

# Chronic Volar Lunate Dislocation Resulting in Carpal Tunnel Syndrome: A Case Report

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**Funding** The authors received no financial support for the research, authorship, and publication of this article.

**Conflict of Interest** The authors report no conflicts of interest.

**Informed Consent** The patient was informed that the data concerning his case would be submitted for publication, and he provided verbal consent.

## ABSTRACT

Lunate dislocations are rare injuries caused by high-energy trauma disrupting the ligamentous restraints that connect the lunate to the carpus. We describe a case of missed volar lunate dislocation 10 years after the initial injury. The patient presented to our clinic with symptoms of carpal tunnel syndrome after falling on an outstretched arm. He had increasing paresthesias in his median nerve territory and underwent a proximal row carpectomy with release of the transverse carpal ligament. At 2 years postoperatively, successful outcomes were noted with an 80° arc of motion of the carpus and complete resolution of carpal tunnel symptoms. Although rare, chronic lunate dislocations should be considered as a cause of carpal tunnel syndrome in patients with considerable traumatic injuries of the wrist. Careful inspection is essential to ensure this diagnosis is not missed.

**Keywords:** Lunate Bone Dislocation, Volar Wrist Dislocation, Carpal Tunnel Syndrome

## INTRODUCTION

Lunate dislocations are rare injuries caused by high-energy mechanisms such as motor vehicle accidents, falls from height, and sporting accidents.<sup>1</sup> The classic mechanisms of injury are forceful wrist extension, ulnar deviation, and carpal supination.<sup>2</sup> In the original Mayfield classification of progressive lunate instability, lunate dislocations are classified as stage IV injuries with complete disruption of the scapholunate complex and dorsal radiocarpal ligament. This allows the lunate to freely rotate into the carpal tunnel.<sup>2</sup> Patients with an acute lunate dislocation commonly present with pain and swelling of the affected wrist after a high-energy traumatic injury. Carpal tunnel syndrome after an acute lunate dislocation has been reported in up to 50% of cases; however, it is estimated that up to 25% of acute

lunate dislocations may be misdiagnosed on initial presentation.<sup>3</sup> These injuries are later identified because patients usually have persistent pain.

Patients with a lunate dislocation may present later with chronic wrist pain, decreased range of motion, and symptoms of carpal tunnel syndrome. We report a patient with a chronic lunate dislocation who presented with worsening signs and symptoms of carpal tunnel syndrome. He subsequently underwent a proximal row carpectomy owing to chronic changes of the lunate, and a carpal tunnel release. The findings of this case differ from previous reports in the duration from original injury until diagnosis and the gross anatomy of the carpal bones at the time of operative treatment. The gross anatomy at the time of operative treatment ultimately guided our surgical management.

## CASE REPORT

A 38-year-old man presented to the emergency department 2 weeks after falling on an outstretched hand. The patient noted pain in the wrist, especially when gripping items, and worsening paresthesias in the index finger, middle finger, and radial aspect of the ring finger. The patient had injured the same wrist 10 years earlier in a motor vehicle accident, but no imaging was obtained at the time.

During physical examination, the patient had minimal swelling and no deformity of the wrist. There was tenderness over the volar wrist in the area of the carpal tunnel, with decreased range of motion caused by pain. Full strength was noted in all extrinsic and intrinsic muscles of the hand, with decreased grip strength owing to pain. The patient noted altered sensation in the distal aspect of the index and middle fingers. Findings of Tinel, Durkan, and compression tests at the carpal tunnel were positive indicating the patient had signs of carpal tunnel syndrome. Pulses were equal to the uninjured side. Radiographs showed a chronic volar



**Figure 1.** A) Anteroposterior and B) lateral views of the right wrist at the time of second injury, showing volar lunate dislocation with chronic arthritic change of the lunate.

dislocation of the lunate with arthritic changes (Figures 1A and 1B).

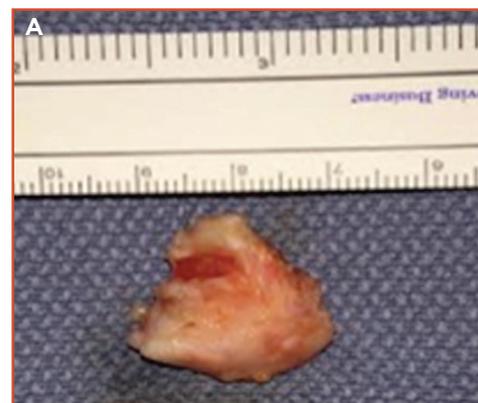
After discussing the injury diagnosis and chronicity with the patient, we performed proximal row carpectomy using dorsal and volar approaches for carpal tunnel release. Intraoperatively, there was no indication of an acute injury to the lunate or carpus. On gross examination of the lunate, there was significant cartilage loss and a groove within the bone caused by the flexor tendons (Figures 2A and 2B). The cartilage findings of the capitate and the radius both appeared normal. The median nerve appeared healthy, without any notable compression. Because of the arthritic condition of the lunate, the patient underwent proximal row carpectomy and transverse carpal ligament release

using volar and dorsal approaches (Figures 3A and 3B). At 2 years postoperatively, the patient noted resolution of symptoms of carpal tunnel syndrome and wrist pain. He achieved 40° wrist flexion and extension (80° arc of motion).

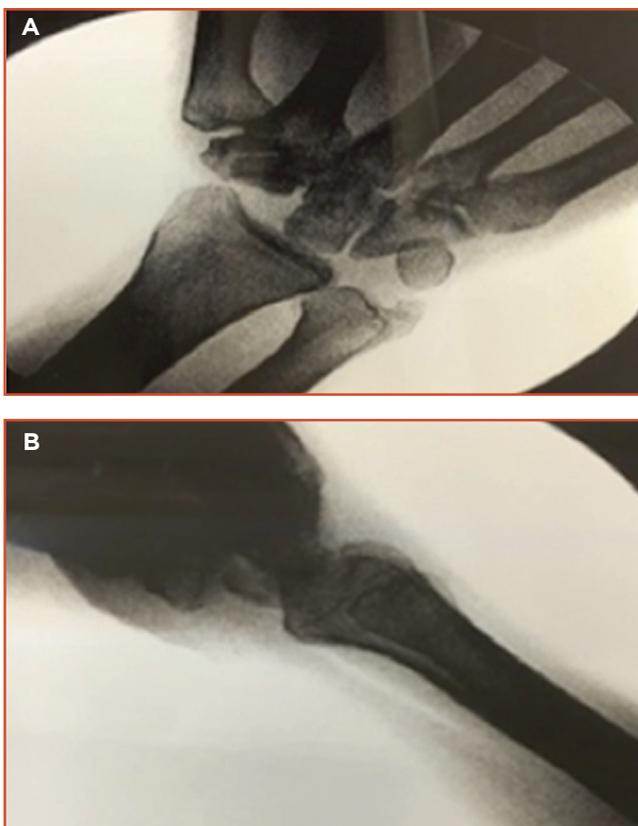
## DISCUSSION

Carpal tunnel syndrome is the most common compressive neuropathy of the upper extremity and occurs in about 5% to 16% of the general population.<sup>4,5</sup> The diagnosis is made clinically, with patients reporting nighttime symptoms of burning pain with associated tingling and numbness of the thumb, index, and middle fingers. Symptoms arise from microvascular compromise owing to compression that disrupts normal axonal transport and nerve function.<sup>6,7</sup> In our patient, the acute fall likely resulted in edema within the carpal tunnel adjacent to the chronic lunate dislocation. This caused him to have an acute worsening of a chronic, indolent carpal tunnel syndrome.

Carpal tunnel syndrome after a missed lunate injury has been reported in only a few cases. Chen<sup>8</sup> analyzed 10 patients in Taiwan with chronic volar lunate dislocations who presented with symptoms of carpal tunnel syndrome. Three of the patients were identified after unsuccessful carpal tunnel release, while the other patients underwent electrodiagnostic studies that identified the location of the compression, confirmed



**Figure 2.** A) Gross examination of the lunate after excision shows notable arthritic change and erosion from the flexor tendons in the carpal tunnel. B) Gross examination of the 1) scaphoid, 2) lunate, 3) triquetrum after excision during the proximal row carpectomy.



**Figure 3.** A) Anteroposterior and B) lateral fluoroscopic images after proximal row carpectomy.

by radiographic findings showing a history of trauma. The time to diagnosis was on average 21 months. Four of the 10 patients underwent PRC, although the other six underwent isolated lunate excision because the authors felt that PRC may be too aggressive.<sup>8</sup> Similarly, Ott et al<sup>9</sup> diagnosed a chronic volar dislocation of the lunate after unsuccessful carpal tunnel release. At the time of diagnosis, there was evidence of scapholunate advanced collapse but management of the dislocated lunate was not discussed.

Our patient presented in a similar manner after a low-energy fall with worsening symptoms of carpal tunnel syndrome. Imaging obtained at the time of presentation identified a volar lunate dislocation and associated arthritic changes, with considerable erosion within the lunate from the flexor tendons. Studies on treatment of chronic lunate dislocation are limited. Some authors have argued that simple lunate excision and transverse carpal ligament release can treat the disorder.<sup>8-10</sup> Oka et al<sup>11</sup> identified chronic dislocation of the lunate in a patient with rheumatoid arthritis. Excellent outcomes were noted after performing lunate excision and the Sauvé-Kapandji procedure for treating radioulnar joint instability. Stabilization of missed lunate dislocations have reported good outcomes if identified within 45 days of injury.<sup>3</sup> In 2015, Cansü et al<sup>12</sup> described a neglected lunate dislocation discovered 5 months after injury stabilization. Repair was performed using two-incision approach, which resulted in notable

improvement in wrist range of motion and resolution of carpal tunnel symptoms. However, further delay may warrant salvage procedures. Owing to the altered shape of the lunate, stabilization alone was not felt to be an option in our patient. Based on radiographic appearance of the lunate and the chronicity of the dislocation, we discussed the option of proximal row carpectomy with our patient preoperatively. When deciding between a repair, reconstruction, or a salvage procedure, we believe the decision should be based on both the condition of the radiolunate articulation and the midcarpal joints with respect to arthritic changes. If the capitate and radial cartilages are disrupted, then a wrist fusion may be considered.

Although rare, acute and chronic lunate dislocations are risk factors for the development of carpal tunnel syndrome. It is important that physicians consider missed lunate dislocations as a cause of carpal tunnel syndrome in patients who underwent unsuccessful carpal tunnel release or had a history of high-energy traumatic injuries to the affected wrist. In this subset of patients, we favor obtaining a radiograph or ultrasound to identify a lunate dislocation that may be causing the symptoms of carpal tunnel. Management of these injuries should be on a case-by-case basis. As seen in the findings of the current case, prolonged dislocation may result in considerable degeneration of the lunate and symptoms may resolve after proximal row carpectomy.

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