

Posttraumatic Static Volar Intercalated Segment Instability - Iatrogenic or Missed Injury

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What to Learn from this Article?

To identify carpal instability following posttraumatic wrist injury, follow-up of patient at regular intervals in the post-operative period to promptly identify and treat carpal instability to prevent morbidity.

Abstract

Introduction: Carpal instability is broad category consisting of various patterns of injury, with dissociative type more common.

Case Report: A 13-year-old boy presented at 6 months following a fall with restriction of wrist movements. Patient had sustained a closed distal one-third both bones fracture forearm fixed with K-wire, and volar lunate instability was found during sequential follow-up.

Conclusion: Posttraumatic carpal instability should be identified at the earliest to avoid poor hand function and morbidity associated with it.

Keywords: Volar intercalated segment instability, posttraumatic, distal radius fracture.

Introduction

Carpal instability and its biomechanics have always been evolving due to the advancement in the field of radiology and arthroscopy. Lunate plays a pivotal role and acts like an intercalated segment in carpal stability, loss of anchorage of this key structure cause intercalated segment instability. Volar intercalated segment instability (VISI) is a less common manifestation of dissociative carpal instability. We report a case of posttraumatic acute static volar instability.

Case Report

A 13-year-boy had sustained distal one-third radius and ulna fracture after fall on an outstretched hand. Open reduction and K-wire fixation

was performed for both bone fracture forearm (Fig. 1). Implants were removed after 4 weeks (Fig. 2). He noticed restriction of dorsiflexion of wrist, while other movements normal. Serial X-rays showed a loss of normal alignment of radio-lunate in comparison with the opposite (Fig. 3, 4). Initial X-ray showed normal alignment of carpus before reduction. Serial radiographs during follow-up showed a volar facing lunate with alteration of scapholunate and lunatocapitate angle and was diagnosed with a volar intercalated lunate instability (Fig. 5). The patient was put on strict rehabilitation protocol and the dorsiflexion improved from 0-10° to 0-40°. At 1 year follow-up patient is still having restriction of dorsiflexion (Fig. 6) with volar lunate instability (Fig. 5). The patient is being planned for further procedure.

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Author's Photo Gallery



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Figure 1: (a) Post-operative radiograph of right wrist posterior-anterior and (b) lateral view showing reduced distal one-third radius and ulna fracture with implants *in situ*.



Figure 2: (a) Radiograph of wrist posterior-anterior and (b) lateral view at 2 months with uniting distal one-third radius and ulna fracture. Volar facing lunate is seen in the radiograph.

Discussion

Carpal instability should be considered as a differential in patients presenting with chronic wrist pain and restricted movements following trauma. Reagan *et al.* classified carpal instability into four categories and lunato-triquetral ligament is involved in stage three which leads to volar lunate instability [1]. Lunate instability is further divided into static or dynamic and acute or chronic.

VISI is a condition in which there is pathologic volar flexion of the lunate, with or without a similar posture of the other proximal row carpal bones. Palmar flexion instability is less commonly recognized [1].

VISI is commonly seen in rheumatoid arthritis. Lunato-triquetral ligament attrition due to congenital ligamentous laxity causes VISI. Posttraumatic

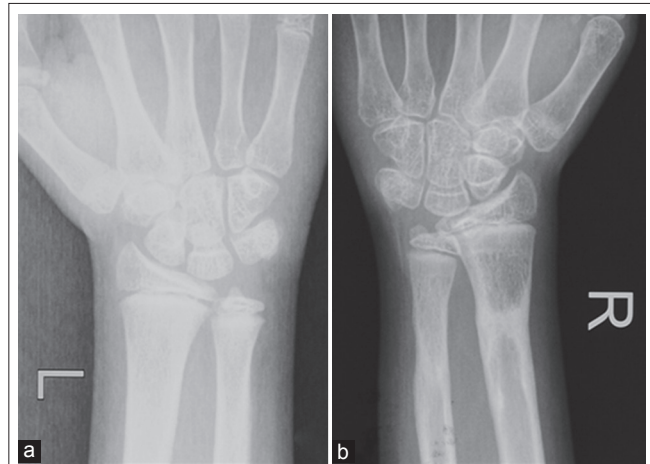


Figure 3: (a) Radiograph of both wrist posterior-anterior view left and (b) right showing union of distal one-third of radius and ulna. Loss of Gilula arc with flexed scaphoid suggesting carpal instability at 6-month follow-up.

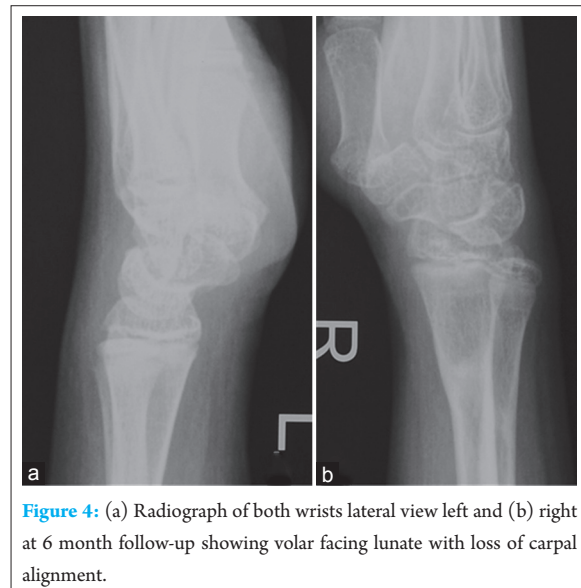


Figure 4: (a) Radiograph of both wrists lateral view left and (b) right at 6 month follow-up showing volar facing lunate with loss of carpal alignment.

volar lunate instability is an entity that can be missed during the initial traumatic event because of its subtle nature [2]. Posttraumatic carpal stability diagnosed at the earliest avoids advanced surgical procedures such as reconstruction and fusion of joint [3]. Earlier management prevents functional morbidity of wrist.

Lunate instability in plain radiograph can be diagnosed with the alteration of various angles namely the loss of scapholunate angle, loss of alignment between the lunate, capitate and radius and increase in the capitollunate angle. Treatment options include from closed reduction and K-wire fixation, dorsal capsulodesis, tenodesis, arthroscopic or open repair with reconstruction and finally arthrodesis [4].

Few cases have been reported in literature [5]. VISI is a missed injury in our case associated distal radius and ulna fracture [6]. This injury could be subtle in nature before reduction and fixation that led to delay in diagnosis or iatrogenic in nature after reduction of the fracture.

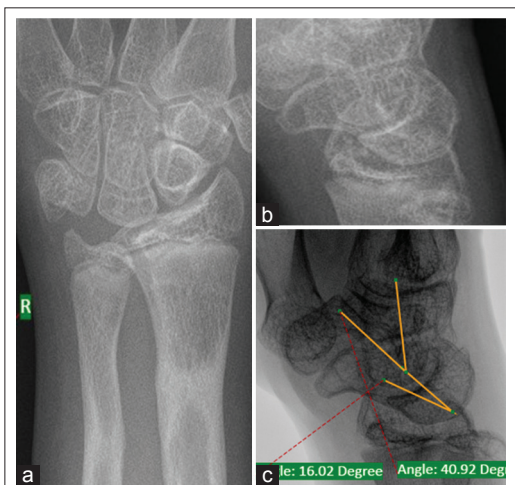


Figure 5: (a) Radiograph of right wrist at 1 year follow-up, post-anterior view and (b and c) lateral views, (a) showing healed distal one-third radius and ulna fracture, signet ring sign of scaphoid and moon like appearance of lunate. (b) Volar facing lunate with loss of alignment between radius, lunate and capitate. (c) Reduction in the scapholunate angle (16°) and increased capitulunate angle (40°).

Conclusion

Wrist function is a complex interaction of various biomechanics involving the carpal bones, ligaments, and the distal radio-ulnar complex. Awareness of carpal instability associated with fractures or injuries around the wrist is needed by the treating surgeon to avoid delay in diagnosis and treatment.

References

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Figure 6: (a) Clinical photograph at 1 year follow-up showing reduction of dorsiflexion ($0-40^\circ$) and (b) normal palmar flexion ($0-80^\circ$) of wrist.

Clinical Message

To suspect VISI following a wrist injury and also following reduction with K-wire fixation. Follow-up of patient at regular intervals to prevent morbidity due to this deformity.

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