

Open reduction and fixation of trapezium fracture

Abstract

Trapezium fractures are very rare and can lead to significant deficit of hand function if missed. The purpose of this article is to document and discuss the surgical treatment performed to a 34-year-old man who sustained a closed isolated vertical split fracture of the trapezium on his left non-dominant hand.

The patient was treated at our Orthopaedic Surgery Department. We performed an open reduction (by a dorsal approach) and internal fixation with a headless compression screw. At the last follow-up 6 months post-op, the functional outcome was excellent. The patient had no complains, complete wrist and thumb range of motion and hand grip and pinch strength comparable to the contralateral limb. The Disabilities of the Arm, Shoulder and Hand (DASH) score was 7.5.

The technique applied ensured a stable and anatomic restoration of the articular joint surface. We decided to discard post-surgical plaster immobilization, which enabled earlier rehabilitation. Furthermore, we believe that the re-establishment of the articular surface will minimize the long-term degenerative changes at the trapeziometacarpal (TMC) joint.

Keywords: Trapezium, Hand Trauma, Carpal Fractures, Trazeziometacarpal joint, ORIF, Thumb

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Abbreviations

ORIF, Open Reduction and Internal Fixation; TMC, Trapeziometacarpal; DASH, Disabilities of the Arm, Shoulder and Hand; CT, Computed Tomography; MRI, Magnetic Resonance Imaging

Introduction

Fractures of trapezium are very rare accounting for about 0.4% of the hand's injuries.¹ However, they should not be missed because inadequate treatment of trapezium fractures can lead to permanent impairment based on the substantial forces experienced at the trapeziometacarpal (TMC) joint in pinch and grip.² When present, often result of high energy trauma and occur in association with other injuries, most commonly fracture of the first (thumb) metacarpal followed by other carpal bone injuries and the distal radius.³ In a trans-trapezium fracture-dislocation the body of the trapezium is usually split vertically.⁴ Several methods have been described in the literature for treatment of this rare fracture, from conservative treatment in plaster to open reduction and internal fixation (ORIF).⁵ In this article, we report an isolated vertical split trapezium fracture following a fall onto an extended left thumb. It was performed an ORIF with a screw, which resulted in an excellent functional outcome at 6 months follow-up.

Case presentation

A 34-year-old right-handed man presented to the emergency department with pain in the left hand after a fall on his extended left thumb. On clinical examination, his left thumb was swollen and he had tenderness over the trapezium and base of first metacarpal with no tenderness in the anatomical snuff box. Movement of the thumb was limited secondary to pain and the neuro-vascular status intact distally. A plain radiograph of his left hand revealed a vertical split trapezium fracture (Figure 1). Computed tomography (CT) scan confirmed the trans-trapezium fracture and showed the significant articular displacement of the TMC joint surface (Figure 2).



Figure 1 Plain radiograph at presentation, showing a vertical split trapezium fracture.

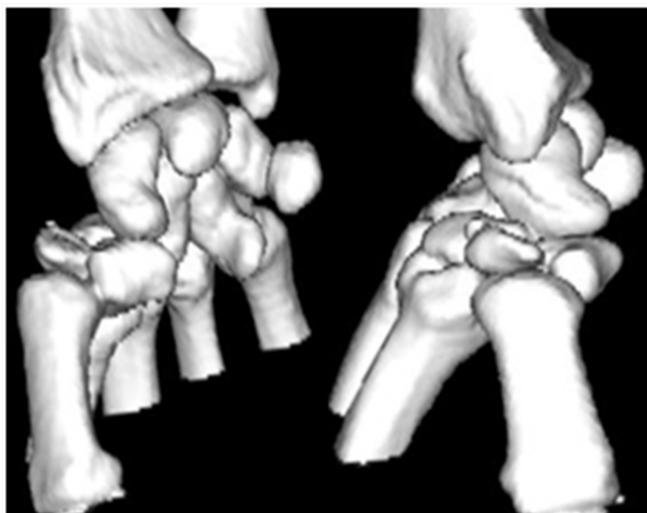


Figure 2 CT scan, confirming the trans-trapezium fracture and significant articular displacement of the TMC joint surface.

The patient was listed for surgical treatment at our Orthopaedic Surgery Department, which occurred 5 days after the injury. He underwent surgery under general anesthesia. It was performed an open reduction of the fracture (by a dorsal approach) establishing anatomic restoration of the articular margin. The fixation was accomplished with a headless compression screw (2.5 x 14 mm) (Figure 3). The osteosynthesis was stable intraoperatively and it was decided to discard post-surgical plaster immobilization.

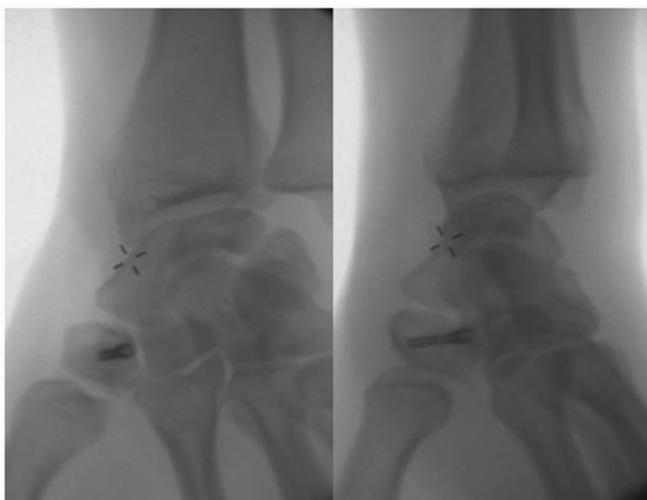


Figure 3 Intraoperative fluoroscopy, demonstrating the anatomic reduction and the compression achieved by the screw fixation.

At 2 weeks post-op, the surgical wound was healed and physiotherapy commenced. At 4 weeks follow-up, he had little residual pain and slight reduced movement amplitude of the wrist and thumb. At 2 months post-op, he did not have any pain or range of motion restriction on his left hand and the fracture was healed. At the last follow-up 6 months post-op, he had no complains or impairments of his daily living activities and exhibited complete range of motion (Figure 4). Hand grip and pinch strength was similar to the contralateral limb. The Disabilities of the Arm, Shoulder and Hand (DASH) score was 7.5. The standard radiographs showed no degenerative changes at the TMC joint (Figure 5).



Figure 4 At 6 months follow-up the range of motion of the left thumb was identical to the contralateral limb.



Figure 5 The standard radiographs at 6 months post-op showed no degenerative changes at the TMC joint.

Discussion

The two major types of trapezium injuries are body fractures and volar ridge avulsion fractures. Body fractures are most common and classically occur from axial loading or hyperextension of an adducted thumb and are typically vertical or comminuted.⁶ These fractures are intraarticular at the first carpometacarpal joint and may be associated with fractures at the first metacarpal base such as a Bennett's fracture and other carpal or distal radius fractures [3]. Ridge fractures are rare and represent an avulsion of the flexor retinaculum. They result from falling onto an outstretched hand or sustaining a direct blow.⁷ Walker and colleagues⁸ presented a classification based on the anatomic appearance of the fracture, which had no relationship to either treatment or prognosis.

The clinical presentation can be quite variable depending on the displacement of the fracture and the involvement of the carpometacarpal joint.⁹ Some patients refer minor pain at the base of the thumb without any significant swelling or deformity; whereas others as in this case report have swelling and severe restriction of movement.

Imaging for this injury includes standard radiographs of the wrist. Suspected fractures and/or dislocations of the thumb may require special radiographic views such as the Bett, Robert's and carpal tunnel views. However, the sensibility of conventional plain radiographs is poor, varying from 18 to 67%.^{10,11} Thus, if the

diagnosis is still in question CT or magnetic resonance imaging (MRI) study is recommended. CT is highly accurate for identifying fracture and/or dislocation. MRI has additional value in detecting both acute and chronic bony and soft tissue injuries such as ligament ruptures, especially in cases with associated dislocation. The rupture of the adjacent ligaments and the dorsal joint capsule may result in instability that could require repair especially in isolated dislocations, as described by Brunelli et al.¹²

Treatment of trapezium fractures includes several management options. Nonoperative treatment consists of immobilization for 4 to 6 weeks.¹³⁻¹⁵ The results of the conservative treatment with a plaster cast for most non-displaced trapezium fractures diverge, from successful,¹⁶ to dismal.¹⁷ Although a universal protocol for the treatment of this injury is lacking, it is commonly accepted that intraarticular fractures require accurate reduction and restoration of the articular surface. This is supported by two series,^{3,10} which emphasized the need for accurate reduction of the articular surface with displacement > 2mm.

Regarding those vertically displaced intraarticular fractures, as in this case, most of the literature recommends ORIF. Corey and Ferrer-Torrells,¹⁸ were the first to recommend this and they used Kirschner wire-fixation for a series of 5 patients. Foster and Hastings,¹⁹ recommended either this or closed reduction and pinning. Walker et al.⁶ recommended ORIF for all displaced fractures. Inston et al.²⁰ described the use of a Herbert screw which gave dynamic compression of the fragments reporting very good success. Recently, arthroscopic assisted fixation of this injury was reported.

In this case report, the patient sustained a trans-trapezium fracture that was successfully treated. It was performed an ORIF with a compression screw, which resulted in an excellent functional outcome at 6 months follow-up. The technique applied ensured stable and anatomic restoration of the articular joint surface. Post-surgical plaster immobilization was discarded, which enabled earlier rehabilitation.

Although studies to compare the outcome of Kirschner wire-fixation (percutaneous or open) to screw fixation are lacking in the literature, we believe that the technique performed in this case will minimize the long-term degenerative changes at the TMC joint.

Acknowledgements

None.

Conflicts of Interest

The authors declare that there are no conflicts of interest regarding the publication of this article.

Patient consent form

The patient gave his consent for the information and material relating to the subject matter above to appear in publications in the media worldwide and any derivative works or products.

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