

Case Report

Emergency bilateral proximal row carpectomy for Mayfield stage IV greater arc injuries: a case report in a restricted social environment

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Received: 05 August 2026

Accepted: 20 August 2026

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ABSTRACT

Bilateral trans-scaphoid perilunate fracture-dislocations (PLFD) with complete lunate enucleation (Mayfield IV-equivalent) represent a terminal stage of carpal instability. While anatomical reconstruction is traditionally favored in young patients, its success depends on intensive, long-term specialized hand therapy. We report a unique case where primary salvage was selected to ensure functional autonomy despite intraoperative findings of irreparability and systemic barriers to rehabilitation. A 22-year-old right-handed male smoker presented with bilateral trans-scaphoid PLFD following a 4-story fall. Intraoperative assessment revealed irreparable, devitalized lunates with 360° ligamentous disconnection and eroded cartilage. Given the lesion severity and documented barriers to accessing specialized physical therapy, bilateral emergency proximal row carpectomy (PRC) was performed 24 hours after trauma. At the 6-month follow-up, the patient was pain-free (VAS 1/10). The right wrist achieved 50° flexion/30° extension (80° arc), while the left achieved 40° flexion/10° extension (50° arc). The QuickDASH score of 25 points reflects moderate disability, influenced by the patient's prioritization of his dominant side during autonomous rehabilitation. Early radiographic evaluation confirmed stable alignment. Emergency bilateral PRC is a pragmatic solution for severe carpal instability when anatomical repair is unattainable or when external constraints preclude standard reconstruction protocols. Long-term surveillance remains mandatory.

Keywords: Acute proximal row carpectomy, Bilateral wrist injury, Greater arc injury, Emergency surgery, Case report

INTRODUCTION

Perilunate dislocations (PLD) and perilunate fracture-dislocations (PLFD) are severe injuries resulting from high-energy mechanisms.^{1,2} Mayfield described a progression of perilunar instability (Stages I-IV) involving the purely ligamentous "lesser arc." By analogy, Stage IV-equivalent displacement in "greater arc" injuries involves lunate enucleation into the carpal tunnel.^{1,3}

Standard acute management typically involves open reduction and internal fixation (ORIF).²⁻⁴ However, 50% to 100% of patients develop osteoarthritis regardless of treatment.⁴ Alternatives include arthroscopy-assisted reduction, four-corner fusion, or partial wrist arthrodesis.^{4,5} PRC, initially a salvage procedure, is

increasingly proposed as a first-line treatment for irreparable trauma due to its simplicity and shorter recovery.^{1,4,6}

This case has been reported in accordance with the updated SCARE 2025 criteria.⁷

CASE REPORT

A 22-year-old right-handed male presented after a high-energy 4th-story fall. Initial imaging confirmed bilateral trans-scaphoid PLFD with complete volar lunate enucleation (Figure 1 and 2) (characterized as Mayfield IV-equivalent) and a scaphoid fragment displaced proximally on the left (Figure 2 A-C). A concomitant subarachnoid hemorrhage was identified and stabilized

medically. Neurovascular examination was normal, specifically showing no clinical signs of acute median nerve compression despite the carpal tunnel displacement.

The patient actively participated in the decision-making process. Given his imminent incarceration, which presented a documented barrier to accessing specialized postoperative physical therapy, and intraoperative findings of irreparable, devitalized lunates (showing 360° ligamentous disconnection and total cartilage erosion), a salvage procedure was selected.

Surgery was performed 24 hours after injury by a professor at a tertiary university hospital once neurological stability was achieved. The patient was in a supine position under general anesthesia, with both limbs prepared and operated on simultaneously. No pneumatic tourniquet was utilized. Through a 4 cm dorsal longitudinal incision, a ligament-sparing capsulotomy (Berger type) was performed. The scaphoid fragments, enucleated lunate, and triquetrum were excised (Figure 1 D and 2 D) while meticulously preserving the radioscaphocapitate (RSC) ligament to maintain stability, no temporary K-wire fixation was used, allowing for early mobilization. Operative times were 25 minutes for the right wrist and 37 minutes for the left.

Postoperatively, wrists were immobilized in volar splints for 10 days.

To address the limited access to postope physical therapy" in a custodial environment., the patient's hospital stay was intentionally extended to 2 weeks, to provide supervised training in an autonomous rehabilitation protocol, ensuring he mastered passive, active, and isometric exercises before his transfer.

At 6-month follow-up, patient expressed satisfaction with the surgical outcome, specifically the relief of his initial debilitating pain. He stated that he is now able to perform the majority of his activities of daily living autonomously, which was his primary goal.

The QuickDASH score was 25 points, which reflects a moderate disability (population norm being approximately 10). The functional arc of motion was reported separately for each side: the dominant right wrist achieved an 80° arc (50° flexion/30° extension), whereas left wrist achieved a 50° arc (40° flexion/10° extension). Bilateral radiographs showed well-centered and congruent capitate within the radial lunate fossa on both sides without evidence of ulnar translocation (Figure 3 A-C).

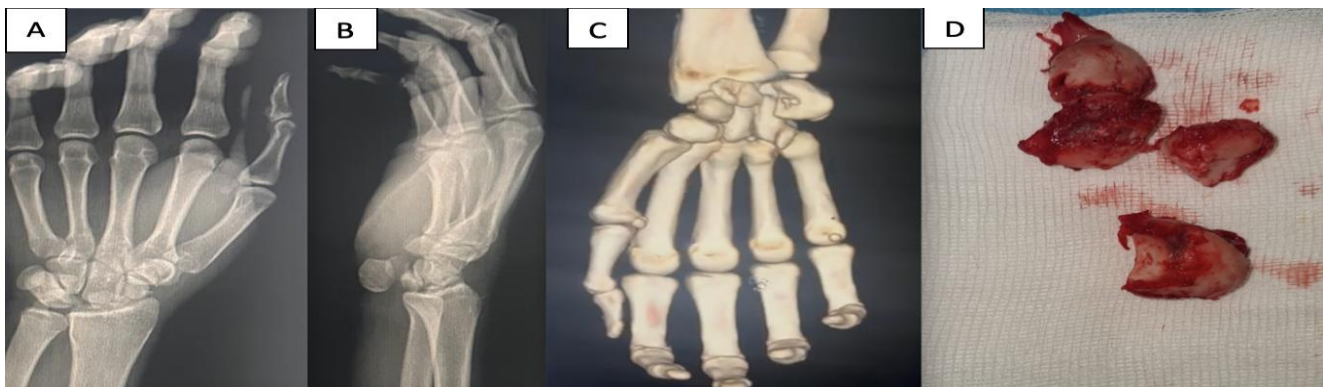


Figure 1 (A-D): Right wrist injury and surgical management (A) Anteroposterior and (B) lateral radiographs showing a trans-scaphoid perilunate fracture-dislocation. The lunate is volarly enucleated into the carpal tunnel. (C) 3D CT reconstruction demonstrating the severe disruption of the greater carpal arc. (D) Right excised proximal row specimens (scaphoid, lunate, triquetrum).

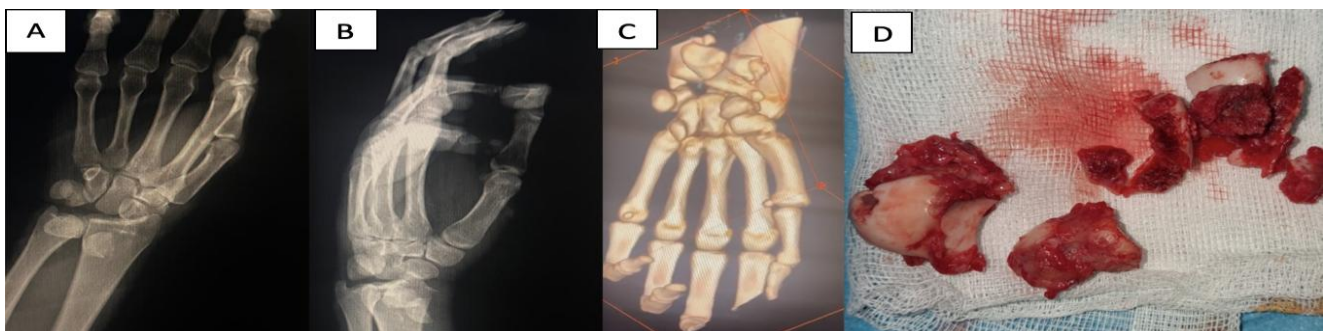


Figure 2 (A-D): Left wrist injury and surgical management (A) A/P and (B) lateral radiographs revealing a trans-scaphoid perilunate fracture-dislocation. In this wrist, lunate is enucleated more proximally along with one half of scaphoid, resting against distal radial epiphysis. (C) 3D CT reconstruction providing detailed visualization of fractures and carpal instability. (D) Left excised proximal row specimens (scaphoid, lunate, triquetrum).

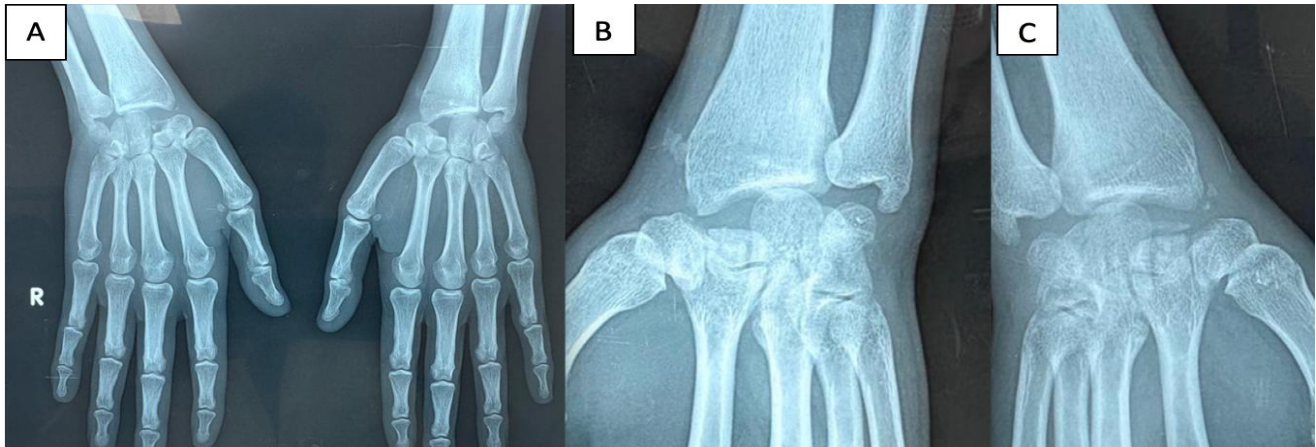


Figure 3 (A-C): Anteroposterior (A) and oblique views (B and C) of both wrists confirming the stable clinical outcome of the bilateral proximal row carpectomy. There is clear visualization of the neo-radiocapitate joint, with the proximal pole of the capitate well-centered and congruent within the radial lunate fossa on both sides.

DISCUSSION

The complexity of this case comes from an unusual combination of medical and environmental factors: the high-energy bilateral nature of the trauma, the complete volar enucleation of both lunates, the proximal displacement of the scaphoid on the left side, and the systemic restriction to postoperative therapy.

While the Mayfield classification was designed for ligamentous "lesser arc" injuries, we apply the framework here by analogy to describe the terminal stage of carpal instability (Stage IV-equivalent) resulting from a high-energy trans-scaphoid mechanism.

Anatomical reconstruction (ORIF) is the traditional gold standard for young patients to preserve carpal height, but its success is inherently dependent on the viability of the carpal bones and strict adherence to a multi-stage rehabilitation protocol.^{2,8} In this case, the decision to proceed with bilateral irreversible salvage was primarily dictated by the anatomical irreparability of the injuries. Intraoperative findings, specifically 360° ligamentous disconnection, eroded cartilage, and devitalized lunates, validated the preoperative choice, confirming that the proximal row was not reconstructable.

The team also considered other published alternatives, such as arthroscopy- and fluoroscopy-assisted percutaneous reduction and fixation, which has shown promising functional results in acute perilunate injuries.⁴ However, the severity of bone displacement and soft-tissue disruption in this case made percutaneous options unfeasible. Four-corner fusion (4CA) is another motion-sparing alternative, particularly when midcarpal arthritis is present.^{6,9,10} While Wagner et al and others note that 4CA may provide superior grip strength (65% of the opposite side compared to 54% for PRC), it also carries a higher complication rate (30% vs 11%), including risks of nonunion (12%) and hardware irritation.^{8,11} Total wrist

arthrodesis reliably eliminates pain but at the cost of complete motion sacrifice, often making it a secondary salvage for failed primary procedures.^{6,12,13} Lunate excision, once used historically for pure dislocations, is now rarely indicated as a primary solution due to the risk of subsequent carpal collapse.³

The efficacy of acute PRC for irreparable trauma is well-supported. Della Santa et al. found that patients treated in the emergency phase achieved significantly higher satisfaction and grip strength compared to those undergoing elective salvage for chronic conditions.^{3,13,14} Furthermore, Muller et al and Smeraglia et al demonstrated that acute PRC yields results comparable to ORIF while offering significantly shorter operative times and reduced immobilization.^{2,4}

We report the bilateral outcomes separately to maintain transparency regarding recovery; at 6 months, the 80° total arc achieved on the right side meets high-performance thresholds, whereas the left wrist was more restricted at 50°. This 37% difference and the limited 10° extension on the left likely stem from the patient's honest prioritization of his dominant hand during self-rehabilitation.

This early report has limitations, including the 6-month follow-up and the lack of grip strength values due to the absence of a dynamometer. Although early results show excellent analgesia, radiocapitate degeneration typically manifests between 5 and 20 years postoperatively.^{5,16} While studies by Wall et al and Bijon et al suggest that functional scores often stabilize despite these radiographic changes, the risk of failure remains higher in younger patients.^{5,16} Vigilance is also required for rare complications such as atraumatic volar carpus dislocation. Consequently, this patient requires mandatory long-term radiocapitate surveillance to monitor for progressive arthritis, which remains the primary concern for any young individual undergoing this irreversible salvage procedure.

CONCLUSION

This report indicates that emergency bilateral PRC can provide a satisfactory early outcome for patients with irreparable carpal disruptions, particularly in limited access to postoperative physical therapy. Given the patient's young age and the known risk of progressive degenerative changes in the neo-radiocapitate joint, mandatory long-term radiocapitate surveillance is essential to monitor for symptomatic arthritis.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: Not required

REFERENCES

1. Yeager KC, Parker KM, Morrell NT. A Case for Acute Proximal Row Carpectomy for Perilunate Injuries. *Iowa Orthop J.* 2023;43(2):14-9.
2. Smeraglia F, Poggetti A, Crisci F, Faccenda C, Balato G, et al. Proximal row carpectomy versus open reduction and internal fixation in late-presenting perilunate dislocations. *Hand Surg Rehabil.* 2026;45(1):102585.
3. Huish EG, Vitale MA, Shin AY. Acute Proximal Row Carpectomy to Treat a Transscaphoid, Transtriquetral Perilunate Fracture Dislocation: Case Report and Review of the Literature. *Hand.* 2013;8(1):105-9.
4. Muller T, Hidalgo Diaz JJ, Pire E, Prunières G, Facca S, Liverneaux P. Treatment of acute perilunate dislocations: ORIF versus proximal row carpectomy. *Orthop Traumatol.* 2017;103(1):95-9.
5. Bijon C, Saab M, Amouyel T, Sturbois-Nachef N, Guerre E, Chantelot C. Long-term radiological changes and functional outcomes after proximal row carpectomy: Retrospective study with 3 years' minimum follow-up. *Orthop Traumatol.* 2020;106(8):1589-95.
6. Calandruccio JH. Proximal row carpectomy. *J Am Society Surg Hand.* 2001;1(2):112-22.
7. Kerwan A, Al-Jabir A, Mathew G, Sohrabi C, Rashid R, Franchi T, et al. Revised Surgical Case Report (SCARE) Guideline: An Update for the Age of Artificial Intelligence. *Premier J Sci.* 2025;10:100079.
8. Wagner ER, Werthel JD, Elhassan BT, Moran SL. Proximal Row Carpectomy and 4-Corner Arthrodesis in Patients Younger Than Age 45 Years. *J Hand Surg.* 2017;42(6):428-35.
9. Mugnai R, Pantaleoni F, Montanari M, Petrella G, Roberto A. Modified volar approach for proximal row carpectomy. *J Hand Microsurg.* 2024;16(4):100129.
10. Kromka JJ, Maher P, Fowler JR. Volar Carpus Dislocation Following Proximal Row Carpectomy for Scapholunate Advanced Collapse: A Rare Complication. *J Hand Surg Global Online.* 2020;2(4):260-5.
11. Wagner ER, Barras LA, Harstad C, Elhassan BT, Moran SL. Proximal Row Carpectomy in Young Patients. *JBJS Essential Surg Techn.* 2021;11(1):e19.00054.
12. Aravinthan N, Siddiqui S, Khan M, Moro J, Pino PA, Prada C. Proximal Row Carpectomy with Soft Tissue Interposition: A Systematic Review of Clinical Outcomes. *Hand.* 2025;20(3):352-9.
13. Della Santa DR, Sennwald GR, Mathys L, Glauser T, Fusetti C, Beaulieu JY. Proximal row carpectomy in emergency. *Chirurgie Main.* 2010;29(4):224-30.
14. Russchen M, Kachooei AR, Teunis T, Ring D. Acute Proximal Row Carpectomy after Complex Carpal Fracture Dislocation. *J Hand Microsurg.* 2015;7(1):212-5.
15. Meulendijks MZ, Lans J, Jupiter JB, Chen NC. Long-Term Patient-Reported Outcomes following Proximal Row Carpectomy. *J Wrist Surg.* 2024;13(05):398-405.
16. Wall LB, DiDonna ML, Kiefhaber TR, Stern PJ. Proximal Row Carpectomy: Minimum 20-Year Follow-Up. *J Hand Surg.* 2013;38(8):1498-504.

Cite this article as: Khmilech I, Chafi O, Bouziane W, Sadougui M, Daoudi A. Emergency bilateral proximal row carpectomy for Mayfield stage IV greater arc injuries: a case report in a restricted social environment. *Int J Res Orthop* 2026;12:1517-20.