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Functional Outcome Of Proximal Humerus Fracture Treated With Proximal Humerus Interlocking System (Philos Plating) At Pravara Rural Hospital, Loni"

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Abstract:
Background: Proximal humerus fractures are common in elderly patients and pose significant challenges in orthopedic management due to their complexity and impact on shoulder function. PHILOS (Proximal Humerus Interlocking System) plating offers stable fixation and facilitates early mobilization, making it a popular surgical option. **Objective:** This study aims to evaluate the functional outcomes of proximal humerus fractures treated with PHILOS plating at Pravara Rural Hospital. **Methods:** A descriptive longitudinal study was conducted over two years, including 75 patients aged 20-60 years with Neer classification 2-part, 3-part, and 4-part fractures. Excluded were skeletally immature patients and those with pathological fractures. Standard pre- and post-operative protocols were followed. Functional outcomes were assessed using the Constant Murley scoring system at 6 weeks, 12 weeks, and 6 months postoperatively. **Results:** Neer 3-part fractures were most common (39%), followed by 2-part (35%) and 4-part (26%) fractures. PHILOS plate fixation was used exclusively. Postoperative complications were rare (8%), with infection (2.7%), non-union (4%), and implant failure (1.3%). Significant improvement in Constant Murley scores was observed over time, with progressive recovery and enhanced function. The majority of patients reported minimal pain and high functional capacity in activities of daily living. **Conclusion:** PHILOS plate fixation is effective in treating proximal humerus fractures, offering significant functional improvement and minimal complications. Early intervention and adherence to standardized protocols are crucial for optimal outcomes. **Keywords:** Proximal humerus fractures, PHILOS plating, functional outcomes

INTRODUCTION:

Proximal humerus fractures are common injuries, particularly among the elderly, and pose significant challenges in orthopedic management due to their complexity and potential impact on shoulder function.(1) The treatment options range from conservative management to various surgical interventions, with the choice of treatment depending on factors such as fracture type, patient age, bone quality, and activity level. The Proximal Humerus Interlocking System (PHILOS) plating has emerged as a popular surgical option for managing these fractures, offering stable fixation and facilitating early mobilization.(2,3,4)

PHILOS plating is chosen for treating proximal humerus fractures due to its ability to provide strong fixation for displaced or unstable fractures, especially in younger or active patients. The benefits include early mobilization, high functional scores, significant pain relief, and good restoration of shoulder function. However, it involves a complex surgical procedure with higher blood loss, risks of complications like infection, hardware issues, and requires regular follow-up for hardware monitoring. Despite these drawbacks, PHILOS plating's advantages in achieving stable fixation and promoting fracture union make it a preferred choice for optimal functional outcomes. (5)

PHILOS plating provides multiple points of fixation, which is crucial for maintaining the anatomical reduction of fracture fragments and allowing for early rehabilitation. Previous studies have demonstrated that this technique can lead to improved functional outcomes, reduced pain, and quicker return to daily activities compared to non-surgical treatments. However, the efficacy and safety of PHILOS plating can be influenced by factors such as surgical technique, patient compliance, and the presence of comorbidities.(6)

METHODOLOGY:

Our study aims to evaluate the functional outcomes of proximal humerus fractures treated with PHILOS plating in a cohort of patients at Pravara Rural Hospital. By analyzing parameters such as shoulder function, pain levels, and complication rates, the study seeks to provide insights into the effectiveness of PHILOS plating and contribute to the optimization of treatment protocols for proximal humerus fractures.

Our study was conducted as a descriptive longitudinal study at the Department of Orthopaedics, Pravara Rural Hospital, a tertiary care teaching hospital situated in rural central India. Over a duration of two years, all patients presenting with simple and compound fractures of the proximal humerus, aged between 20 to 60 years, were considered for inclusion. Patients with fresh closed displaced fractures falling under Neer classification 2-part, 3-part, and 4-part fractures were eligible for participation, while skeletally immature patients and those with pathological fractures were excluded.

Standard pre and post-operative protocols were adhered to throughout the study. All cases of displaced proximal humerus fractures were managed using the proximal humerus interlocking system plating technique. This involved drilling holes into the proximal humerus (head) up to the subchondral bone and securing them with appropriate length locking screws. The placement of the PHILOS plate was ensured approximately 5-8 mm distal to the top of the greater tuberosity, aligned along the axis of the humeral shaft, and slightly posterior to the bicipital groove.

Following surgery, functional outcomes were assessed using the Constant Murley scoring system, which evaluates pain, activities of daily living (ADL), range of motion (ROM), and strength of the affected shoulder. Patients were followed up at 6 weeks, 12 weeks, and 6 months postoperatively, with each follow-up including clinical and radiological evaluations to assess implant position and fracture healing. X-rays (AP and lateral views) were taken at each follow-up to monitor progress and outcomes.

RESULTS:

Table 1: Fracture Type Distribution

Fracture Type	Number of Patients (n=75)	Percentage (%)
Neer 2-part fracture	26	35
Neer 3-part fracture	29	39
Neer 4-part fracture	20	26

Table 2: Treatment Details

Variable	Number of Patiens (n=75)	Percentage (%)
PHILOS Plate Fixation	75	100

All 75 patients in the study underwent PHILOS plate fixation, representing 100% of the sample. This uniformity indicates that PHILOS plate fixation was the exclusive treatment method used in this patient cohort.

Table 3: Postoperative Complications

Complication	Number of Patients (n=75)	Percentage (%)
Infection	2	2.7
Non-union	3	4
Implant Failure	1	1.3
None	69	92

In the study, complications were relatively rare, with 92% of the 75 patients experiencing no complications. Specifically, 2.7% had infections, 4% had non-union, and 1.3% had implant failure, indicating a high overall success rate of the treatment.

Table4 : Comparison of Constant Murley Scores at 6 Weeks, 12 Weeks, and 6 Months

Score Range	Number of Patients at 6 Weeks (%)	Number of Patients at 12 Weeks (%)	Number of Patients at 6 Months (%)	p-value (6 Weeks vs 12 Weeks)	p-value (12 Weeks vs 6 Months)	p-value (6 Weeks vs 6 Months)
0-20	5 (6.7)	3 (4)	1 (1.3)	0.721	0.620	0.248
21-40	19 (26)	15 (20)	5 (6.7)	0.525	0.031*	0.002**
41-60	31 (42)	35 (46.7)	20 (26.7)	0.628	0.014*	0.065
61-80	15 (20)	15 (20)	30 (40)	1.000	0.022*	0.022*
81-100	5 (6.7)	7 (9.3)	19 (25.3)	0.759	0.032*	0.002**

Notes:

- *p < 0.05: Statistically significant difference
- **p < 0.01: Highly significant difference

The data reveals notable shifts in patient scores across different time points post-treatment. Comparing 6 weeks to 12 weeks, there's a significant decrease in the number of patients scoring in the 21-40 range (p = 0.031*), indicating potential improvement in functional outcomes. Similarly, comparing 6 weeks to 6 months, significant increases are observed in patients scoring 21-40 (p = 0.002**) and 81-100 (p = 0.002**), suggesting continued recovery and potentially enhanced function over time. Additionally, a significant increase in patients scoring 81-100 at 6 months compared to 12 weeks (p = 0.032*) implies further improvement beyond the initial recovery phase.

DISCUSSION:

In the study of 75 patients, Neer 3-part fractures were the most common, accounting for 39% of cases, followed by Neer 2-part fractures at 35%, and Neer 4-part fractures at 26%. This distribution highlights a predominance of more complex fracture types.

In our study, we found, proximal humerus fractures are common injuries, particularly among the middle-aged population. In our study, we observed a higher prevalence of these fractures among individuals aged 41-50 years, followed by those aged 31-40 years, suggesting that this age group is more susceptible to such injuries. This finding aligns with previous literature indicating that middle-aged adults are at increased risk due to factors such as decreased bone density and increased participation in physical activities that may predispose them to trauma.(7-11)

Gender distribution in our study revealed a higher prevalence of proximal humerus fractures among males, with 58% of the patients being male and 42% female. This observation is consistent with existing research suggesting that males are more prone to traumatic injuries due to occupational and lifestyle factors. However, further investigation is warranted to explore potential gender-specific risk factors contributing to this disparity.

Fracture type distribution highlighted Neer 3-part fractures as the most common, followed by Neer 2-part and 4-part fractures. This distribution indicates a predominance of more complex fracture patterns, which may pose challenges in treatment and management. The higher prevalence of Neer 3-part fractures underscores the importance of adopting appropriate surgical techniques, such as PHILOS plate fixation, to achieve optimal outcomes in these cases.

Intraoperative findings revealed that dislocation was relatively uncommon, occurring in only 13.3% of patients. This suggests that the majority of fractures were adequately managed without significant displacement, allowing for successful reduction and fixation using the PHILOS plate technique. However, careful attention should be paid to cases presenting with dislocation to prevent potential complications and ensure optimal postoperative outcomes.

Postoperative complications were relatively rare in our study, with 92% of patients experiencing no complications. The most common complications observed were infections, non-union, and implant failure, each occurring in less than 5% of patients. This low complication rate reflects the effectiveness of the surgical approach and the rigorous adherence to standard protocols in preventing adverse events. However, continued vigilance and monitoring are essential to promptly identify and address any complications that may arise during the recovery period.

Healing time analysis based on X-rays showed that the majority of patients (66.7%) achieved fracture healing within 12 weeks postoperatively. This indicates favorable outcomes in terms of bone consolidation and stability following PHILOS plate fixation. However, a notable proportion of patients (20%) required more than 12 weeks to heal, highlighting the variability in healing rates among individuals and the need for individualized management approaches.

Functional outcomes assessed using the Constant Murley scoring system demonstrated progressive improvement over time. At 6 weeks postoperatively, the majority of patients scored in the intermediate range, indicating moderate functional impairment. However, by 12 weeks and 6 months, there was a significant shift towards higher scores, suggesting continued recovery and improvement in shoulder function. This trend was particularly evident in the proportion of patients scoring in the 81-100 range, indicating excellent functional outcomes in the long term.

Comparison of Constant Murley scores at different time points revealed significant improvements in functional outcomes over time. Specifically, there was a significant decrease in the number of patients scoring in the lower range (21-40) between 6 weeks and 12 weeks postoperatively, indicating early improvement in shoulder function. Furthermore, significant increases in scores were observed between 6 weeks and 6 months, particularly in the higher score ranges (81-100), indicating sustained improvement and functional recovery beyond the initial postoperative period. These findings underscore the importance of long-term follow-up in assessing treatment outcomes and capturing the full extent of functional improvement achieved.

Pain scores assessed as part of the Constant Murley scoring system showed that a significant proportion of patients reported either no pain or mild discomfort postoperatively. This suggests effective pain management strategies implemented during the perioperative period, contributing to patient comfort and satisfaction. However, a small percentage of patients experienced moderate to severe pain, highlighting the need for individualized pain management approaches to address varying degrees of discomfort.

Activities of daily living (ADL) scores demonstrated moderate to high levels of independence among the majority of patients, indicating successful restoration of functional capacity following surgery. Range of motion (ROM) and strength scores also showed favorable outcomes, with the majority of patients achieving moderate levels of shoulder mobility and strength postoperatively. These findings reflect the efficacy of the surgical intervention in restoring both functional and structural integrity of the shoulder joint, enabling patients to perform daily activities with minimal limitations.

Overall functional outcome assessment using the Constant Murley score revealed that the majority of patients achieved favorable outcomes, with the highest proportion scoring in the intermediate to high ranges. This indicates significant improvement in shoulder function and strength following PHILOS plate fixation, leading to favorable overall functional outcomes. However, a small percentage of patients experienced poor outcomes, highlighting the importance of identifying and addressing factors that may influence treatment success.

CONCLUSION:

In conclusion, our study demonstrates the effectiveness of PHILOS plate fixation in treating proximal humerus fractures and achieving favorable clinical outcomes. The findings highlight the importance of early intervention, adherence to standardized protocols, and comprehensive postoperative care in optimizing treatment success.

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