

Original Research

Humeral interlocking nail and compression plating in management of humerus shaft fracture

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ABSTRACT:

Aim: To compare humeral interlocking nail and compression plating in fracture of shaft of humerus cases. **Methodology:** One hundred ten cases of fracture of shaft of humerus of both genders were divided patients into 2 groups of 55 each. In group I, internal fixation by humeral interlocking nails was performed and in group II, internal fixation by dynamic compression plating, with or without bone grafting was performed. Parameters such as AO classification, mode of injury, level of injury, side, range of elbow joint movements, DASH score and complications in both groups were recorded. **Results:** Age group 20-30 years had 12 patients in group I and 15 in group II, 30-40 years had 18 in group I and 12 in group II, 40-50 years had 15 in group I and 16 in group II and 50-60 years had 10 in group I and 12 in group II. In 20 cases in group I and 18 in group II had A3 type of fracture and B2 was seen in 11 and 12 patients respectively. Mode of injury was RTA in 42 in group I and 38 in group II, fall in 10 in group I and 12 in group II and violence in 3 in group I and 5 in group II. Left side was involved in 30 cases in group I and 28 in group II and right side in 25 and 27 in group I and II respectively. Level of injury was upper 1/3rd seen in 16 and 19, middle 1/3rd in 29 and 30 and lower 1/3rd in 10 and 6 patients in group I and II respectively. 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 ($P > 0.05$). In 20 cases in group I and 32 in group II DASH score was excellent, 15 cases in group I and 10 in group II had good, 15 in group I and 7 in group II had fair and 5 in group I and 6 in group II had poor DASH score. The difference was significant ($P < 0.05$). Complications seen were implant failure 1 in group I and 2 in group II, superficial infection 1 in group I and 1 in group II, and deep infection 2 in group I and 1 in group II, non-union 2 in group I and 2 in group II, shortening seen in 1 in group I and 3 in group II. The difference was non-significant ($P > 0.05$). **Conclusion:** In the treatment of humeral shaft fractures, both humeral interlocking nails and dynamic compression plating might be taken into consideration. **Key words:** Interlocking nail, shaft, Dynamic compression plating

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INTRODUCTION

Humerus fractures can occur in different locations and can be classified based on the specific region of the bone that is affected. The common types of humerus fractures are proximal, midshaft humerus fractures and distal humerus fractures. Proximal humerus fractures occur near the shoulder joint. They can involve the humeral head (the rounded part that articulates with the shoulder socket) or the neck of the humerus (the portion just below the head). Proximal humerus fractures are often seen in older individuals and can be associated with osteoporosis or low-energy trauma.¹ Midshaft humerus fractures occur in the middle portion of the humerus, between the shoulder

and the elbow. They can result from direct trauma, such as a fall or a direct blow to the arm. Distal humerus fractures occur near the elbow joint. They can involve the lower end of the humerus and are commonly associated with injuries such as a fall on an outstretched hand.²

Fractures of the humerus bone can occur due to trauma, falls, or repetitive stress. Fractures may involve the proximal end, shaft, or distal end of the bone. Orthopaedic surgeons frequently see humeral shaft fractures, which make up around 3% of all fractures. Intense pain, bruising, swelling, restricted arm movement, deformity, or a popping or cracking

sound at the time of injury are all signs of humerus bone fractures.^{3,4}

Most humeral shaft fractures are treated non-operatively, while there are indications for primary or subsequent operational treatment in some situations. Open reduction and internal fixation (ORIF) employing plates and screws is still recognised as the gold standard for surgical therapy due to its lower complication rate and quicker time to union than intramedullary nailing.^{5,6} The present study compared humeral interlocking nail and compression plating in fracture of shaft of humerus cases.

METHODOLOGY

One hundred ten cases of fracture of shaft of humerus of both genders were selected for the study.

All enrolled patients gave their written consents to participate in the study. Ethical review board of the institute approved the study.

Data such as name, age, gender etc. was recorded. We divided patients into 2 groups of 55 each. In group I, internal fixation by humeral interlocking nails was performed and in group II, internal fixation by dynamic compression plating, with or without bone grafting was performed. Parameters such as AO classification, mode of injury, level of injury, side, range of elbow joint movements, DASH score and complications in both groups were recorded. Results of the study were subjected to statistical analysis. P value less than 0.05 was considered significant.

RESULTS

Table 1 Distribution of patients based on age group

Age group (years)	Group I	Group II	P value
20-30	12	15	0.91
30-40	18	12	0.12
40-50	15	16	0.95
50-60	10	12	0.91

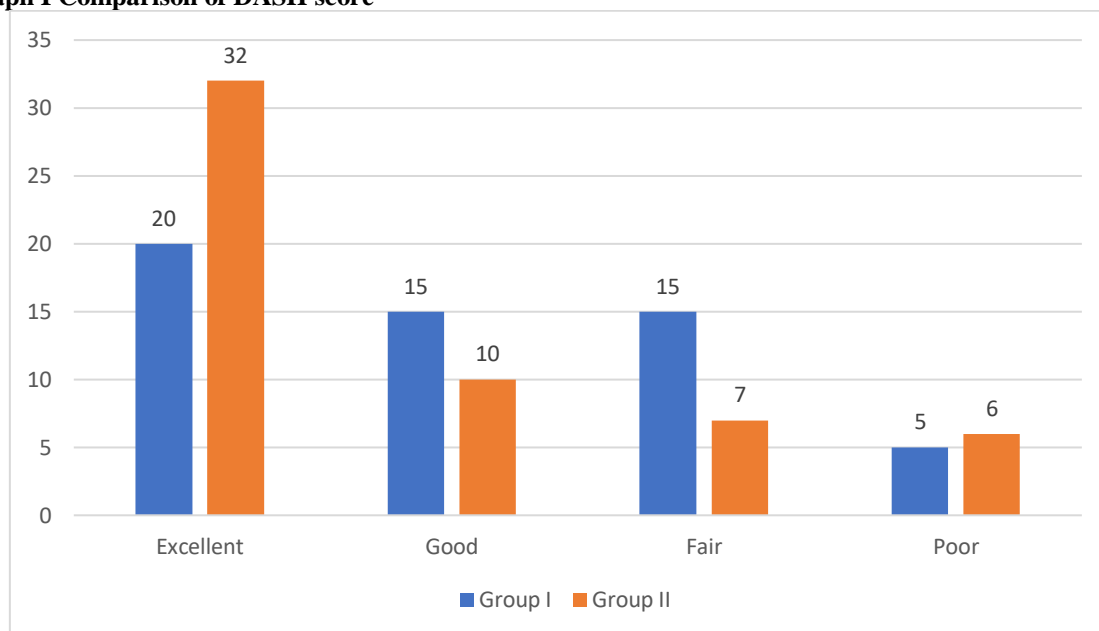
Age group 20-30 years had 12 patients in group I and 15 in group II, 30-40 years had 18 in group I and 12 in group II, 40-50 years had 15 in group I and 16 in group II and 50-60 years had 10 in group I and 12 in group II (Table 1).

Table II Comparison of parameters

Parameters	Variables	Group I	Group II	P value
AO classification	A1	6	5	0.91
	A2	4	3	
	A3	20	18	
	B1	5	4	
	B2	11	12	
	B3	4	2	
	C1	3	4	
	C2	1	3	
Etiology	RTA	42	38	0.72
	Fall	10	12	
	Violence	3	5	
Side	Left	30	28	0.91
	Right	25	27	
Level of injury	Upper 1/3 rd	16	19	0.11
	Middle 1/3 rd	29	30	
	Lower 1/3 rd	10	6	
Range (in degree)	Pre- op	8-128	4-130	0.94
	Post- op	4-134	5-130	0.81

In 20 cases in group I and 18 in group II had A3 type of fracture and B2 was seen in 11 and 12 patients respectively. Mode of injury was RTA in 42 in group I and 38 in group II, fall in 10 in group I and 12 in group II and violence in 3 in group I and 5 in group II. Left side was involved in 30 cases in group I and 28 in group II and right side in 25 and 27 in group I and II respectively. Level of injury was upper 1/3rd seen in 16 and 19, middle 1/3rd in 29 and 30 and lower 1/3rd in 10 and 6 patients in group I and II respectively. 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) (Table II).

Graph I Comparison of DASH score



In 20 cases in group I and 32 in group II DASH score was excellent, 15 cases in group I and 10 in group II had good, 15 in group I and 7 in group II had fair and 5 in group I and 6 in group II had poor DASH score. The difference was significant ($P < 0.05$) (Graph I).

Graph I Comparison of complications

Complications	Group I	Group II	P value
Implant failure	1	2	0.52
Superficial infection	1	1	
Deep infection	2	1	
Non- union	2	2	
Shortening	1	3	

Complications seen were implant failure 1 in group I and 2 in group II, superficial infection 1 in group I and 1 in group II, and deep infection 2 in group I and 1 in group II, non- union 2 in group I and 2 in group II, shortening seen in 1 in group I and 3 in group II. The difference was non- significant ($P > 0.05$) (Graph I).

DISCUSSION

With excellent to good results, non-operative treatment is an option for the majority of humeral shaft fractures. The fractured parts have a healthy blood supply and are covered in muscles along the whole humeral shaft.⁷ Humeral shaft fractures can be caused by both direct and indirect trauma. The flow of blood is necessary for the fracture to heal, just like it is for any other wound.⁸The surgical indications include unsatisfactory fracture reduction, concurrent vascular lesions, open fractures, radial nerve palsy, polytrauma patients, floating elbow, and obese patients at risk of developing a varus angulation.⁹ Our study showed that age group 20-30 years had 12 patients in group I and 15 in group II, 30-40 years had 18 in group I and 12 in group II, 40-50 years had 15 in group I and 16 in group II and 50-60 years had 10 in group I and 12 in group II. Changulani et al¹⁰ in their study internal fixation was performed on 23 patients

using IMN and 24 using DCP. All cases involved reaming antegrade 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 outcome was evaluated. There was no discernible difference in the ASES scores between the two groups when the results of the independent samples t test were compared. When comparing IMN with DCP, it was discovered that the average union time was substantially shorter for IMN. In 20 cases in group I and 18 in group II had A3 type of fracture and B2 was seen in 11 and 12 patients respectively. Mode of injury was RTA in 42 in group I and 38 in group II, fall in 10 in group I and 12 in group II and violence in 3 in group I and 5 in group II. Left side was involved in 30 cases in group I and 28 in group II and right side in 25 and 27 in group I and II respectively. Level of injury was upper 1/3rd seen in 16 and 19, middle 1/3rd in 29 and 30 and lower 1/3rd in 10 and 6 patients in group I and II respectively. 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. Hashib et al¹¹ treated internal fixation with humeral interlocking nails in 15 patients

(Group-A) and dynamic compression plating in 14 cases (Group-B), with or without bone grafting. All except one of the cases from each group resumed their old jobs. These two situations both progressed to non-union. They could go about their regular lives, but they couldn't go back to work. Thus, 92.3% of cases in both groups had good functional results, while 7.7% of cases in either group had poor results. Infections were established in 4 patients in group-B (30.8%) that were treated with dynamic compression plating. Complications were also noted in this investigation. Two of them had superficial infections that were successfully treated with antibiotics and bandages, leading to successful healing and unification. In two cases, sinuses started to discharge. We observed that in 20 cases in group I and 32 in group II DASH score was excellent, 15 cases in group I and 10 in group II had good, 15 in group I and 7 in group II had fair and 5 in group I and 6 in group II had poor DASH score. Complications seen were implant failure 1 in group I and 2 in group II, superficial infection 1 in group I and 1 in group II, and deep infection 2 in group I and 1 in group II, non-union 2 in group I and 2 in group II, shortening seen in 1 in group I and 3 in group II. Men outnumbered women, and 40% of the cases were between the ages of 31 and 40, according to Ghosh et al.¹² 63.3% of the cases were related to motor vehicle accidents. The right humerus was impacted more frequently (66.6%). Surgery was performed on the majority of patients (40%) 4-6 days after the occurrence. Infection (6.6%), delayed union (13.3%), shoulder restriction (13.3%), and elbow restriction (6.6%) all occurred in the plate group of 30 patients. In the nail group, there were 30 patients, and of those, there were issues with the shoulders (46.6%), elbows (6.6%), infections (6.6%), delayed union (26.6%), shoulder mobility restriction (13.3%), and splintering of the fracture end (6.6%). Maximum number of fractures were clinically united between 11 and 13 weeks (73.3% in the plating group and 60% in the nailing group). The majority of patients (73.3% plate) had radiological union between 12 and 16 weeks.

CONCLUSION

In the treatment of humeral shaft fractures, both humeral interlocking nails and dynamic compression plating might be taken into consideration.

REFERENCES

1. Putti AB, Uppin RB, Putti BB. Locked intramedullary nailing versus dynamic compression plating for humeral shaft fractures. *J OrthopSurg (Hong Kong)* 2009;17:139-41.
2. Raghavendra S, Bhalodiya HP. Internal fixation of fractures of the shaft of the humerus by dynamic compression plate or intramedullary nail: A prospective study. *Indian J Orthop*2007;41:214-8.
3. Rommens PM, Kuechle R, Bord T, Lewens T, Engelmann R, Blum J. Humeral nailing revisited. *Top of Form Injury* 2008;39:1319-28.
4. Puri SR, Biswas SK, Salgia A, Sanghi S, Aggarwal T, Kohli A. Operative management of fracture of shaft humerus by dynamic compression plate versus interlocking intramedullary nailing: A comparative prospective study of 30 cases. *Med J DY Patil Univ*2013;6:49-54.
5. An Z, Zeng B, He X, Chen Q, Hu S. Plating osteosynthesis of mid-distal humeral shaft fractures: Minimally invasive versus conventional open reduction technique. *Int Orthop*2010;34:131-5.
6. Meekers FS, Broos PL. Operative treatment of humeral shaft fractures. The Leuven experience. *Acta OrthopBelg*2002;68:462-70.
7. Tingstad EM, Wolinsky PR, Shyr Y, Johnson KD. Effect of immediate weight bearing on plated fractures of the humeral shaft. *J Trauma* 2000;49:278-80.
8. Bhandari M, Devereaux JP, McKee MD, Schemitsch EH. Compression plating versus intramedullary nailing of humeral shaft fractures a meta-analysis. *Acta Orthop*2006;77:279-84.
9. Kesemenli CC, Subasi M, Arslan H, Necmioglu S, Kapukaya A. Comparison between the results of intramedullary nailing and compression plate fixation in the treatment of humerus fractures. *Acta OrthopTraumatolTurc*2003;37:120-5.
10. Changulani M, Jain UK, Keswani T. Comparison of the use of the humerus intramedullary nail and dynamic compression plate for the management of diaphyseal fractures of the humerus. A randomised controlled study. *Int Orthop.* 2007;31:391-5.
11. Hashib G. Management of humeral shaft fracture: a comparative study between interlocking nail and dynamic compression plate. *Int J Res Orthop*2016;2:40-7.
12. Ghosh S, Halder TC, Chaudhuri A, Datta S, Dasgupta S, Mitra UK. Comparative study of operative treatment of mid shaft fracture of humerus by locking plate versus intramedullary interlocking nail. *Med J DY Patil Univ*2013;6:390-4.