. Bora and Didizian described a view with the forearm pronated 30° from the routine AP projection or supinated 60° from the routine lateral projection to better study the fifth CMC joint. [8] When in doubt, further examination with CT would be definitive [4].

There have been sporadic case reports of volar CMC dislocations in the literature. There are reports of treating these rare injuries with closed reduction and casting open reduction, and internal fixation is usually needed to stabilize the injury. Failure to diagnose these injuries or inability to maintain an anatomic reduction will predispose the patient to pain as well as grip weakness [8].

Surgical approaches to CMC dislocations include open reduction and internal fixation or closed reduction and percutaneous pinning. Nonsurgical methods such as closed reduction and conservative management with splint immobilization may be preferred if the patient has no concomitant lesions or has contraindications to surgery. Previous cases in the literature have reported excellent outcomes after 6 weeks of splint immobilization [5].

The most critical point for successful conservative treatment of CMC joint dislocations is the early and precise diagnosis along with an anatomic and stable closed reduction. Due to the risk of secondary dislocations, especially within the first two weeks from injury, serial X-rays and close follow-ups should always be performed to avoid loss of reduction. In such incidents, surgical treatment would be inevitable [9].

For our patient, the mechanism of the lesion was indirect with a loading applied in the first phalange of the fifth finger, which was flexed (handlebar position). Two of the 3 ligaments were torn the piso-metacarpal, which caused a fracture avulsion and the carpometacarpal due to the displacement of the fifth metacarpal. The best option after the review of the literature was to treat the patient surgically to maintain the best reduction.

4. Conclusion

Volar carpometacarpal dislocation of the fourth and fifth fingers is less frequent than that of the dorsal variety, and frontal displacement to the ulnar can suggest the integrity or absence of ligaments stabilizing the metacarpal. After closed reduction, the treatment can be surgical with k-wire fixation or nonsurgical with splint immobilization with a close follow-up to avoid the loss of the reduction.

Compliance with ethical standards

Statement of ethical approval

The present research work does not contain any studies performed on animals/humans subjects by any of the authors.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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