International Journal of Environmental Sciences
ISSN: 2229-7359
Vol. 11 No. 18s, 2025
https://theaspd.com/index.php

Case paper of right proximal ulna comminuted fracture treated with double plating

Dr Swaroop solunke MS[1], Dr Vishal Patil MS[2], Dr Omkar Shinde*[3]
[1]Associate Professor Orthopedics, Dr D Y Patil Medical College, Hospital and Research Centre, Dr. D Y Patil Vidyapeeth, Pune, Maharashtra, India.
[2]Professor orthopedics, Dr D Y Patil Medical College, Hospital and Research Centre, Dr. D Y Patil Vidyapeeth, Pune, Maharashtra, India
Fourth author-Dr Parminder Singh, MBBS, OrthopedicsResident, Dr D Y Patil Medical College, Hospital and Research Centre, Dr. D Y Patil Vidyapeeth, Pune, Maharashtra, India
[3*]MBBS, Orthopedics Resident, Dr D Y Patil Medical College, Hospital and Research Centre, Dr. D Y Patil Vidyapeeth, Pune, Maharashtra, India.
***Corresponding author:**
Dr Omkar Shinde
MBBS, Orthopedics Resident, Dr D Y Patil Medical College, Hospital and Research Centre, Dr. D Y Patil Vidyapeeth, Pune, Maharashtra, India.

Abstract:
An 18-year-old male presented with a comminuted fracture of the right proximal ulna following a fall into an open manhole while jogging. He was managed operatively using a double plating technique and Herbert screw to achieve optimal stabilization and allow early rehabilitation. Postoperative outcomes showed excellent union, restored range of motion, and return to pre-injury activity level without complications.
Keywords: *proximal ulna fracture, Double plating, comminuted fracture.*

INTRODUCTION:

Fractures of the proximal ulna, particularly those that are comminuted, are complex injuries that pose a significant challenge to orthopedic surgeons. The proximal ulna plays a pivotal role in the stability and movement of the elbow joint, acting as the insertion point for the triceps and forming the trochlear notch which articulates with the humerus. Comminuted fractures often disrupt both the bony anatomy and the surrounding soft tissue structures, leading to functional impairment if not properly addressed[1,2].

Traditional methods of fixation—such as posterior plating—may be insufficient in cases of multi-fragmented fractures due to instability under torsional and bending forces. The double plating technique, involving orthogonal plates (typically one dorsal and one medial), has been shown to provide increased biomechanical stability, particularly useful in young, active patients who are at risk of fixation failure due to early mobilization[3-5].

The goal of treatment in such cases is to achieve anatomical reduction, stable fixation, and early rehabilitation to minimize stiffness and ensure optimal functional recovery. This case report highlights the management of a high-energy, comminuted fracture of the right proximal ulna in a healthy adolescent male using a double plating technique and discusses the rationale, surgical approach, and postoperative outcomes with reference to current literature.

Case presentation

An 18-year-old right-hand dominant male, otherwise healthy with no prior medical or surgical history, presented to the emergency department after sustaining trauma to his right upper limb. He reported that while jogging in his residential area early in the morning, he failed to notice an open manhole and fell directly into it. His arm struck the edge of the manhole, resulting in immediate pain, swelling, and inability to move his right elbow.

On examination, he was alert and hemodynamically stable. Local examination revealed diffuse swelling and

tenderness over the proximal forearm, especially over the olecranon and the medial aspect of the elbow. There was visible deformity with but no open wounds. Neurovascular examination of the right upper limb was normal.

Radiographs of the right elbow revealed a comminuted fracture of the proximal ulna, extending into the olecranon with multiple fracture fragments with extension into joint as seen in figure A. A CT scan was performed for better characterization as seen in figure B.and confirmed comminution with no radial head subluxation.

Given the degree of comminution and instability, surgical intervention was planned.

The patient was administered general anesthesia and placed in the lateral decubitus position with the affected arm supported over a bolster to allow easy access to the posterior and medial aspects of the elbow as seen in figure C. A posterior midline incision was made, beginning 5 cm above the olecranon and extending distally along the ulna. Skin and subcutaneous tissues were dissected carefully, with preservation of the posterior cutaneous nerve of the forearm. The triceps muscle was split in the midline, and the olecranon fracture fragments were identified. Soft tissues were preserved as much as possible to maintain vascularity. The ulnar nerve was identified medially, protected throughout the procedure, and not transposed as there was no entrapment. Under fluoroscopic guidance, the fracture fragments were anatomically reduced. This required temporary guide wire fixation followed by Herbert screw fixation and sometimes joystick techniques using reduction clamps to manipulate and align smaller fragments. Particular care was taken to reconstruct the articular surface of the trochlear notch to ensure proper articulation with the humerus. A pre-contoured 3.5 mm locking compression plate was applied dorsally. The plate spanned the fracture zone and secured the primary fragments. Locking screws were used proximally and distally to provide angular stability, especially beneficial in comminuted bone. A 2.7 mm low profile plate was contoured to the medial border of the ulna and applied in an orthogonal configuration to the dorsal plate. This plate supported smaller, unstable fragments and increased the construct's torsional rigidity. Cortical screws were inserted to engage both cortices and compress the plate to the bone.

After securing both plates, fluoroscopic images were taken in multiple planes to confirm alignment, joint congruity, and screw placement. The stability of the fixation was tested manually by gentle range of motion of the elbow under sterile conditions. After thorough irrigation, the triceps split was approximated, and the fascia, subcutaneous tissue, and skin were closed in layers using absorbable sutures. A drain was placed, and a posterior slab was applied with the elbow in 90° flexion. Final fixation checked under fluoroscopy guidance as seen in figure D.

International Journal of Environmental Sciences
ISSN: 2229-7359
Vol. 11 No. 18s, 2025
https://theaspd.com/index.php

FIGURE A. ap and lateral xray of right elbow showing comminuted proximal ulna fracture

FIGURE B. showing 3d ct reconstruction of right elbow

FIGURE C. showing lateral decubitus position of right upper limb.

International Journal of Environmental Sciences
ISSN: 2229-7359
Vol. 11 No. 18s, 2025
https://theaspd.com/index.php

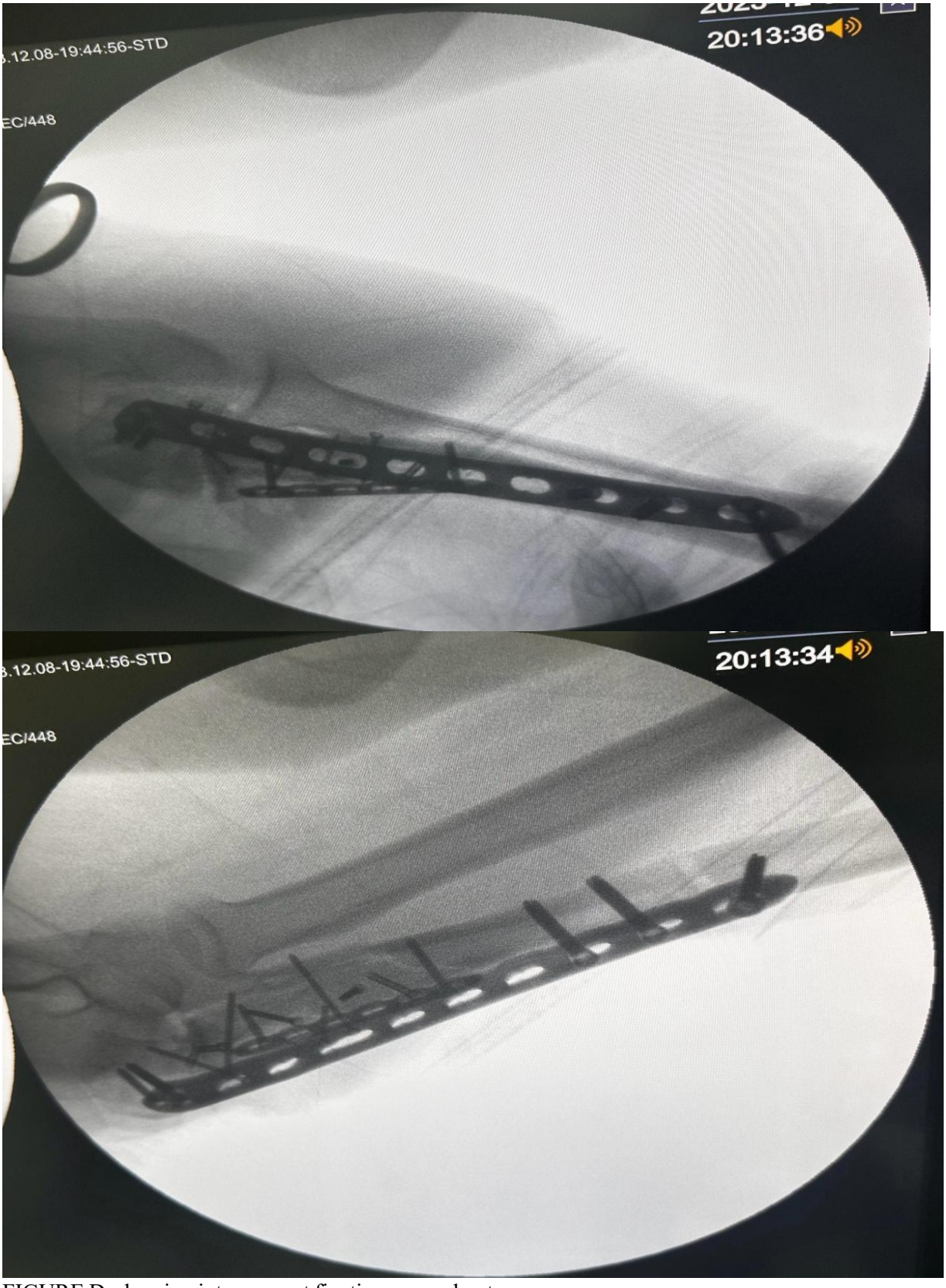

FIGURE D. showing intra op post fixation c arm shoot.

DISCUSSION

Comminuted fractures of the proximal ulna, especially in young patients, require an approach that balances stability with the need for early motion to prevent joint stiffness [6,7]. In this case, the mechanism of injury—a fall into a manhole—produced high-energy trauma, causing significant comminution.

Posterior plating alone may be insufficient in highly unstable patterns, as bending and torsional forces are significant at the elbow joint during daily activity. Biomechanical studies have shown that orthogonal (double) plating can offer significantly higher resistance to failure than single posterior plates [8-10].

The dorsal-medial configuration used in this case allows optimal access to all fragments, improved screw purchase, and resistance to multidirectional loading. While dual plating may be more invasive and involve more soft tissue dissection, in cases of complex comminution, it is justified to ensure durable fixation [11,12].

Additionally, early mobilization is essential to reduce the incidence of elbow contractures and stiffness, which are known complications of prolonged immobilization. Our postoperative protocol included early passive ROM starting on day 5, progressing to active ROM at 3 weeks, in accordance with recommendations for stable internal fixation [13,14].

RESULTS:

The patient's postoperative course was uneventful, and he tolerated the procedure well. On the first postoperative day, neurovascular status of the right upper limb was intact, and the surgical site showed no signs of hematoma or excessive swelling. The posterior splint was maintained for five days to allow soft tissue rest and reduce postoperative inflammation.

On day five, the splint was removed, and the patient was started on supervised passive range of motion exercises with a physiotherapist. He was motivated, compliant, and showed good tolerance to the exercises. By the end of the third week, he had progressed to active assisted movements with noticeable improvements in pain and stiffness. By the sixth week, the patient demonstrated a range of elbow flexion up to 110°, with mild discomfort at terminal range. Supination and pronation were almost full, with mild tightness during rotation. Radiographic evaluation showed progressive callus formation, confirming the stability of the fixation. At this point, strengthening exercises for the upper limb were initiated under supervision.

At ten weeks postoperatively, radiographs showed clear signs of bony union, with bridging callus across the fracture site and no evidence of hardware loosening or failure. Clinically, the patient had achieved 130° of flexion, with an extension lag of about 10°. Forearm rotation was nearly full with supination to 80° and pronation to 85°. There was no tenderness at the surgical site, and the surgical wound had healed with minimal scarring. By the twelfth week, he had resumed most of his daily activities independently. His DASH score was 5.2, reflecting minimal disability in upper limb function, and his Mayo Elbow Performance Score (MEPS) was 90, categorized as excellent. He reported no functional limitations, and strength in the affected limb was approaching parity with the contralateral side. By three months, he had returned to college and resumed activities such as writing, carrying a backpack, and mild recreational sports. By the fifth month, he resumed jogging and light weight training without discomfort. At the six-month follow-up, he exhibited full participation in sports and daily activities, with no complaints of pain, instability, or hardware prominence. Clinically, the elbow had good strength, aesthetics were acceptable, and there were no postoperative complications such as infection or hardware-related issues.

The case concluded with successful anatomical union, functional recovery, and patient satisfaction—validating the decision for early fixation with a double plating technique in this high-energy comminuted proximal ulna fracture.

Overall Functional Results:

By the end of 6 months, the patient had regained near-full function of the right upper limb with no subjective complaints. Elbow strength was comparable to the contralateral limb, and the cosmetic result was acceptable with no visible deformity. The patient was able to participate in sports and activities without restriction.

CONCLUSION:

The management of complex, comminuted proximal ulna fractures in young, active individuals requires a delicate balance between providing rigid fixation and allowing early mobilization to restore function. This case illustrates how a carefully planned and executed double plating technique can successfully address these challenges. By employing orthogonal dual plating, we were able to achieve anatomical reduction and stable internal fixation, enabling the initiation of early range of motion exercises within the first postoperative week. This approach not only restored joint congruity and elbow kinematics but also prevented common complications such as stiffness, implant failure, or non-union. At six months, the patient had returned to full functional activity, with excellent clinical scores and radiological union demonstrating that rigid fixation combined with early rehabilitation is key to successful outcomes in such injuries.

REFERENCES:

1. Ring D, et al. Fracture of the olecranon: treatment with plate fixation. J Bone Joint Surg Am. 2003;85-A(8):1543–51.
2. Duckworth AD, et al. The epidemiology of fractures of the ulna. Bone Joint J. 2013;95-B:653–6.
3. Kloen P, et al. Fixation of comminuted olecranon fractures using double plates. Injury. 2002;33(7):581–5.
4. Egol KA, et al. Biomechanics of plate fixation. Clin Orthop Relat Res. 2002;(405):207–19.
5. Stoffel K, et al. Biomechanical evaluation of double plating techniques. J Orthop Trauma. 2008;22(9):618–23.
6. Grewal R, et al. Complex fractures of the proximal ulna. J Am Acad Orthop Surg. 2008;16(5):281–9.
7. Athwal GS. Surgical techniques in olecranon fractures. J Hand Surg Am. 2015;40(6):1226–31.
8. Kamineni S, et al. Biomechanics of double vs single plating. J Shoulder Elbow Surg. 2014;23(8):1126–31.
9. Wiggers JK, et al. Comparison of posterior vs double plate fixation. Clin Biomech. 2011;26(8):745–9.
10. Hak DJ, et al. Biomechanical efficacy of double plating in comminuted fractures. J Orthop Trauma. 2005;19(10):687–92.
11. Rockwood CA, Green DP. Fractures in Adults. 9th ed. Wolters Kluwer; 2020.
12. AO Foundation. AO Principles of Fracture Management. 3rd ed. Thieme; 2017.
13. Doornberg JN, et al. Radiographic analysis of elbow trauma. J Bone Joint Surg Am. 2007;89(8):1745–50.
14. Pape HC, et al. Treatment concepts for ulnar fractures. Orthop Clin North Am. 2013;44(4):501–12.
15. De Giacomo AF, et al. Elbow injuries: current treatment approaches. J Orthop Trauma. 2012;26(5):296–302.