

## “Comparative Study of Functional Outcome of Dynamic Compression Plating and Interlocking Nailing For Fracture Shaft of Humerus in Adults”

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### Abstract

**Background:** 3% to 5% of all fractures are mid humeral shaft fracture and 2% to 10% are open fractures. The options available for mid shaft fractures are open reduction and internal fixation with plate, and closed reduction and fixation with interlocking nail and conservative. The treatment outcomes have been studied.

**Objective:** In this study we compared the outcome of fracture fixation with dynamic compression plating and interlocking nailing.

**Materials and methods:** Forty adult patients with fracture shaft humerus attending to Jubilee Mission Medical College Hospital, Thrissur between January 2014 and January 2015 was evaluated pre-operatively and the functional results were assessed post-operatively. The patients were evaluated as per the history, mode of injury. Necessary radiological investigations and hematology profile was done on admission. Type of surgery and details was noted. The immediate post-operative x-ray was evaluated. All the cases were evaluated through clinical and radiological methods at weeks, 6 weeks, 12 weeks, 6 months, 1 year and in between if required.

**Results:** Forty two percent of cases were in the age group 31-40 years. The males outnumbered the females. The most common cause was motor vehicle accidents amounting to 64%. Right side was involved in 65% of all cases. All operations were done within 4-6 days of injury. In the twenty patients of plate group, the **complications were:** Infection-7.1%; delayed union-12%; movement restriction of shoulder-12%; movement restriction of elbow-7%. In the twenty patients of nail group, complications were: infection-6.7%; fracture end splintering-7.6%; delayed union-26.8%; movement restriction of elbow-7.6%; movement restriction of shoulder-14.3%; shoulder pain-48%. Maximum number of fractures (73.3% in plating group and 60% in nailing group) clinically united in 12 weeks but the results were statistically insignificant. Excellent results were obtained in 15 patients (73.3%) in locking plate group and 12 patients (60%) in locking nail group on functional assessment.

**Conclusion:** Both locking plating and interlocking intramedullary nailing provided statistically comparable results for patients requiring surgical treatment of mid shaft humeral fractures. But, a higher rate of excellent and good results and a tendency for earlier union was seen with locking plating group in our study.

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### I. Introduction

Humeral mid shaft fractures account for 3% to 5% of all fractures and 2% to 10% are open fractures, thus a very common fracture. Its incidence has a bimodal distribution, mostly young males of 21 to 30 years age group and the other, females of 60 to 80 years. High velocity injuries is the most common cause of the fracture. The second most common cause is fall on outstretched hand, which is an indirect injury especially in the geriatric group<sup>1-4</sup>. Most fractures were conservatively treated except for those who had the indications. The surgical indications are: Unacceptable reduction of fractures, radial nerve palsy, associated vascular lesions, open fractures, polytrauma patients, floating elbow, obese patients who may develop varus angulations<sup>1-5</sup>. Among surgical options, open reduction and fixation with plate and screw, is the gold standard, because of shorter time to union and lesser complications, when compared to intra medullary nailing.<sup>1-4</sup> The soft tissue violation is a major disadvantage of plating over nailing, thus less invasive measures like indirect reduction and percutaneous plate fixation has been developed. A simple, effective and safe treatment, is anterior plating for nonunion of humeral shaft fracture. There is no extensive dissection of soft tissue as radial nerve visualization is not needed. The healing time is similar to other options for humeral non union. Minimally invasive plate osteosynthesis (MIPO) is a new option which is very safe for management of the fracture. MIPO requires intra-operative imaging and surgical experience to obtain adequate fracture alignment. MIPO offers advantages in terms of reduced incidence of iatrogenic radial nerve palsies and accelerated fracture union when compared to conventional plating. But the functional outcome was similar in both cases<sup>6-9</sup>.

## **Aims And Objectives**

To compare the results of dynamic compression plating and interlocking nailing in treatment of fracture shaft humerus with reference to rate of healing.  
Functional outcome Complications and Morbidity

## **II. Materials And Methods**

Data was collected from 40 Adult patients with fracture shaft humerus attending to Jubilee Mission Medical College Hospital during the period from January 2014 to January 2015. Patients were randomized into two groups using odd or even hospital numbers. They were evaluated pre-operatively and the functional results was assessed post-operatively. The patients were evaluated as per mode of injury and the history. Necessary radiological investigations and hematology profile was done on admission itself. Post-operatively Xray and patient was evaluated. All the cases were called up for radiological and clinical evaluation at 2 weeks, 6weeks, 12weeks, 6months, 1year and in between if required for any morbidity and mortality.

### **Study type:**

Analytical Study of functional outcome following dynamic compression plating and interlocking nailing for fracture shaft humerus in adults. A sample of size of 40 patients was divided into two groups based on odd or even hospital numbers.

20 patients underwent dynamic compression plating.

20 patients underwent inter-locking nailing.

### **Inclusion Criteria:**

1. Patient aged 18 years and above.
2. Only the diaphyseal humeral fractures.
3. Fresh fractures.

### **Exclusion criteria.**

1. Fracture of upper and lower ends of humerus.
2. Patients treated conservatively.
3. Patients who lost to follow up
4. Open fracture
5. Pathological fractures.
6. Vascular injury
7. Brachial plexus injuries

### **Collected data was analyzed by Chi-Square test.**

Operative technique: all patients were operated after proper pre anaesthetic check up. An ante grade interlocking technique was done with maximum care not to damage of the rotator cuff at the time of nail insertion. Anterolateral approach was used for plating of the fracture, the biceps was medially retracted with minimal periosteal stripping soft and tissue dissection. Precautions were taken to minimize radial nerve damage.

Post-op period: All patients were encouraged to start postoperative shoulder and elbow exercises immediately. Radiographs at proper intervals were assessed for union. At each visit, the overall rating of excellent, good, fair and poor outcomes based on scores of elbow and shoulder movements along with pain and disability was done after the procedure. Follow up: follow was done routinely for rehabilitative exercises and clinical assessment. Xrays were taken at 2 weeks, 6 weeks, 3 months, 6 months, 12 months, 18 months and in between if required.

## **III. Results**

42% of cases were in the age group 31-40 years. The males outnumbered the females. The most common cause was motor vehicle accidents, amounting to 64%. The right side humerus accounted for 65% of all cases. All patients were operated within 4-6 days of injury. In the twenty patients of plate group, the complications were: Infection-7.1%; delayed union-12%; movement restriction of shoulder-12%; movement restriction of elbow-7%. In the twenty patients of nail group, complications were: fracture end splintering-7.6%; infection-6.7%; delayed union-26.8%; movement restriction of shoulder-14.3%; movement restriction of elbow-7.6%; shoulder pain-48%. Maximum number of fractures (73.3% in plating group and 60% in nailing group) clinically united in 12 weeks. Mean time of union in plate group was 13.7 weeks and nail was 14.1 weeks. There was no significant difference between the two groups. The Functional grading system of SICOT scoring was used to analyse the results. On functional assessment, excellent results were obtained in 15 patients (73.3%) in locking plate group and 12 patients (60%) in locking nail group. There was no significant difference between the locking plate and locking nail group (P value 0.631).

#### **IV. Discussion**

When options for surgical treatment for shaft of humerus fracture was assessed, locking plating and interlocking intramedullary nailing both provide statistically comparable results but a higher rate of excellent and good results and earlier union was seen with locking plating group in our study. Various surgical approaches are mentioned in the literature for ORIF of mid shaft fracture of humerus but we, in our study, we have done plating of fractures through anterolateral approach, by medially reflecting the biceps with minimum soft tissue dissection and periosteal stripping and with maximum care for radial nerve, specially at spiral groove. In our study, no post operative radial nerve palsy occurred for both plating group and nailing group. Humerus nailing was done in all cases of our study through antegrade route. Rotator cuff injury was prevented as much as possible by being careful at entry site selection. In our study no radial nerve palsy, fracture ends splintering occurred for the nailing group. But we had, inspite of strict aseptic precaution 13.3% infection in plate group and 6.6% in nail group, which included superficial skin infection. Majority of the plating group had radiological union before 16 weeks (73.3%) when compared to nailing group (66.6%). So healing as such was not a problem but cases of early healing were more in plate group. Results of our study were comparable to the study by Singiseti K et al 2010. In that study 20 patients were operated with interlocking nailing and 16 patients with plating. They too noticed a higher rate of excellent and good results and a tendency for earlier union with the plating group. Putti et al 10, in 2009, studied and followed up 34 patients with humeral shaft fractures, who were randomized to undergo locked ante grade intramedullary nailing and plating. They concluded that the complication rates were higher in the intramedullary nailing group, whereas functional outcomes were equally good in both modalities. Raghvendra S et al 11 followed up 36 patients in a prospective study. There was no significant difference between plating or nailing in terms of time to union, compression plating is the preferred method in the majority of fractures of the shaft of the humerus with better preservation of joint function and lesser need for secondary bone grafting for union.

#### **V. Conclusion**

For patients requiring surgical treatment of mid shaft humeral fractures, locking plating and interlocking intramedullary nailing both provide statistically comparable results but a higher rate of excellent and good results and a tendency for earlier union was seen with locking plating group in the present series. Further prospective, randomized comparative study is warranted.

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