



## Analysis of Functional Outcome of Proximal Humerus Fractures Managed with Philos Plate

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### KEYWORDS

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### ABSTRACT:

Proximal humerus fractures constitute approximately 7% of all fractures and around 80% of humeral fractures. They are the second most common fracture of the upper extremity in patients over 65 years and the third most common osteoporotic fracture in the elderly. This type of fracture shows a bimodal age distribution, affecting young patients following road traffic accidents (RTA) and elderly patients following accidental falls on an outstretched hand. Among the elderly, post-menopausal women are particularly at risk due to osteoporosis (1, 2).

Non-displaced or minimally displaced fractures are typically managed conservatively, aiming for a functionally acceptable range of motion and functional exercises. Displaced fractures, however, often require surgical intervention to achieve good anatomical reduction, stable fixation, and early mobilization. Various surgical techniques are employed to treat displaced proximal humerus fractures, including transcutaneous suture fixation, percutaneous pinning, locking compression plates, intramedullary interlocking nailing, and hemiarthroplasty. Despite the range of techniques available, none consistently yield high success rates (3, 4).

### INTRODUCTION

Proximal humerus fractures constitute approximately 7% of all fractures and around 80% of humeral fractures. They are the second most common fracture of the upper extremity in patients over 65 years and the third most common osteoporotic fracture in the elderly. This type of fracture shows a bimodal age distribution, affecting young patients following road traffic accidents (RTA) and elderly patients following accidental falls on an outstretched hand. Among the elderly, post-menopausal women are particularly at risk due to osteoporosis (1,2).

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locking compression plates, intramedullary interlocking nailing, and hemiarthroplasty. Despite the range of techniques available, none consistently yield high success rates (3,4).

Successful fracture healing and early mobilization depend on minimal soft tissue dissection, minimal exposure, and the use of rigid implants for good reduction and stable fixation. These factors create an optimal environment for fracture healing and facilitate early shoulder joint mobilization (5). In this study, we treated proximal humerus fractures with the Proximal Humerus Internal Locking System (PHILOS) plating after achieving good anatomical reduction. The outcomes were assessed using the Constant-Murley score, which evaluates functional range of movement, pain, activities of daily living, and strength.

The purpose of this study is to evaluate the functional outcomes of proximal humerus fractures treated with PHILOS plating using the Constant-Murley score. The PHILOS plate provides a rigid implant that enables improved functional outcomes, stable fixation,



and rotator cuff suturing, thereby preventing shoulder stiffness, cuff dysfunction, and the need for later salvage surgery <sup>(6,7)</sup>.

## MATERIAL METHODS

This prospective study was conducted at Sree Balaji Medical College and Hospital, Chennai, in the Department of Orthopaedics, from July 2022 to June 2024, spanning 24 months. Twenty patients with displaced proximal humerus fractures were admitted. Informed consent was obtained from each patient in a comprehensible manner, and the study was approved by the ethical committee. Inclusion Criteria Patients aged 18 to 65 years of either sex with closed proximal humerus fractures, with an injury duration of less than 3 weeks, and with 2-part and 3-part fractures were included in the study. Exclusion criteria included skeletally immature patients, Undisplaced fractures, pathological fractures, associated head injury or vascular injury, and associated infections. All patients underwent surgical fixation with PHILOS plates. Key factors noted included biological age, mechanism of injury, extent of injury, and timing of final treatment. The study documented the time for bone

union, pre- and post-surgical complications, and time to resume previous activities. Each patient was evaluated using the Constant-Murley score based on clinical and radiological results. The deltopectoral approach was used for surgery. The study comprised 8 males and 12 females, with 10 patients under 50 years and 10 patients over 50 years. Injuries resulted from road traffic accidents (11 patients) and slip and falls (9 patients). The right upper limb was involved in 9 patients, and the left upper limb in 11 patients. The fractures included 7 two-part fractures and 13 three-part fractures. Four patients had Type 2 Diabetes, and four had systemic hypertension. A typical surgical procedure lasted about 120 minutes, with an average blood loss of 220 millilitres. Surgery was typically performed on the third day post-injury. There were no anesthesia-related complications or post-surgery neurological deficits. Initial management in the casualty and OPD included stabilization with analgesics and application of U-slab or arm sling. X-rays and CT scans were used to classify fractures according to the Neer classification, followed by blood investigations and anesthetic fitness assessments for surgery.

## RESULT

**Table 1: Patient Demographics and Injury Characteristics**

Category	Subcategory	No. of Patients
Sex Incidence	Males	8
	Females	12
Age Distribution	20 – 30	3
	31 – 40	2
	41 – 50	5
	51 – 60	5
	61 – 70	5
Side Involved	Right	9
	Left	11
NEER Fracture Type	2 Part	7
	3 Part	13
Injury Mode	Road Traffic Accident	11
	Slip & Fall	9



Table 2: Evaluation, Fracture Type, and Bony Union Outcomes

Category	Subcategory	Number of Patients	Percentage (%)	Constant Score Grade	Mean Constant Score	Average Time for Bony Union (Weeks)
Evaluation	Excellent	16	80	Excellent	89.7	-
	Good	2	10	Good	82.5	-
	Moderate	1	5	Moderate	70	-
	Poor	1	5	Poor	55	-
Neer Fracture Type	2 Part	7	-	Excellent	88.2	-
	3 Part	13	-	Good	83.1	-
Average Time Taken for Bony Union	11-12 Weeks	10	-	-	-	11-12
	12-13 Weeks	10	-	-	-	12-13

## DISCUSSION

Our study was a prospective analysis involving 20 patients with displaced proximal humerus fractures, where 60% were females, aligning with Christiansen et al.'s <sup>(7)</sup> findings of a higher female prevalence due to early osteoporosis. Radiological union in our study was achieved at 12 weeks, which is earlier than Rather et al.'s <sup>(8)</sup> reported 15.6 weeks for a similar cohort. In 2014, Sivanandha <sup>(9)</sup> and colleagues found that PHILOS plates offered superior mechanical and biological benefits for proximal humeral fractures, a conclusion mirrored in our study where all patients had Excellent to Good outcomes. AA Martinez et al. in 2009 <sup>(10)</sup> reported a mean constant score of 80 for patients treated with PHILOS plates, while our study achieved a higher mean score of 87.0, indicating better functional outcomes. Manjeet et al. (2015) <sup>(11)</sup> recommended using medial calcar screws and bone grafts to prevent varus collapse, reflecting our practice and resulting in a comparable mean constant score of 87.0. Sharma et al. (2015) <sup>(12)</sup> highlighted the advantages of PHILOS plates in achieving good outcomes in displaced fractures, consistent with our findings of strong fracture fixation, early joint mobilization, and rotator cuff restoration. Overall, our study reported a single case of varus collapse and screw backing, with no non-union, mal-union, avascular necrosis, or impingement, underscoring the benefits of early mobilization and physiotherapy for achieving better functional outcomes in proximal humerus fractures managed with PHILOS plates.

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