

# Compare the Functional Outcome of Dynamic Compression Plating Versus Interlocking Nail Procedure for Fracture Shaft of Humerus

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## ABSTRACT

**Aim:** To compare the outcomes of dynamic compression plating versus interlocking nail procedure in patients presented with fracture shaft of humerus.

**Study Design:** Randomized control trial

**Place and Duration of Study:** The study was in Orthopaedic & Spine Unit Hayatabad Medical Complex Hospital Peshawar for a period of 2 years from 1<sup>st</sup> July 2018 to 30<sup>th</sup> June 2020.

**Methodology:** 60 patients of both genders with ages 18 to 65 years presented with fracture shaft of humerus were included in this study. All the patients were equally divided in to two groups. Each group consist of 30 patients. Group A patients were treated with dynamic compression plating while group B received interlocking nail procedure. Pre and post-operative radiographical assessments were done. Post-operative complications were noted at 7<sup>th</sup> postoperative day. Functional outcomes were examined by the DASH criteria. Data was analyzed by SPSS 24.0

**Results:** No significant difference was observed regarding age, sex, BMI between both groups. RTA was the most common mode of injury in 40 (66.67%) patients (Group A 21, Group B 19). Most of the fractures were on left side 38 (63.33%). Transverse fracture was the most common type found in 39 (65%) patients (Group A 19, group B 20). Mean union time in group A was significantly shorter than group B 2.46±0.89 months Vs 3.25±1.37 months. In group A delayed union was found in 2 (6.67%) while in group B it was found in 4 (13.33%) patients. At final follow-up in group A, 24 (80%) patients shows excellent, 4 (13.33%) patients shows good and 2 (6.67%) had fair with no poor results while in group B 10 (33.33%) patients shows excellent, 15 (50%) patients shows good 3 (10%) shows fair and 2 (6.67%) patients had poor functional outcomes. A significant difference was found between both groups regarding functional outcomes with p-value <0.05.

**Conclusion:** Dynamic compression plating shows better functional outcomes with fewer rate of complications and shorter time to bone union as compared to interlocking nail procedure.

**Keywords:** Fracture shaft of humerus, Dynamic Compression Plating, Interlocking Nail, Union of Bone, NEER's Criteria.

## INTRODUCTION

The conservative management of humerus shaft fracture has a union rate of up to 90 percent.<sup>1</sup> While a complete reduction in anatomical location is rarely accomplished by shortening up to 3 cm, less than 30 degrees of rotation and up to 20 degrees of angulations are considered acceptable.<sup>2</sup> But nowadays, as a result of the treating surgeon's low tolerance to the previously thought to be an acceptable tolerance.<sup>3</sup> Relevant criteria for surgical management are also available: polytrauma, obese and elderly osteoporosis patients, segmental fracture, open fracture, radial nerve injury, related neurovascular injury, early undesirable decrease or failure of conservative management, and floating elbow.<sup>1</sup>

For humeral shaft fracture, several randomized controlled trials have documented plate and IMN fixation. Some research found little difference between the two methods in the radiological and functional results of patients.<sup>4</sup> In addition, there was no consensus on the efficacy of these two methods. Study performed by Zarkadis et al.<sup>5</sup> and other colleagues found that open

reduction and internal fixation (ORIF) was the preferred surgical treatment choice in adult patients for humeral shaft fractures, but involves extensive wider incision surgery, extraction of soft tissue and periosteum from the bone.<sup>6</sup> This raises the risk of paralysis of the radial nerve, infection, delayed unionization.<sup>7</sup>

The present study was conducted aimed to compare the functional outcomes of dynamic compression plating versus interlocking nail procedure for the treatment of fracture shaft of humerus.

## MATERIALS AND METHODS

This randomized controlled trial was conducted at Department of Orthopaedic & Spine Unit Hayatabad Medical Complex Hospital Peshawar for a period of 2 years from 1<sup>st</sup> July 2018 to 30<sup>th</sup> June 2020. 60 patients of both genders with ages 18 to 65 years presented with fracture shaft of humerus were enrolled in this study. After taking written consent from all the patients, detailed demographics including age, sex, body mass index, causes and types of fractures were recorded. Patients less than 18 years of

age, patients with complex fractures, patients with poly trauma and patients with no consent were excluded.

All the patients were equally divided in to two groups. Each group consist of 30 patients. Group A patients were treated with dynamic compression plating while group B received interlocking nail procedure. Pre and post-operative radiographical examinations were done. Post-operative complications were noted at 5<sup>th</sup> postoperative day. Functional outcomes were examined by the DASH scoring system. Patients were followed for 6 months postoperatively. All the data was analyzed by SPSS 24.0. Chi-square test was done to compare complications and functional outcomes between both groups. P-value <0.05 was significantly considered.

**RESULTS**

In group A, 23 (76.67%) patients were males and 7 (23.33%) were females with mean age of patients were 34.26±8.37 years while in group B mean age was 33.87±9.46 years and 24 (80%) patients were males and 6 (20%) were females. Mean BMI in Group A and B was 25.26±2.48 kg/m<sup>2</sup> and 25.32±2.85 kg/m<sup>2</sup>. 20 (66.67%) patients had right side fracture and 10 (33.33%) had left side in group A while in group B 18 (60%) had right side and 12 (40%) had left side fracture. In group A 22 (73.33%), 5 (16.67%) and 3 (10%) patients had transverse, spiral and oblique fractures, in Group B 23 (76.67%) patients had transverse, 5 (16.67%) had spiral and 2 (6.67%) had oblique. (Table 1)

Table 1: Demographics of all the patients in both groups

Variables	Group A	Group B
Mean age (yrs)	34.26±8.37	33.87±9.46
Mean BMI (kg/m)	25.26±2.48	25.32±2.85
Gender		
Male	23 (76.67%)	24 (80%)
Female	7 (23.33%)	6 (20%)
Type of Fracture		
Transverse	22 (73.33%)	23 (76.67%)
Spiral	5 (16.67%)	5 (16.67%)
Oblique	3 (10%)	2 (6.67%)
Side		
Left	10 (33.33%)	12 (40%)
Right	20 (66.67%)	18 (60%)

Road traffic accident was the most common mode of injury in 43 (71.67%) patients (Group A 22, Group B 21) followed by fall from height in 10 (16.67%) (Group A 5, Group B 5), 3 (5%) patients (group A 1, group B 2) had sports injury, 4 (6.67%) patients (group A 2, group B 2) had others. (Figure 1)

At final follow-up in group A, 24 (80%) patients shows excellent, 4 (13.33%) patients shows good and 2 (6.67%) had fair with no poor results while in group B 10 (33.33%) patients shows excellent, 15 (50%) patients shows good 3 (10%) shows fair and 2 (6.67%) patients had poor functional outcomes. A significant difference was found between both groups regarding functional outcomes with p-value <0.05. (Table 2)

Mean union time in group A was significantly shorter than group B 2.46±0.89 months Vs 3.25±1.37 months. In group A delayed union was found in 2 (6.67%) while in

group B it was found in 4 (13.33%) patients. In group B 17 (56.67%) patients had shoulder pain while in group A 6 (20%) patients had shoulder pain. In group B shoulder stiffness found in 8 (26.67%) patients while in group A 2 (6.67%) patients had shoulder stiffness. In group A none of patient had non-union while in group B 2 (6.67%) patients had non-union. Significantly complications rate was high in group group B patients as compared to group A with p-value <0.05. (Table 3)

Figure 1: Mode of Injury in all the patients

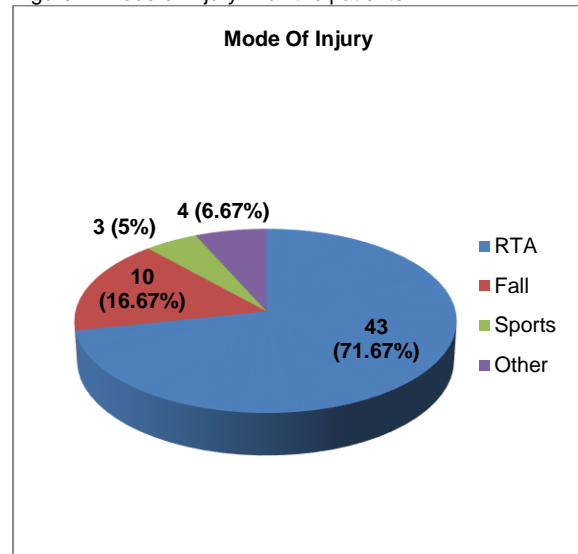


Table 2: Comparison of functional outcomes between both groups

DASH Scoring	Group A	Group B
Excellent	24 (80%)	10 (33.33%)
Good	4 (13.33%)	15 (50%)
Fair	2 (6.67%)	3 (10%)
Poor	0	2 (6.67%)

P-value 0.038

Table 3: Comparison of Union Time, and postoperative complications between both groups

Variable	Group A (n=30)	Group B (n=30)	P value
Union of bone (months)	2.46±0.89	3.25±1.37	0.02
Complication			
Shoulder pain	6 (20%)	17 (56.67%)	0.01
Non-union	0	2 (6.67%)	
Delayed union	2 (6.67%)	4 (13.33%)	
Stiffness	2 (6.67%)	8 (26.67%)	

**DISCUSSION**

In present study majority of patients were males 78.33% while females were 21.67%. Overall average of patients in our study was 35 years. These results show similarity to some other studies in which male patients' population was high 60 to 75% as compared to females 25 to 40% with mean ages of patients 35.5 years and 39.8 years.<sup>8,9</sup>

In present study road traffic accidents was the most common mode of injury in 71.67% patients followed by falling from height in 16.67% patients and 5% patients had sports related injury. Many of previous studies reported

road traffic accidents was the most frequent cause of fracture shaft humerus followed by fall from height.<sup>10-11</sup> We found that most of the fractures were on right side. In our study transverse fractures were the most common type of fracture and accounted for 75% followed by spiral and oblique. A study conducted by Yousaf et al<sup>12</sup> reported transverse fracture as the most common type of fracture.

In the present study mean union time in patients treated with dynamic compression plating was 2.46±0.89 months while in patients who were treated with interlocking nail procedure mean union time was 3.25±1.37 months, a significant difference was observed between both procedures with p-value <0.05. The overall union rate was 95%. These results were comparable to some previous study in which union of bone rate was 85 to 95% with mean time 10.5 to 14.6 weeks.<sup>13-15</sup>

We found that in group A delayed union was found in 2 (6.67%) while in group B it was found in 4 (13.33%) patients. In group B 17 (56.67%) patients had shoulder pain while in group A 6 (20%) patients had shoulder pain. In group B shoulder stiffness was found in 8 (26.67%) patients while in group A 2 (6.67%) patients had shoulder stiffness. In group A none of the patients had non-union while in group B 2 (6.67%) patients had non-union. Significantly complications rate was high in group B patients as compared to group A with p-value <0.05. These results show patients treated with DCP had fewer rates of complications. Some other studies show similarity that dynamic compression plating for fracture shaft humerus had lesser complications as compared to other modalities.<sup>16,17</sup>

According to the DASH scoring system, in group A, 24 (80%) patients show excellent, 4 (13.33%) patients show good and 2 (6.67%) had fair with no poor results while in group B 10 (33.33%) patients show excellent, 15 (50%) patients show good, 3 (10%) show fair and 2 (6.67%) patients had poor functional outcomes. A significant difference was found between both groups regarding functional outcomes with p-value <0.05. Thus, we found DCP procedure had better outcomes in terms of abduction at shoulder and rotation of shoulder as compared to interlocking nail procedure. These results show similarity to some other studies in which DCP group had high rate of excellent results with no poor results 80 to 92% as compared to other techniques.<sup>18,19</sup>

## CONCLUSION

We concluded from this study that dynamic compression plating shows better functional outcomes with fewer rates of complications and shorter time to bone union as compared to interlocking nail procedure.

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