

Comparing the Treatment Results of Proximal Humerus Fracture Based On Surgical or Nonsurgical Methods

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Abstract:

Background: Proximal humerus fractures are common injuries, particularly among the elderly. The optimal treatment strategy for these fractures remains controversial, with both surgical and nonsurgical methods being employed. This prospective study aims to compare the outcomes of surgical versus nonsurgical treatment of proximal humerus fractures over a three years period at Indira Gandhi Institute of Medical Sciences (IGIMS) in Patna, Bihar, India.

Materials and Methods: This study was conducted from January 2020 to December 2022 in the Department of Orthopedics at IGIMS. A total of 100 patients with proximal humerus fractures were enrolled and divided into two groups: surgical (n=50) and nonsurgical (n=50). Surgical treatments included open reduction and internal fixation, while nonsurgical treatments involved immobilization using slings or braces. Patients were followed up at 3, 6, and 12 months post-treatment. Functional outcomes were assessed using the Constant-Murley score and radiographic evaluations. Complications and recovery times were also recorded.

Results: The average Constant-Murley score at 12 months was significantly higher in the surgical group (85 ± 5) compared to the nonsurgical group (75 ± 8) ($p < 0.05$). Radiographic evaluations showed better fracture union in the surgical group, with 90% achieving complete union by 6 months compared to 70% in the nonsurgical group. Complications were more frequent in the surgical group (30%) compared to the nonsurgical group (10%), with infection and hardware-related issues being the most common. However, the surgical group exhibited faster functional recovery and better overall shoulder function.

Conclusion: Surgical treatment of proximal humerus fractures results in superior functional outcomes and faster recovery compared to nonsurgical methods. Despite a higher complication rate, the benefits of surgical intervention, including better fracture union and improved shoulder function, suggest it as a preferable treatment option for selected patients.

Keywords: Proximal humerus fracture, surgical treatment, nonsurgical treatment, functional outcomes, Constant-Murley score, fracture union, orthopedic surgery.

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Introduction

Proximal humerus fractures are among the most common fractures in the elderly population, accounting for approximately 5% of all fractures. These fractures are often associated with osteoporosis and typically result from low-energy trauma such as falls from a standing height.

The management of proximal humerus fractures remains a topic of debate in orthopedic practice, with both surgical and nonsurgical approaches

being utilized depending on the patient's age, activity level, bone quality, and fracture type [1,2].

Surgical treatment options for proximal humerus fractures include open reduction and internal fixation (ORIF), intramedullary nailing, and shoulder arthroplasty. These interventions aim to restore anatomical alignment and facilitate early mobilization, potentially leading to better functional outcomes. However, surgical treatment

is associated with risks such as infection, hardware failure, and postoperative stiffness [3,4]. On the other hand, nonsurgical management, typically involving immobilization with slings or braces, is often preferred for less displaced fractures or in patients with significant comorbidities. While nonsurgical methods avoid the risks associated with surgery, they may result in prolonged immobilization, joint stiffness, and suboptimal functional recovery [5,6].

Previous studies have yielded conflicting results regarding the superiority of surgical versus nonsurgical treatment for proximal humerus fractures. Some studies suggest that surgical intervention provides better functional outcomes and faster recovery, while others indicate no significant difference between the two approaches [7-9]. Given the lack of consensus and the potential implications for patient care, this prospective study aims to compare the treatment outcomes of surgical and nonsurgical methods for proximal humerus fractures at a tertiary care center in India.

This study was conducted at the Indira Gandhi Institute of Medical Sciences (IGIMS) in Patna, Bihar, India, over a three years period from January 2020 to December 2022. By assessing functional outcomes, radiographic healing, and complications, this study seeks to provide evidence-based recommendations for the optimal management of proximal humerus fractures.

Materials and Methods:

Study Design and Setting: This prospective study was conducted in the Department of Orthopedics at Indira Gandhi Institute of Medical Sciences (IGIMS), Patna, Bihar, India, over a period of three years from January 2020 to December 2022.

Participants: A total of 100 patients with proximal humerus fractures were enrolled in the study. The inclusion criteria were patients aged 18 years and above with acute proximal humerus fractures confirmed by radiographic imaging. Exclusion criteria included pathological fractures, previous humerus fractures, or pre-existing shoulder conditions affecting the functional outcome.

Randomization and Group Allocation: Participants were randomly assigned into two groups: surgical (n=50) and nonsurgical (n=50). Randomization was performed using a computer-generated random number table. The surgical group underwent open reduction and internal fixation

(ORIF) with locking plates or intramedullary nailing, while the nonsurgical group received conservative treatment with slings or braces.

Surgical Procedure: Patients in the surgical group underwent ORIF using locking plates or intramedullary nailing under general anesthesia. The choice of surgical technique was based on the type and complexity of the fracture as determined by the attending surgeon. Postoperative care included immobilization, followed by a structured rehabilitation program.

Nonsurgical Procedure: Patients in the nonsurgical group were treated with immobilization using slings or braces. The duration of immobilization was determined by the degree of fracture stability and patient comfort. Rehabilitation included progressive range of motion exercises starting from the third week post-injury.

Follow-up and Outcome Measures: All patients were followed up at 3, 6, and 12 months post-treatment. The primary outcome measure was the Constant-Murley score, which assesses shoulder function based on pain, activities of daily living, range of motion, and strength. Secondary outcomes included radiographic evaluation of fracture union, time to return to normal activities, and incidence of complications.

Radiographic Evaluation: Fracture union was assessed using serial radiographs at each follow-up visit. Fracture union was defined as the presence of bridging callus across the fracture site in at least three cortices on two orthogonal views.

Statistical Analysis: Data were analyzed using SPSS software version 25.0. Continuous variables were presented as mean \pm standard deviation (SD), and categorical variables as frequencies and percentages. The Constant-Murley scores between the surgical and nonsurgical groups were compared using the independent t-test. Chi-square test was used for comparing categorical variables. A p-value of <0.05 was considered statistically significant.

Results

A total of 100 patients with proximal humerus fractures were enrolled and randomly allocated into two groups: surgical (n=50) and nonsurgical (n=50). The baseline characteristics of the patients in both groups were comparable, as shown in Table 1.

Table 1: Baseline Characteristics of Patients

Characteristic	Surgical Group (n=50)	Nonsurgical Group (n=50)
Mean Age (years)	65 \pm 10	66 \pm 9
Gender (Male/Female)	28/22	26/24
Fracture Type (2-part)	30	32
Fracture Type (3-part)	15	13
Fracture Type (4-part)	5	5

Functional Outcomes: The functional outcomes assessed using the Constant-Murley score at 3, 6, and 12 months post-treatment are summarized in Table 2. The surgical group demonstrated significantly higher scores at all follow-up points compared to the nonsurgical group.

Table 2: Constant-Murley Scores

Follow-up Time	Surgical Group (mean ± SD)	Nonsurgical Group (mean ± SD)	p-value
3 months	70 ± 8	60 ± 10	<0.01
6 months	80 ± 6	70 ± 9	<0.01
12 months	85 ± 5	75 ± 8	<0.01

Radiographic Evaluation: The rates of fracture union at different follow-up periods are presented in Table 3. The surgical group showed a higher rate of complete fracture union compared to the nonsurgical group.

Table 3: Fracture Union Rates

Follow-up Time	Surgical Group (%)	Nonsurgical Group (%)	p-value
3 months	70	50	<0.05
6 months	90	70	<0.05
12 months	95	85	<0.05

Complications: The complications observed in both groups are detailed in Table 4. The surgical group had a higher incidence of complications, predominantly due to infection and hardware-related issues.

Table 4: Complications

Complication Type	Surgical Group (n=50)	Nonsurgical Group (n=50)
Total Complications	15 (30%)	5 (10%)
Infection	5 (10%)	1 (2%)
Hardware-related issues	7 (14%)	0 (0%)
Non-union	1 (2%)	3 (6%)
Shoulder stiffness	2 (4%)	1 (2%)

Time to Return to Normal Activities:

The average time to return to normal activities was shorter in the surgical group (4 ± 1 months) compared to the nonsurgical group (6 ± 2 months), with a statistically significant difference ($p < 0.01$).

In summary, the surgical group demonstrated better functional outcomes, higher rates of fracture union, and shorter recovery times compared to the nonsurgical group, despite a higher incidence of complications.

Discussion

The management of proximal humerus fractures remains a challenging and debated topic in orthopedic surgery. This prospective study aimed to compare the outcomes of surgical versus nonsurgical treatment of proximal humerus fractures over a three years period.

Our findings indicate that surgical treatment results in superior functional outcomes, higher rates of fracture union, and shorter recovery times compared to nonsurgical methods, despite a higher incidence of complications.

The results of this study align with previous research that has demonstrated the benefits of surgical intervention for proximal humerus fractures. Surgical treatment, particularly with

locking plates or intramedullary nails, allows for accurate anatomical reduction and stable fixation, which facilitates early mobilization and rehabilitation. This early mobilization is critical for achieving better functional outcomes, as evidenced by the higher Constant-Murley scores in the surgical group at all follow-up points [1,2].

Our study found that the surgical group had significantly higher rates of fracture union at 3, 6, and 12 months post-treatment. These findings are consistent with those reported by Fjalestad et al., who demonstrated that angular stable plates provided better outcomes in terms of fracture union and functional recovery compared to nonsurgical methods [3]. Additionally, the surgical group in our study showed a shorter time to return to normal activities, highlighting the advantages of surgical intervention in promoting quicker functional recovery.

However, the increased complication rate in the surgical group is a notable finding. Complications such as infection, hardware-related issues, and non-union were more frequent among surgically treated patients. This observation is supported by previous studies that have reported similar complications associated with surgical management of proximal humerus fractures [4,5]. Infection and hardware failure are particularly concerning and underscore

the need for meticulous surgical technique and postoperative care to minimize these risks. Despite these complications, the overall benefits of surgical treatment, including improved shoulder function and quicker recovery, suggest that surgery should be considered for patients with displaced or unstable proximal humerus fractures.

In contrast, nonsurgical treatment, while associated with fewer complications, often results in prolonged immobilization and suboptimal functional recovery. Robinson et al. highlighted that nonsurgical management might be more appropriate for minimally displaced fractures or patients with significant comorbidities, where the risks of surgery outweigh the potential benefits [6]. It is important to note the limitations of this study, including the relatively small sample size and the single-center design, which may limit the generalizability of the findings. Additionally, the study did not account for variations in surgical techniques or the experience level of the surgeons, which could influence the outcomes.

Conclusion

In conclusion, this prospective study demonstrates that surgical treatment of proximal humerus fractures results in better functional outcomes, higher rates of fracture union, and faster recovery compared to nonsurgical methods, despite a higher complication rate. These findings support the use of surgical intervention for selected patients with proximal humerus fractures, particularly those with displaced or unstable fractures.

Further multicenter studies with larger sample sizes are needed to validate these findings and provide more comprehensive guidelines for the management of proximal humerus fractures.

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