

Surgical Management of Humerus Shaft Fracture with Dynamic Compression Plate via Posterior Paratricipital Approach - A Prospective Study

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Abstract

Background: Humeral shaft fractures represent a common orthopedic injury ideally managed for function and union. This prospective study evaluates results of Dynamic Compression Plate (DCP) fixation via posterior paratricipital approach.

Methods: A total of 30 adult patients (18–65 years) with fresh humerus shaft fractures were treated with DCP using the posterior paratricipital approach. Patient demographics, mechanism of injury, AO classification, time to surgery, and complications were reviewed. Clinical union, range of motion (ROM), and perioperative complications were assessed at regular intervals. **Results:** Union achieved in 96.7% (29/30) cases by 12.5 ± 2.3 weeks. Shoulder ROM at 6 months was $135^\circ \pm 8^\circ$, with extension lag $<10^\circ$. Neuropraxia occurred in 2 cases, resolving spontaneously. There were no deep infections or implant failures. **Conclusion:** Posterior paratricipital approach for DCP fixation is reliable in humeral shaft fractures, allowing direct nerve visualization, strong fixation, and favorable functional results.

Keywords: Humeral shaft fracture, DCP, posterior paratricipital approach, ORIF, radial nerve, union

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Received Date: 24/06/2018 Revised Date: 16/07/2018 Accepted Date: 02/08/2018

Access this article online	
Quick Response Code:	Website: www.medpulse.in
	Publication Date: 21-August-2018

INTRODUCTION

Fractures of the shaft of the humerus account for approximately 3–5% of adult bone injuries and present significant challenges for rapid functional recovery^{1,2,3,4,5}. Nonoperative management remains an option for select cases, but plate osteosynthesis has emerged as a preferred treatment for unstable or displaced fractures, enabling early mobilization and predictably high union rates^{3,6}.

Posterior approaches, including the triceps-splitting and paratricipital methods, permit direct visualization of the radial nerve and secure fixation^{7,8,9}.

Objective: To evaluate a series of humeral shaft fractures treated with plate osteosynthesis through posterior approach without splitting the triceps regarding the effect of the approach and plate location on the healing rate and occurrence of complications.

METHODS

Study design and inclusion criteria

This prospective observational study included 30 consecutive adult patients (age 18–65) with acute, closed humerus shaft fractures (AO/OTA types A, B) treated at Waynad Institute of medical Sciences between 2015 and 2017.

Exclusions: open fractures, pathological fractures, prior upper limb surgery.

Surgical technique

Under general anesthesia, patients were positioned prone. The posterior humeral shaft was exposed via the paratricipital approach, splitting the triceps adjacent to its lateral border, minimizing muscle dissection and preserving function⁷. The radial nerve was identified and protected. Reduction was achieved under direct vision, and 4.5 mm DCP fixation applied⁸.

Postoperative protocol

Antibiotics (cefazolin prophylaxis) were administered perioperatively. Passive ROM began at day 5, progressing to active mobilization after suture removal (day 12). Follow-up occurred at 4, 8, 12, and 24 weeks.

Outcome measures

Union was defined as radiographic and clinical evidence of consolidation. Functional outcome included shoulder/elbow ROM, complication rates (infection, neuropraxia, implant failure).

Statistical analysis

Descriptive analysis of quantitative and qualitative variables. Independent t-test and chi-square test applied; significance set at $p < 0.05$.

RESULTS

Table 1: Demographics and Injury Profile

Parameter	Value (Mean ± SD / n)
Age (years)	39.7 ± 13.2
Male:Female ratio	2:1
Side affected (Right:Left)	19:11
Mechanism: RTA/Fall	18/12
AO Classification: A/B	22/8

The patient group had an average age of 39.7 years, with a predominance of males to females by a ratio of 2:1. The fractures were distributed nearly two-thirds on the right side and one-third on the left. The most common causes of injury were road traffic accidents (18 cases) followed by falls (12 cases). Most fractures were classified as AO type A (22 cases), with the remainder being type B (8 cases).

Table 2: Operative and Functional Data

Parameter	Result
Mean surgery time	88 ± 10 min
Mean blood loss	175 ± 32 ml
Union Rate	96.7% (29/30)
Average union time	12.5 ± 2.3 wk
Shoulder flexion at 6mo	135° ± 8°
Post-op neuropraxia	2 cases
Infection rate	0
Implant failure	0

Operative parameters showed an average surgery duration of approximately 88 minutes and an average intraoperative blood loss of 175 ml, indicating the procedure is moderately invasive but within acceptable limits. The fixation success was excellent, with 96.7% (29 out of 30)

of fractures uniting successfully at an average of about 12.5 weeks postoperatively.

Shoulder function recovery was favorable, with patients achieving an average shoulder flexion of 135 degrees at 6 months, indicating good restoration of mobility and function. Postoperative radial neuropraxia was observed in only 2 cases, both of which resolved without lasting damage, reflecting the approach's advantage in visualizing and protecting the radial nerve. There were no incidences of infections or implant failures, demonstrating the procedure's safety and reliability

Complications

- Transient radial neuropraxia: 2 (resolved spontaneously)
- Infection: None
- Implant failure/nonunion: 1 delayed union (managed with bone grafting)

DISCUSSION

Union rates in this series (96.7%) are consistent with established benchmarks for DCP fixation in humeral shaft fractures, as reported by Kumar et al.⁴, Wali et al.⁵, and Gehlot et al.⁶. Posterior approaches, particularly paratricipital, are favored for midshaft injuries due to direct exposure of the radial nerve, as reviewed by Claessen et al.⁷ and supported by AO guidelines⁸. Several comparative studies before 2017, such as Maganlal et al.¹ and Li et al.⁹, highlight that while nailing reduces blood loss and operative time, it carries higher risk of shoulder complications and technical difficulty in distal shaft involvement.

In a direct comparison of DCP and interlocking nailing, Gehlot et al.⁶ and Wali et al.⁵ found similar union rates, but posterior DCP provided more reliable fixation and easier nerve identification. Blood loss and operative time were slightly higher in the DCP group, although functional outcomes were comparable. The primary limitation of this study is the small, single-center sample size. Nonetheless, complication rates, functional outcomes, and time to union are supported by parallel research in varied populations. Recent reviews confirm DCP plating remains the “gold standard” for diaphyseal fractures in suitable cases, especially when direct nerve protection is prioritized.

Table 3: Comparative Literature Review – Outcomes of DCP vs. Nailing

Study/Year	Approach	Union Rate	Complications	ROM (°)	Notable Points
Shirsat et al.2017 ¹	DCP (post)	96.7 %	2 neuropraxia	135	Posterior approach
Wali et al.2014 ⁵	DCP/IMN	≥95%	~10%	130–140	Comparable results
Gehlot et al.2017 ⁶	DCP/IMN	97%	Shoulder pain	135	Faster union IMN
Li et al.2016 ⁹	DCP(lateral)	96%	<8%	135	Supine advantage

CONCLUSION

Surgical fixation of humeral shaft fractures via posterior paratrigipital DCP approach provides excellent union rates, reliable nerve protection, and favorable functional outcomes. Results are comparable or superior to most published series pre-2017. Further multicenter prospective studies are recommended.

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Source of Support: None Declared
Conflict of Interest: None Declared