Hand Tips and Tricks: Treatment of a Volar Coronal Shear Lunate Fracture with Midcarpal Instability

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Introduction

Traumatic fractures of the lunate are rare, with an incidence ranging from 0.5% to 6.5% of all carpal bone fractures.[1,2] Different mechanisms have been described, including impaction fractures into the radial fossa as a result of wrist hyperextension with ulnar deviation, or an axial load that drives the capitate into the lunate.[1,3] Fractures may also be associated with instability of the radiocarpal or midcarpal joint. Left untreated, these fractures may lead to degenerative changes or avascular necrosis of the lunate. Displaced fractures should be treated with ORIF,[4] whereas extra-articular non-displaced fractures may be treated conservatively.[1]

We report the case of a 44 year old female who sustained a coronal volar shear lunate fracture associated with midcarpal instability following an assault.

Case Report

History and presentation

A 44 year old right hand dominant female presented to the emergency department (ED) with a closed left coronal volar shear lunate fracture with volar dislocation of the distal carpal row and median nerve paresthesias after being assaulted (Figure 1). The patient underwent closed reduction of the dislocated distal carpal row in the ED. Median nerve paresthesias resolved after the reduction maneuver. In addition to x-rays, a post-reduction computed tomography (CT) scan was obtained for preoperative planning for fixation of the lunate fracture (Figure 2). The patient was scheduled for surgical fixation as an outpatient.

Operative Course

The patient underwent surgical treatment five days after her initial injury. A volar approach to the lunate through the carpal tunnel was used to decompress the median nerve and access the lunate volar shear fracture fragment. The volar lunate fragment had an intact capsular attachment that was anatomically reduced and provisionally fixed with a Kirschner wire. A cannulated 2.4 mm headless screw definitively fixed the fracture with absolute stability (Figure 3). A dorsal spanning bridge plate from the radius to the third metacarpal provided supplemental fixation to offload the lunate and maintain the reduction of the midcarpal joint (Figure 4). The wounds were then irrigated and closed with nylon sutures and a volar splint was applied for comfort.

Postoperative course

One week post operatively, fluoroscopic imaging demonstrated maintenance of the anatomic reduction and stable fixation. Two weeks post operatively, the patient's wounds were well healed and sutures were removed. The patient was transitioned to a short arm cast. Seven weeks post operatively, the patient underwent removal of her dorsal plate. Examination under anesthesia at that time did not reveal carpal instability (Figure 5). Thirteen weeks after the initial fixation, radiographs demonstrated

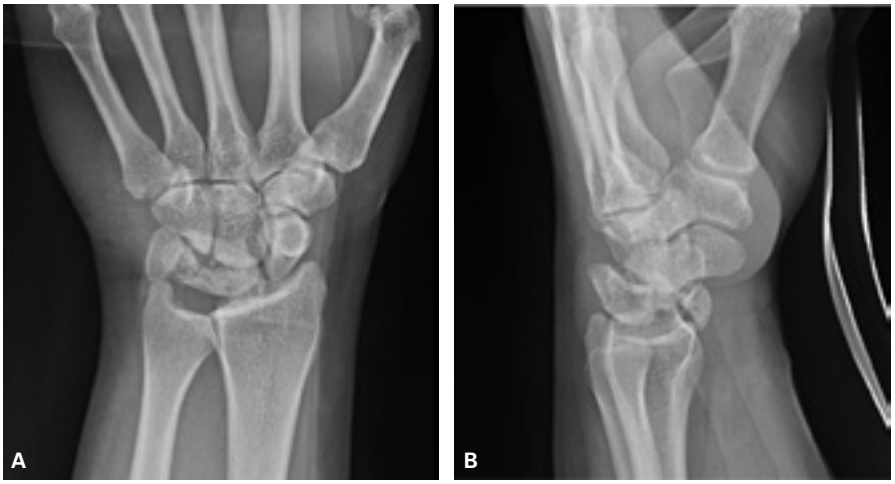

Figure 1. X-rays of the initial injury. **(A)** PA and **(B)** lateral views of the left wrist.

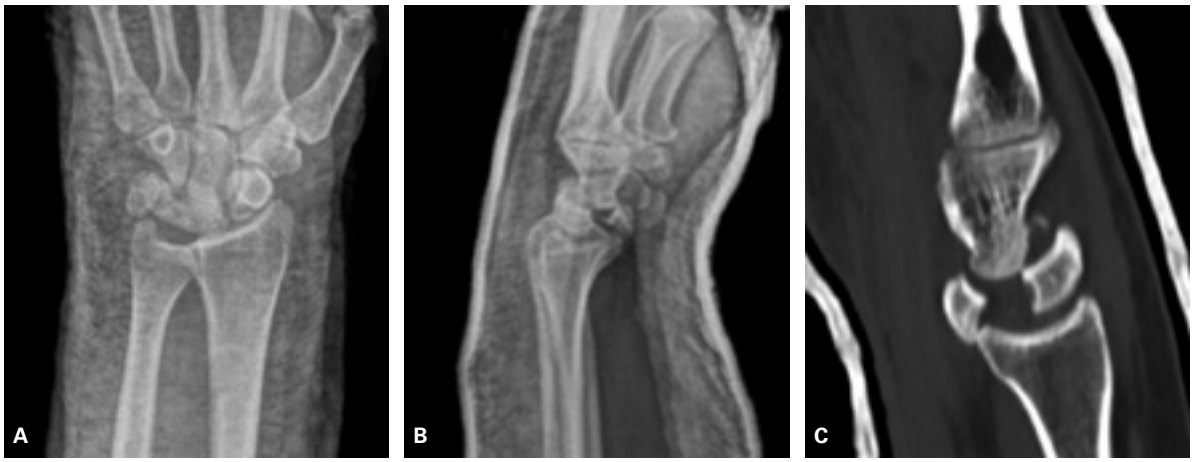

Figure 2. Images obtained following closed reduction and splinting. **(A)** PA and **(B)** lateral views of the left wrist. **(C)** Sagittal cut from CT scan.

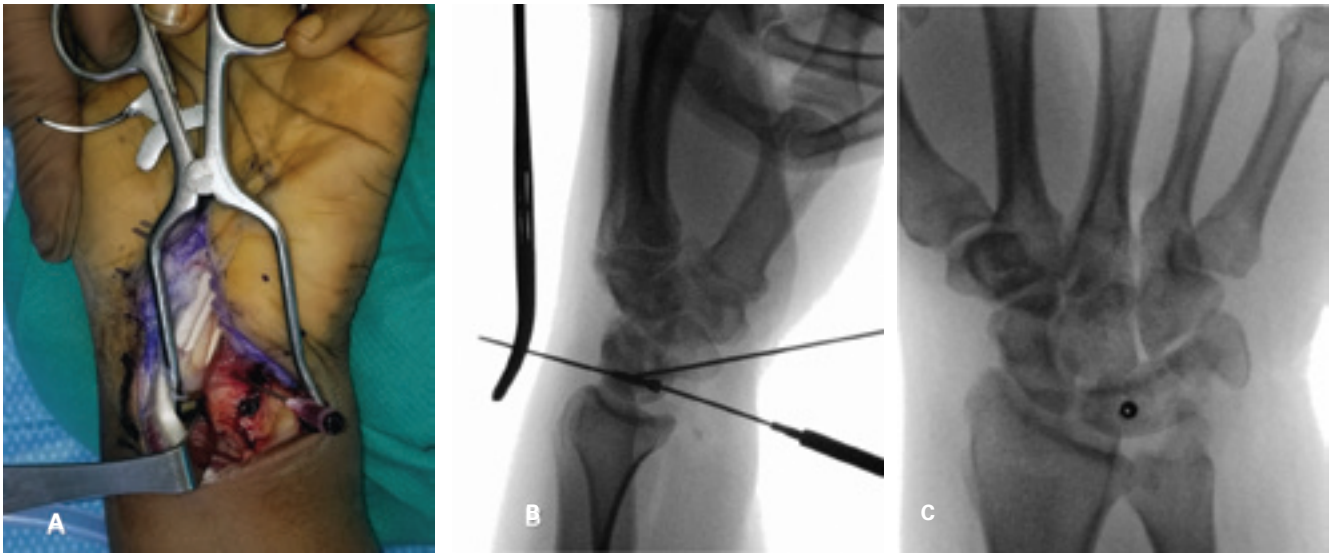

Figure 3. Intra-operative images demonstrating the approach. **(A)** Volar approach via the carpal tunnel. An 18G needle was used to localize the volar fracture fragment **(B)** Intraoperative fluoroscopy demonstrating cannulated screw applied volarly over a Kirschner wire. **(C)** AP view showing fracture reduction with the cannulated screw.

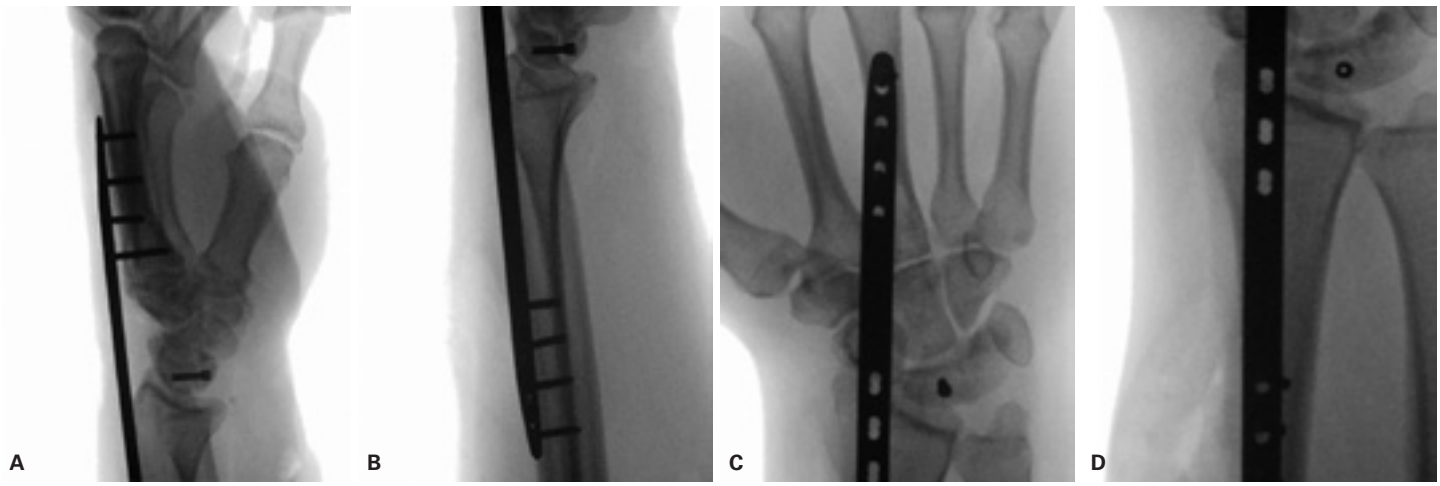

Figure 4. Fluoroscopic images obtained after fixation with a cannulated screw and dorsal spanning bridge plate. **(A)** Distal and **(B)** proximal lateral views. **(C)** Distal and **(D)** proximal AP views.

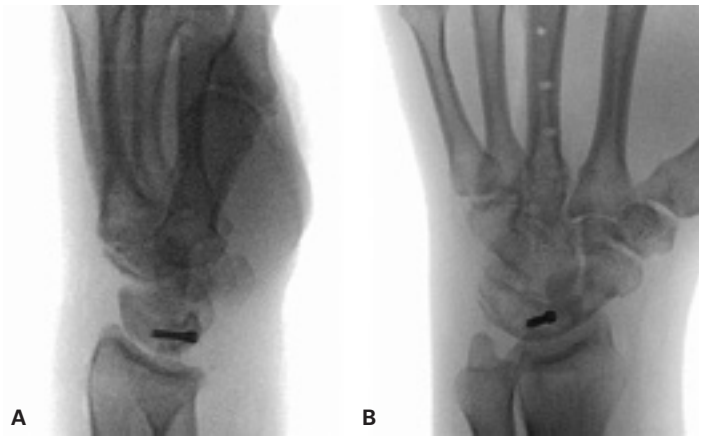

Figure 5. Fluoroscopic image obtained intraoperatively after removal of the dorsal bridge plate seven weeks after the initial fixation. **(A)** Lateral and **(B)** oblique views of the left wrist.

maintenance of the reduction with stable fixation and no signs of lunate avascular necrosis.

Discussion

We report a case of a traumatic lunate fracture with a volar shear fragment and midcarpal instability. In this patient, a volar approach through the carpal tunnel was performed and stable fixation was achieved with a cannulated headless screw and supplemental dorsal bridge plate. In a case report of an isolated lunate fracture without ligamentous injury, open reduction and internal fixation with microscrews via the same approach resulted in satisfactory fixation at follow-up.[5] Open reduction and internal fixation of the lunate has also shown no evidence of malunion in a series of patients with Kienbock disease with an average follow-up time of seven years.[6]

Conclusions

Lunate fractures are uncommon, complex injuries that are difficult to treat. They may be treated with an anatomic open reduction and internal fixation with good results.

References

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