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Fracture of the Hamate with Interposition of the Base of 5th Metacarpal, a Frequently Missed Injury

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Abstract

We report a case of hamate fracture in the coronal plane with interposition of the base of 5th metacarpal bone. This injury is frequently missed and may results in increasing rate of morbidity and mal-union. In this article, the approach to this type of injuries, the diagnostic modalities, and the management will be discussed with review of the literature.

Keywords: Hamate Bone; Fracture-Dislocation; Missed Injury

List of Abbreviations: Three Dimensional Computed Tomography: 3D CT Scan

Introduction

Hamate fracture represents a small percentage of all carpal bone fractures [1], it is rare to the point that the incidence of its subtypes was not established. Hamate fractures with dislocation of fifth metacarpal are frequently missed by conventional x-rays, they need special views to be diagnosed, and the fracture architecture is best seen on three dimensional computed tomography (3D CT scan) [2]. Missing such fracture leads to osteoarthritis and functional impairment [3].

Case Report

We present a case of a 29 year old right hand dominant male that presented to an out-patient orthopedic clinic with painful swelling of the dorsum of the right hand. X-rays were done 3 days ago in another institution and were reported as normal. Physical exam revealed swelling and a bony lump that was palpated on the dorsum of the hand at the carpo-metacarpal joint of the little finger. Shortening of the little finger was present. The diagnosis of right hamate fracture with proximal migration of fifth metacarpal bone was done after plain x-rays (Figure 1). CT scan was then requested and showed a coronal fracture of the Hamate with interposition of the base of the fifth metacarpal bone between the two fracture fragments (Figure 2).

Figure 1: Fracture of hamate (white arrow), with proximal migration of fifth metacarpal bone

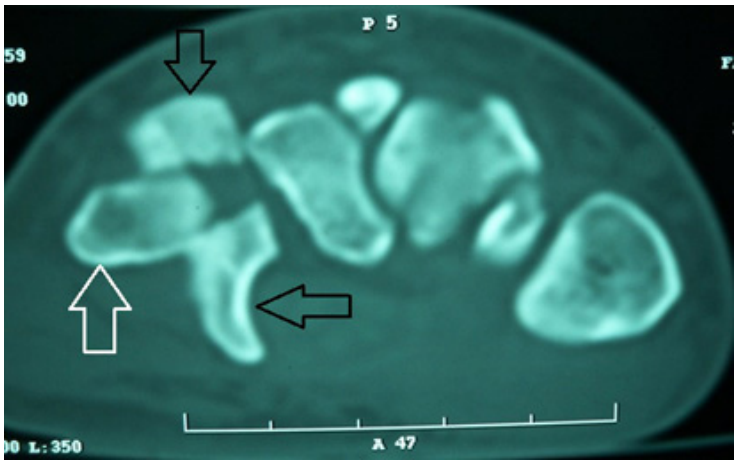

Figure 2: CT scan of the hand (axial cut) showing a hamate fracture in coronal plane (black arrows) with interposition of base of fifth metacarpal bone (white arrow)

The fracture was exposed through a dorsal incision. There was interposition of the base of fifth metacarpal between the two hamate fragments. Traction was applied on the little finger, and then the hamate fragments were reduced and fixed with two cannulated Herbert screws (Figure 3). A below elbow splint was applied for 4 weeks. After removal of splint the patient had stable fifth carpo-metacarpal joint, with good painless range of motion and a normal grip power in comparison to the other side.

Figure 3: Intraoperative fluoroscopy images showing the reduced fracture with two cannulated Herbert screws (white arrow)

Discussion

Fractures of the body of Hamate occur mostly in the young and active persons following punch injuries [4]. Hamate fractures are relatively rare representing 2-4% of carpal fractures [1]. Coronal fractures of the hamate represent a small subset of this fracture group. Fracture of the hamate combined with dislocation of the fourth and fifth metacarpals is a rare injury that is usually missed initially due to lack of familiarity with the injury and proper X-rays [5]. Milch (1934) originally identified two types of hamate fractures which passed either side of the hamulus or through the hamulus itself. The less common coronal fracture pattern and its relation to underlying carpo-metacarpal disruption were not included in this original classification [6]. Then a new classification adding the coronal type of fracture was done by cain *et al.* (1987) who reviewed 17 patients hamato-metacarpal fracture–dislocations [7].

Type I lesions include fractures to the metacarpals (type I,a) and the hamate (type I,b), associated with subluxation or dislocation of the fourth or fifth metacarpal. In case of comminution, injury is classified as type II, and type III injuries include coronal splitting of the Hamate.

The Hamate bone gives stability to the fourth and fifth metacarpals and any alteration of its geometry may result in arthritis and functional impairment [3,8]. Although Nisenfield and Neviaser described Hamate fracture as being stable because of bone interlocking and the strong intercarpal ligaments [5], but this fracture pattern "type III" is inherently unstable because of the action of the long flexor and extensor tendons [9]. Injury to the ulnar nerve, the most serious complication of hamate injuries, was not

noted in our patient. Ulnar nerve palsy has been associated with this type of fracture and also with isolated dorsal dislocations of the bases of the fourth and the fifth metacarpals without hamate fracture. Ulnar nerve palsy can result from contusion of the nerve or pressure caused by hemorrhage and edema. Surgical evacuation has been recommended in severe cases to prevent ischemic necrosis of the nerve [10].

Plain x-rays with pronated view together with carpal tunnel or "skyline" view are helpful in diagnosing these fractures [11], however, the literature shows that only 60% of carpal bone injuries can be diagnosed with plain X-rays regardless of the views taken [2]; so computerized tomography are needed to define the nature of this injury and to help in planning management. Lutter *et al*. reported 12 climbers with hamate hook fractures most of them are type I injury. They were diagnosed with CT scan in cases of unclear radiograph. Conservative treatment with immobilization resulted in reduced pain and restored strength in 9 of the 12 patients however 3 patients had nonunion and needed surgical resection of the hamate hook. All athletes were free of symptoms after within 12 weeks and regained their pre-injury climbing level [12]. However coronal hamate fractures (type III injury) and with carpo-metacarpal disruption are successfully treated with open reduction and internal fixation with compression screws.

Conclusion

In conclusion, as these fractures are rare and frequently missed, history and clinical evaluation are important in the diagnosis. CT scan should be done whenever there is a fracture of the base of 4th and 5th metacarpals with concomitant shortening of the 4th and 5th rays, or if the clinical finding are disproportionate to the radiological findings. And finally, management is best done by open reduction internal fixation with compression screws.

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