

Proximal Row Carpectomy for Established Post-Traumatic Radiocarpal Arthritis Following Distal Radius Volar Rim and Scaphoid Fractures: A Case Report

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Learning Point of the Article:

Early recognition of post-traumatic radiocarpal arthritis following combined distal radius volar rim and scaphoid fractures allows proximal row carpectomy with capsular interposition and radiocapitate stabilization to serve as an effective motion-preserving salvage procedure.

Abstract

Introduction: Post-traumatic radiocarpal arthritis can occur as a result of complex wrist injuries. Distal radius volar rim fractures associated with scaphoid fractures can result in progressive cartilage degeneration, pain, loss of motion, and functional impairment. Malunited distal radius volar rim fractures, where optimal stabilization is not done, can lead to radiocarpal incongruity and early post-traumatic radiocarpal arthritis. Proximal row carpectomy (PRC) remains a valuable motion-preserving salvage procedure for selected patients with advanced radiocarpal arthritis.

Case Report: A 32-year-old male presented 4 months after a motorcycle-related injury with persistent right wrist pain, reduced grip strength, difficulty performing fine motor tasks, and limitations in lifting heavy objects. He had sustained a distal radius volar rim fracture and scaphoid fracture and developed radiocarpal arthritis. Clinical examination demonstrated pain aggravated by wrist motion and reduced grip strength. Arthroscopic evaluation confirmed significant post-traumatic chondral degeneration of the radiocarpal joint. The patient underwent wrist arthroscopy, PRC, posterior interosseous nerve neurectomy, capsular interposition arthroplasty, and radiocapitate K-wire stabilization. He subsequently developed early post-traumatic radiocarpal arthritis due to inadequate fixation of the volar rim fragment.

Conclusion: This case highlights the critical importance of recognizing and adequately fixing the distal radius volar rim (volar lunate facet) fragment during the initial management of wrist trauma. Failure to restore the volar buttress resulted in persistent radiocarpal incongruity and rapid progression to symptomatic post-traumatic radiocarpal arthritis within 4 months in a young patient. It demonstrates the role of PRC as a biomechanically sound salvage option for radiocarpal arthritis secondary to a missed or malunited volar rim fracture.

Keywords: Proximal row carpectomy, radiocarpal arthritis, distal radius fracture, volar rim fracture, scaphoid fracture, wrist salvage surgery.

Introduction

The volar rim of the distal radius helps maintain carpal stability. A fracture involving this area can compromise stability and load-bearing function, while an associated scaphoid injury causes reduced wrist mobility. Post-traumatic arthritis may occur as a result of untreated radiocarpal injuries. Prolonged stress results

in chondral damage, causing progressive cartilage degeneration [1].

The volar lunate facet is a small yet biomechanically critical component of the distal radius. It acts as the volar buttress, preventing volar translation of the carpus. Failure to recognize or adequately stabilize this fragment can result in loss of radiocarpal

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Figure 1: Pre-operative clinical photograph demonstrating wrist deformity and swelling. Pre-operative clinical photographs of the right wrist demonstrating healed surgical scars following previous treatment and persistent functional limitation secondary to post-traumatic radiocarpal arthritis.

congruity, carpal subluxation, abnormal load transmission, and accelerated cartilage degeneration [2].

In the present case, inadequate fixation of the volar rim fragment led to early radiocarpal arthritis despite previous treatment, ultimately necessitating a salvage procedure.

Management of post-traumatic wrist arthritis presents practical challenges requiring salvage procedures that focus on pain relief rather than wrist mobility. Surgical procedures are complicated by the wrist's complex anatomy [3]. Wrist arthrodesis is one such procedure that provides pain relief while sacrificing motion [4]. Proximal row carpectomy (PRC) offers an alternative that preserves motion is preserved in appropriate patients by reducing radiocarpitate articulation and stabilizing it using a K-wire. Arthroscopic management also minimizes soft-tissue damage and preserves ligament integrity with the use of small skin incisions.

PRC was selected as a motion-preserving salvage option because it removes the arthritic proximal carpal row and creates a new articulation between the capitate head and the lunate fossa of the distal radius.

Although the capitate head has a smaller radius of curvature than the distal radial articular surface, biomechanical studies have demonstrated that satisfactory congruity is maintained throughout the arc of wrist motion. This neo-articulation distributes load effectively, preserves a functional range of motion, and provides durable pain relief.

For young and active patients with radiocarpal arthritis secondary to missed or malunited volar rim fractures, PRC offers several advantages:

- Preservation of wrist motion

- Reliable pain relief
- Avoidance of total wrist arthrodesis
- Earlier rehabilitation and return to function
- Biomechanically stable radiocarpitate articulation.

We present a case of established post-traumatic radiocarpal arthritis developing within 4 months of combined distal radius volar rim and scaphoid fractures, successfully managed with PRC, posterior interosseous nerve neurectomy, capsular interposition arthroplasty, and radiocarpitate K-wire stabilization.

Case Report

A 32-year-old male presented with difficulty with fine motor activities, reduced grip strength, and difficulty lifting heavy weights with his right wrist. The patient reported pain during wrist flexion and extension. Pain

was aggravated by wrist movement and relieved with rest. The patient had a history of a fall from a motorcycle 4 months ago.

Prior medical history of the patient includes a distal radius fracture in the left hand, which had been surgically treated. He had also sustained a right scaphoid fracture and fractures involving the fourth and fifth metacarpophalangeal joints, which were treated with a K-wire fixation.

On clinical examination, it was found that there was a bilateral reduction in grip strength. Scarring was found over the right wrist and left forearm. The Visual Analog Scale was 2/10 at rest and increased during movement.

Radiological evaluation (Figs. 1 and 2) demonstrated



Figure 2: Pre-operative radiograph showing distal radius volar rim fracture with associated scaphoid injury. Pre-operative anteroposterior and lateral radiographs of the right wrist demonstrating a malunited distal radius volar rim (volar lunate facet) fracture with an associated scaphoid fracture, resulting in radiocarpal incongruity and early degenerative arthritic changes.

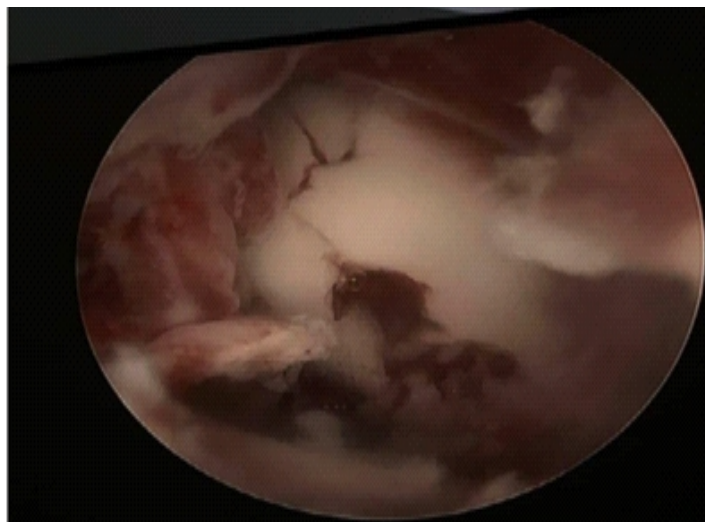


Figure 3: Arthroscopic image demonstrating radiocarpal chondral degeneration. Diagnostic wrist arthroscopy demonstrating advanced chondral degeneration of the radiocarpal joint consistent with established post-traumatic arthritis.

established radiocarpal arthritis secondary to a distal radius volar rim fracture associated with a scaphoid fracture. Based on persistent symptoms and degenerative changes, operative intervention was planned.

Surgical technique

The procedure was performed under regional anesthesia with the patient in the supine position and the affected upper limb prepared under tourniquet control.

Diagnostic wrist arthroscopy was first performed through standard 3–4 and 6R portals. Arthroscopic assessment demonstrated significant chondral damage and confirmed post-traumatic arthritic changes involving the radiocarpal joint (Fig.



Figure 5: Post-operative radiograph following proximal row carpectomy (PRC). Immediate post-operative anteroposterior and lateral radiographs confirming successful PRC with satisfactory radiocarpitate alignment and K-wire stabilization.

3). The triangular fibrocartilage complex and midcarpal joint were also evaluated arthroscopically.

A longitudinal dorsal wrist incision was then made to expose the radiocarpal joint (Fig. 4). The scaphoid, lunate and triquetrum were excised completely using osteotomes, rongeurs and curettes. The remaining articular surfaces were contoured, and the radiocarpitate articulation was assessed.

A posterior interosseous nerve was identified, and a segment was excised for wrist denervation. A distally based dorsal capsular flap was fashioned and interposed between the capitate head and the lunate fossa of the distal radius and secured using absorbable sutures. The radiocarpitate articulation was reduced and stabilized using K-wire fixation under fluoroscopic guidance. Position was confirmed on anteroposterior and lateral views before layered closure and immobilization.



Figure 4: Intraoperative excision of proximal carpal row. Intraoperative photographs showing dorsal exposure of the wrist and sequential excision of the proximal carpal row (scaphoid, lunate, and triquetrum) during proximal row carpectomy.

Post-operative management

A sterile dressing was applied, and a well-padded dorsal plaster slab was used to maintain the wrist in a neutral position. Standard post-operative analgesia, antibiotics, and rehabilitation protocols were initiated (Fig. 5).

Discussion

Treatment of radiocarpal arthritis is mostly directed at the relief of pain and may cause a reduction in wrist mobility [5]. Post-traumatic arthritis following combined distal radius volar rim and scaphoid fractures may cause accelerated cartilage damage with prolonged strain and can result in profound functional impairment [6].

PRC has traditionally been used for degenerative wrist conditions such as scapholunate advanced collapse and scaphoid non-union advanced collapse. However, its indications have expanded to include selected cases of post-traumatic radiocarpal arthritis with preserved cartilage over the capitate head and the lunate fossa of the distal radius [7]. In the present case, PRC was selected as the salvage procedure because it removes the diseased proximal carpal row while preserving wrist motion through the creation of a new radiocapitate articulation.

The addition of capsular interposition arthroplasty improves radiocapitate congruity and potentially reduces contact pressures [8]. Posterior interosseous nerve neurectomy serves as an adjunctive pain-relieving procedure without compromising motor function. Temporary radiocapitate stabilization with K-wire fixation can further support early healing and maintenance of alignment [9].

This case not only highlights the success of PRC, but also illustrates the consequences of failing to adequately address the volar lunate facet fracture at the time of the original injury. The volar rim fragment serves as the primary restraint to volar carpal subluxation [10]. Inadequate fixation may lead to persistent radiocarpal incongruity and rapid degenerative arthritis, as observed in this patient. Once arthritis becomes established, reconstructive options are limited. In such circumstances, PRC serves as a biomechanically sound salvage procedure that

preserves motion while providing a congruent and pain-free radiocapitate articulation.

Conclusion

PRC represents a biomechanically sound salvage option for radiocarpal arthritis secondary to a missed or malunited volar rim fracture. In carefully selected patients, PRC combined with capsular interposition arthroplasty, posterior interosseous nerve neurectomy, and radiocapitate stabilization can provide a viable motion-preserving salvage option by maintaining satisfactory congruity and providing a functional and pain-relieving articulation. Long-term follow-up is required to evaluate the durability of outcomes and progression of degenerative changes.

Clinical Message

Missed or malunited volar rim (volar lunate facet) fractures of the distal radius can result in persistent radiocarpal incongruity, leading to early post-traumatic radiocarpal arthritis and significant functional impairment. Early recognition and stable fixation of this critical fragment are essential to preserve wrist biomechanics. When degenerative changes become established, PRC serves as a biomechanically sound, motion-preserving salvage procedure by creating a functional radiocapitate articulation, providing reliable pain relief while maintaining a useful range of wrist motion.

Declaration of patient consent: The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given the consent for his/ her images and other clinical information to be reported in the journal. The patient understands that his/ her names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Conflict of interest: Nil **Source of support:** None

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