

**A Comparison of Humeral Interlocking Nail and Compression Plating in Fracture of Shaft of Humerus at a Tertiary Centre****Sanjay Kumar<sup>1</sup>, Asif Ahmad Khan<sup>2</sup>, Kumar Anshuman<sup>3</sup>, Ram Nandan Suman<sup>4</sup>**<sup>1</sup>Senior Resident, Department of Orthopaedics, Narayan Medical College and Hospital, Jamuhar, Rohtas, Sasaram, Bihar, India<sup>2</sup>Senior Resident, Department of Orthopaedics, Bhagwan Mahavir Institute of Medical Sciences, Pawapuri, Nalanda, Bihar, India<sup>3</sup>Professor and Head of Department, Department of Orthopaedics, Narayan Medical College and Hospital, Jamuhar, Rohtas, Sasaram, Bihar, India<sup>4</sup>Professor and Head of Department, Department of Orthopaedics, Bhagwan Mahavir Institute of Medical Sciences, Pawapuri, Nalanda, Bihar, India

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Corresponding author: Asif Ahmad Khan

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**Abstract:****Background:** Humeral shaft fractures make up about 3% of all fractures. In the majority of series of humeral shaft fractures treated with closed reduction or open reduction and internal fixation, good to outstanding results have been documented.**Aims and Objectives:** The present study was conducted to compare humeral interlocking nails and compression plating in patients with fractures of the shaft of the humerus.**Materials and Methods:** 74 cases of shaft of the humerus fracture in both genders were divided into 2 groups. Each group consisted of 37 patients. Group I underwent internal fixation by humeral interlocking nail, and group II underwent internal fixation by dynamic compression plating, with or without bone grafting. Parameters such as mode of injury, range of elbow joint movements, and complications were recorded.**Results:** Group I had 20 males and 17 females, and Group II had 18 males and 19 females. The modes of injury were RTA in 28 in group I and 25 in group II; falls in 5 in group I and 7 in group II; and violence in 4 in group I and 5 in group II. The difference was significant ( $P < 0.05$ ). The range of movement pre-operatively in group I was 8–128 degrees and in group II was 4–130 degrees, and post-operatively in group I was 4–134 degrees and in group II was 5–130 degrees. The difference was non-significant ( $P > 0.05$ ). Complications were shortening seen in 3 in group I and 4 in group II; non-union in 2 in group I and 1 in group II; superficial infection in 1 in group I and 2 in group II; deep infection in 1 in group I and 2 in group II; and implant failure in 1 in group II. The difference was non-significant ( $P > 0.05$ ).**Conclusion:** Dynamic compression plating was found to be a superior method of stabilising diaphyseal fractures of the humerus. Dynamic plating resulted in lesser union time, fewer complications, and a better range of motion.**Keywords:** Humerus, Interlocking nail, Dynamic compression plating

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**Introduction**

Humeral shaft fractures make up about 3% of all fractures. Although there are indications for primary or secondary operational treatment in specific circumstances, the majority of humeral shaft fractures are treated non-operatively [1]. Unacceptable fracture reduction, concomitant vascular lesions, open fractures, radial nerve palsy, polytrauma patients, floating elbow, and obese patients who are at risk of developing a varus angulation are the surgical indications [2]. The OTA classification of humerus shaft fracture includes bone number, fracture location, and fracture patterns

such as simple, wedge, and complex. Fracture location can be proximal, middle, or distal third, and fracture pattern may be spiral, transverse, comminuted, or Holstein-Lewis fracture, which is a spiral fracture of the distal one-third of the humeral shaft commonly associated with neuropraxia of the radial nerve [3]. In the majority of series of humeral shaft fractures treated with closed reduction or open reduction and internal fixation, good to outstanding results have been documented [4]. To choose the best course of action, it is important to take into account the fracture pattern, together with the

patient's characteristics and any related injuries [5]. Healing of the fracture site depends on the blood supply. There can be various complications in conservative management, such as non-union, malunion, limitation of joint motion, and progressive degenerative arthritis [6].

### Aims and Objectives

The present study was conducted to compare humeral interlocking nails and compression plating in patients with fractures of the shaft of the humerus.

### Materials & Methods

The present study consisted of 74 cases of shaft of humerus fracture of both genders attending outpatient departments (OPD), Department of Orthopaedic, Bhagwan Mahavir Institute of Medical Sciences, Pawapuri, Nalanda, Bihar, India, and Department of Orthopaedic, Narayan Medical College & Hospital, Jamuhar, Rohtas, Sasaram, Bihar, India, that were operated on between August 2019 and July 2020. All were informed regarding the study, and their written consent was obtained.

The institutional ethical committee granted ethical approval.

Data such as name, age, gender, etc. was recorded. Patients were divided into two groups. Each group consisted of 37 patients. Group I underwent internal fixation by humeral interlocking nail, and group II underwent internal fixation by dynamic compression plating, with or without bone grafting. Parameters such as mode of injury, range of elbow joint movements, and complications were recorded. The findings thus obtained were subjected to statistical analysis by using Microsoft Excel and SPSS software, Version 22.0. A P value less than 0.05 were considered significant.

### Results

The mean age of the present cohort studied was  $62.51 \pm 2.82$  years in Group I, who underwent internal fixation by humeral interlocking nail, and  $37.82 \pm 10.26$  years in Group II, who underwent internal fixation by dynamic compression plating, with or without bone grafting.

**Table 1: Baseline Demographic characteristics**

Parameters	Variables	Group I (n=37)	Group II (n=37)	P value
Age (years) [Mean±SD]		36.50±10.82	37.82±10.26	0.75
Gender	Male	20 (54.05%)	18 (48.65%)	0.94
	Female	17 (45.95%)	19 (51.35%)	
Mode of injury	RTA	28 (75.68%)	25 (67.57%)	0.05
	Fall	5 (13.51%)	7 (18.92%)	
	Violence	4 (10.81%)	5 (13.51%)	
Injury to surgery (day)[Mean±SD]		6.28±2.04	5.46±1.83	0.80
Follow up (month) [Mean±SD]		3.20±0.42	3.82±0.50	0.46

Table 1 shows that group I had 20 males and 17 females, and group II had 18 males and 19 females. The modes of injury were road traffic accidents (RTA) in 28 in group I and 25 in group II; falls in 5 in group I and 7 in group II; and violence in 4 in group I and 5 in group II. RTA is the most common mode of injury in both groups I and II. The difference was significant ( $P < 0.05$ ).

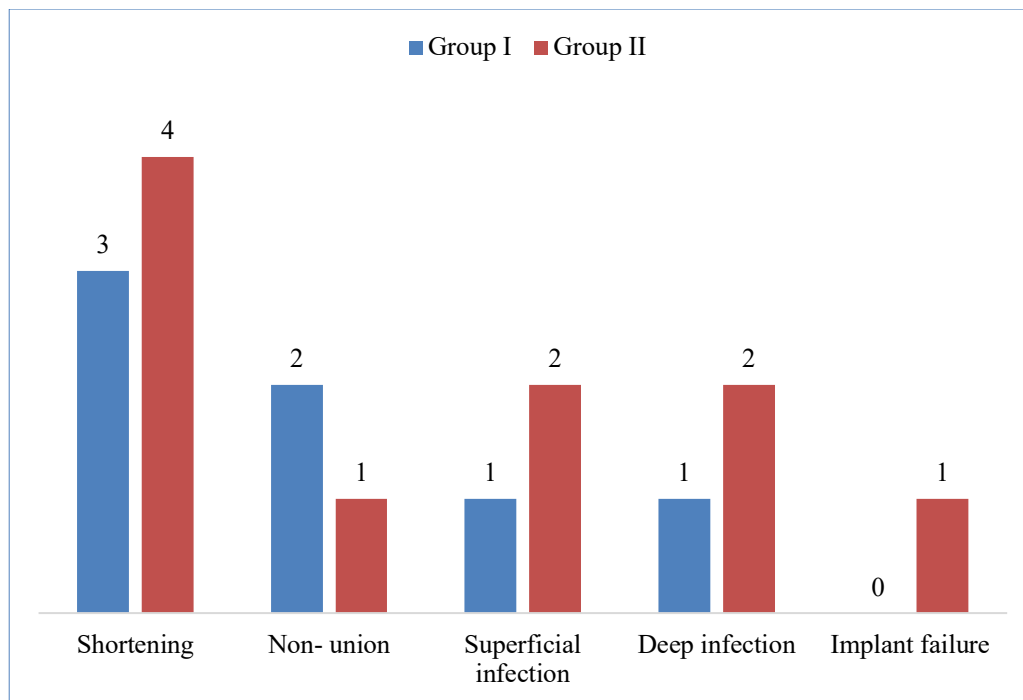
**Table 2: Assessment of the range of elbow joint movements**

Range (in degree)	Group I	Group II	P value
Pre- op	8- 128	4-130	0.21
Post- op	4-134	5-130	0.36

Table II shows that the range of movement preoperatively in group I was 8–128 degrees and in group II was 4–130 degrees, and postoperatively in group I was 4–134 degrees and in group II was 5–130 degrees. The difference was non-significant ( $P > 0.05$ ).

**Table 3: Assessment of Complications**

Complications	Group I (n=37)	Group II (n=37)
Shortening	3	4
Non-union	2	1
Superficial infection	1	2
Deep infection	1	2
Implant failure	0	1



**Figure 1: Assessment of complications**

Table 3, Figure 1, shows that complications were shortening seen in 3 in group I and 4 in group II; non-union in 2 in group I and 1 in group II; superficial infection in 1 in group I and 2 in group II; deep infection in 1 in group I and 2 in group II; and implant failure in 1 in group II. The difference was non-significant ( $P > 0.05$ ).

### Discussion

The present study was conducted to compare humeral interlocking nails and compression plating in fractures of the shaft of the humerus.

As improvements are achieved in both surgical and non-surgical therapy, the way these injuries are treated is always changing [7]. The majority of humeral shaft fractures can be treated non-operatively with excellent to good results. Muscles cover the entire humeral shaft, and the fracture pieces have a good blood supply. Direct and indirect trauma can result in humeral shaft fractures [8]. Like any other wound, the healing of the fracture is dependent on the flow of blood. An easy, secure, and efficient therapy for humeral shaft non-union is anterior plating [9]. It has a similar recovery period to previous techniques for treating humeral shaft non-union and does not necessitate substantial soft tissue dissection or radial nerve imaging. This alternative method of treating humeral shaft non-union involves inserting a plate [10].

We found that group I had 20 males and 17 females, and group II had 18 males and 19 females. The modes of injury were RTA in 28 in group I and 25 in group II; falls in 5 in group I and 7 in group II; and violence in 4 in group I and 5 in group II. In Changulani et al.'s [11], study, internal fixation was performed on 23 patients using IMN and 24 using DCP. All cases involved repeating ante grade nailing. Anterolateral or posterior approaches were

used for DCP. The outcome was evaluated based on the union time, union rate, functional outcome, and complication incidence. Using the American Shoulder and Elbow Surgeons Score (ASES), functional outcomes were evaluated. There was no discernible difference in the ASES scores between the two groups. When comparing IMN with DCP, it was discovered that the average union time was substantially shorter for IMN.

We found that the range of movement pre-operatively in group I was 8–128 degrees and in group II was 4–130 degrees, and post-operatively in group I was 4–134 degrees and in group II was 5–130 degrees. Complications were shortening seen in 3 in group I and 4 in group II; non-union in 2 in group I and 1 in group II; superficial infection in 1 in group I and 2 in group II; deep infection in 1 in group I and 2 in group II; and implant failure in 1 in group II. Hashibet al. [12], found that in their study, 15 cases (Group-A) underwent internal fixation by humeral interlocking nail and 14 cases (Group-B) underwent internal fixation by dynamic compression plating, with or without bone grafting. They were able to perform daily activities but not resume their occupation. The functional result was good in 92.3% of cases and poor in 7.7% of cases in either group. 4 cases in group B (30.8%) managed by dynamic compression plating developed infections. In this study, complications were also observed. Two of them were superficial infections that responded well to antibiotics and dressings and

later healed well and united. Two cases developed discharging sinuses and subsequently infected unions. Singh et al.[13], conducted a study on 30 cases of fracture shaft humerus, which were divided into close ILN and open DCP groups. The average age of patients was 35.77 years, with a male-female ratio of 7:3. 63.33% of cases were seen on the right side; in 63.33% of cases, RTA was the common mode of injury. The common region was the middle third seen in 53.33%, most common AO type A3 53.33% cases, closed type 93.33% cases as the most common type, with group A ILN showing 20% cases as excellent results and 46.67% cases showing satisfactory results, and in group B, DCP revealed 80% cases as excellent results and 20% cases showing satisfactory results.

#### Limitations of the study

Smaller sample size and a shorter follow-up period.

#### Conclusion

The authors found that dynamic compression plating was a superior method of stabilising diaphyseal fractures of the humerus. Dynamic plating resulted in lesser union time, fewer complications, and a better range of motion.

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