

# Comparative Study of Compression Plating vs Interlocking Nail in Fracture Shaft of Humerus

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## ABSTRACT

**Introduction:** Fractures of shaft humerus are very common these days, the modes of treatment are also advancing, so this study was conducted to assess the outcome of this fracture by two most common modes of treating this fracture. Aim of the study was to compare the results of open reduction and internal fixation with DCP or close interlocking nail, in fractures shaft of humerus.

**Material and methods:** It was the Prospective study, consisted of 30 cases of fracture shaft humerus, divided in two groups randomly of 15 each to which close ILN and open DCP done. Study was conducted in department of orthopaedics Govt. Medical College Amritsar/Guru Nanak Dev Hospital. Results were evaluated with Neers Criteria. The results were analyzed using different parameter; male v/s female, age, mode of trauma, functional outcome and complications etc.

**Results:** the average age of patients was 35.77 years, with male female ratio 7:3, more common on right side 63.33%, road side accident in 63.33% cases as common mode of injury, middle third as common region 53.33%, most common AO TYPE A3 53.33% cases, closed type 93.33% cases as most common type, with group A ILN shows 20% cases as excellent result and 46.67% cases showing satisfactory results and in group B, DCP SHOWS 80% cases excellent result with 20% cases shows satisfactory results.

**Conclusion:** In the present study it was concluded that compression plating is still time tested and gold standard for fracture shaft humerus.

**Keywords:** interlocking nail (ILN), dynamic compression plate (DCP), antiseptic dressing (ASD)

## INTRODUCTION

Fractures of humerus shaft are very commonly seen now a days of modern World accounting about 3% of all the fractures.<sup>1</sup> Treatment methods are also advancing for these fracture in both operative and non operative modes, initially they were treated with the help of hanging casts, arm cylinders, collar and cuff slings, then functional cast bracing, U casts, shoulder spica improved results but the long duration of treatment results in adverse effect on economy of the patients.<sup>2</sup> Nonunion, malunion, limitation of joint motion and progressive degenerative arthritis are commonly seen complications in conservative modes, hence arose the need of operative intervention. The fracture usually occurs with direct trauma, but indirect forces like fall on outstretched hand or elbow are also common causes of shaft humerus fracture. The encouraging results that have been reported with recent advances in internal fixation techniques and latest instrumentation have led to an expansion of surgical indications for such fractures.

The present study covers the comparison of results of open reduction and internal fixation by dynamic compression plate with close interlocking nailing in fracture shaft of humerus.

## MATERIAL AND METHODS

This was a prospective study conducted in Govt. Medical College Amritsar, during the period of June 2009 to June 2012, after taking ethical committee approval. The study consist of 15 cases (group A) of fracture shaft humerus treated with close intramedullary nailing and 15 cases (group B) treated with dynamic compression plating. The grouping was done randomly. All the cases were done in general anesthesia as a protocol. The inclusion criterion was patients more than 15 years of age of either sex. All cases of compound fractures, poly trauma patients who were initially managed with external fixator and patients below 15 years age were excluded from the study. All the fractures were managed and stabilized initially with pop back splint or crammer wire, after that x-rays done fractures then fractures were classsified and managed accordingly with intramedullary nails or DCP. For interlocking nail under General anesthesia patient was placed in semi inclined position, A 2 cm incision was given lateral to acromian in the direction of deltoid fibers. Entry made into the medullary canal just medial to the greater tuberosity. Guide wire passed into the proximal fragment under c. arm control, passed to distal fragment. Sequential reaming done over the guide wire. Then nail of appropriate size placed with jig and guide wire taken out. Distal locking done by free hand technique, fracture compression given by back hammering. Wound closed A.S.D done crepe and arm sling applied.

For D.C.P patient was placed in supine position under G.A with shoulder fully adducted and forearm lying on the chest. After proper painting and draping incision was given proximally and distally to fracture site through Henry- Thompson approach. Skin and subcutaneous tissue incised. Deep fascia was incised in the line of skin incision. Biceps muscle identified and retracted medially exposing brachialis and brachioradialis muscle. Biceps and brachialis retracted medially. Radial nerve identified and explored wherever required. Muscle were stripped off by periosteal elevator, fracture reduced and plate of appropriate size fixed with screws. Wound washed with saline and betadine and stitched in layers under drain, crepe bandage applied arm sling given.

Postoperatively limb was elevated over pillow. Broad spectrum

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I/V antibiotics, anti-inflammatory and analgesic were given. Physiotherapy of shoulder and elbow advised from the next day in group A patients and after stitch removal on 12<sup>th</sup> day in group B patients. Radiographic examination done on next day to confirm the fixation of reduction. Suction drain removed was removed after 48 hours. Alternate stitches were removed on 10<sup>th</sup> day and full stitches removed on 12<sup>th</sup> postoperative day. Patients were followed up examined thrice weekly interval till union. On every visit radiographs were taken in anteroposterior and lateral view. Radiological sign of union, displacement, angulation were recorded (figures 1,2). Clinically patients were examined for any tenderness, infection, pain. Movements of elbow and shoulder recorded. Results were evaluated according to NEERS classification<sup>11</sup>

### STATISTICAL ANALYSIS

SPSS version 21 was used for the statistical analysis. Chi square test was used for comparison between two variables. Descriptive statistics were used to interpret the data.

### RESULTS

30 patients of fracture shaft humerus admitted in orthopaedics department of Guru Nanak Dev Hospital, Amritsar. Out of 30 patients 15 were grouped as A and given interlocking nail as treatment and 15 were given the D.C.P as treatment group B. The youngest patient in our study had age of 19 years and oldest has age of 60 years. Average age was 35.77 years. 80% of fractures occurred between age group of 21-50 years as this age has more outdoor activities. There is male preponderance in our study with male female ratio 7:3 due to more involvement in outdoor activities. Injury was more common on right arm because of conditioned protective reflex in using right upper limb more often in a bid to avoid trauma. As > 80% persons are right handed.

In Most 19 (63%) common mode of injury was road accident being most common mode of injuries now a days. 10 (33%) cases occurred because of fall from height and 1 (3%) case, mode of injury was railway accident. 53.33% cases had fracture in middle third, 36.67% in distal third and 10% in proximal third. Present study had 86.66% fractures of type A (simple) and 10% had type B (wedge) and 3.34% of type C (complex). Present study had 93.33% closed fractures and 6.67% compound fractures and all had grade 1 injury as per Gustilo Anderson classification. 10 (33%) patients had associated injuries like fracture both bone forearm, radial nerve involvement, fracture metatarsals, head injury, pelvic injury, abdomen injury. In this study majority of the patients were operated within three days (80%) in group A and (73.33%) in group B. With average union time in group A was 10.73 weeks; average union time in group B was 12.2 weeks. With early complications are more in group B like superficial infection 6.67%, radial nerve neurapraxia 6.67%. with late complications like shoulder pain 66.67% delayed union in 13.33% cases and shoulder stiffness in 66.67% cases in group A compared with 20% / 20% / 0% in group B respectively (table-1). There was statistical significant ( $p < 0.05$ ) decrease in abduction and rotation possible at shoulder joint at final follow up in group A patients (tables-2,3).

### DISCUSSION

In the study of comparison of compression plating v/s interlocking



Figure-1: Showing preoperative, postoperative and union radiographs (DCP)



Figure-2: Showing preoperative, postoperative and union radiographs (ILN)

Complications	Group	A	Group	B	Chi <sup>2</sup>	P value	Result
	No. of cases	%Age	No. of cases	%Age			
Shoulder pain	10	66.67	3	20	6.787	0.009	Significant
Instability	0	0	0	0	-	-	-
Malunion	0	0	0	0	-	-	-
Delayed union	2	13.33	3	20	0.48	0.08	Not significant
Non union	0	0	0	0	-	-	-
Deep infection	0	0	0	0	-	-	-
Elbow stiffness	0	0	0	0	0	0	-
Shoulder stiffness	10	66.67	0	0	15.15	0.001	Highly significant

Table-1: Showing late complications

Abduction at shoulder in degree	Group	A	Group	B	Total	%Age
	No. of cases	% Age	No. of cases	%Age		
>164	3	20	13	86.67	16	53.33
140-164	7	46.67	2	13.33	9	30
<140	5	33.33	0	0	5	16.67
Total	15	100	15	100	30	100

Table-2: Showing abduction possible at shoulder joint

Rotation at shoulder in degree	Group	A	Group	B	Total	%Age
	No. of cases	% Age	No. of cases	%Age		
>89	4	26.67	12	80	16	53.33
60-89	8	53.33	3	20	11	36.67
<60	3	20	0	0	3	10
Total	15	100	15	100	30	100

Table-3: Showing rotation at shoulder joint

Grade	Group	A	Group	B	Total	% Age
	No. of cases	%Age	No. of cases	% Age		
Excellent	3	20	12	80	15	50
Satisfactory	7	46.67	3	20	10	33.33
Unsatisfactory	5	33.33	0	0	5	16.67
Total	15	100	15	100	30	100

Table-4: Showing grading of result according to neer shoulder performance index<sup>11</sup>

nail in fractures shaft humerus conducted in orthopaedics department in Govt. Medical college Amritsar/ Guru Nanak Dev Hospital, 15 of each cases group A and group B were treated with interlocking nail and compression plating respectively with age of youngest patient 19 years and oldest 60 years with mean age 35.7. Similar trend was seen in a series of Lal et al<sup>3</sup> in which mean was 39.5 years and Chacha et al<sup>4</sup> average being 36.3 years. In this study male/ female ratio being 7:3 similar to study series of Reddy et al<sup>5</sup> where also m/f ratio was 7:3. The study shows the more involvement of right side with road side accidents as mode of injury 63.33% cases, fall from height 33.33% cases and 3.33% cases due to railway injuries. Loomer et al observed that injuries was as a result of motor vehicle accidents in 50% of cases. In this study 93.33% were closed fractures and 6.67% were compound of Gustilo Anderson type 1. P.M Rommens<sup>7</sup> found 7% rate of open fracture. No patient of group A had superficial infection<sup>6</sup> in comparison with 1 patient in group which is not statistical significant (p value 0.015); 1 patients in group B has postoperative neurapraxia of radial nerve with no patient in group in A which is not statistical significant (p value 0.150) this patient recovered from neurapraxia within 12 weeks of conservative management and no exploration was needed in this case.

10 patients in group A had shown pain in shoulder in comparison to 3 in group B shows statistical significant difference (p value 0.009) 10 patients of group A has shoulder stiffness in comparison to no patient in group B, showing statistical significant difference (p value 0.001); two patients in group A had shown delayed union in comparison to 3 in group B showing no statistical difference (p value 0.08). In this study 66% of patients develops shoulder stiffness treated with interlocking nail, same trends seen in study of Suh JT et al<sup>8</sup> where 50% of patients shows shoulder stiffness. No patient in either group shows nonunion, malunion, deep infection and any instability. In our study 100% cases achieve union. Ikpeme<sup>9</sup> noted 100% union of shaft fractures with I.L.N. Willis MP et al<sup>10</sup> reported union rate of 100% in humerus fractures with plating. The results in group A shows excellent in 3 cases (20%), satisfactory 7 cases (46.67%) unsatisfactory 5 (33.33%) with group B shows excellent in 12 cases (80%), satisfactory 3 cases (20%) unsatisfactory 0 (0%) with statistical difference (p value 0.002) (chi square 12.00) in two groups in their results (table-4).

## CONCLUSION

So we concluded that compression plating is gold standard for fracture shaft humerus. While there is no significant difference

in the radiological union in the patients treated with interlocking nail and compression plate, but there is significant decrease in movements of shoulder joint; shoulder stiffness and persistent shoulder pain in patients treated with interlocking nail.

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