

## COMPARISON OF FUNCTIONAL OUTCOME BETWEEN DCP AND INTRAMEDULLARY NAIL IN THE MANAGEMENT OF SIMPLE TRANSVERSE HUMERUS FRACTURE

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### ABSTRACT

**Objective:** To compare functional outcome in patients managed with dynamic compression plating or locked intramedullary nailing for humeral shaft transverse fractures in Ghurki Trust Teaching Hospital.

**Methods:** This randomised control trial was conducted in Ghurki Trust Teaching Hospital, Lahore from September 15 to March 15, 2020. Patients of either gender and all ages with humerus shaft transverse fracture fulfilling the inclusion criteria were assessed and treated with either DCP or locking intramedullary nail. Post-operative functional outcome was graded as excellent, good, fair and poor.

**Results:** The total number of patients in our study were 60. Mean age was 38.7±12.79 years. Male patients were 45(75%) and female 15(25%). Mean follow up period minimum was of 6 months. In the Intramedullary nail group(I), the Neer scores were 13 (43.3%) excellent, 11 (36.7%) good, 4 (13.3 %) fair and 2(6.7%) poor. Whereas, functional outcome Neer scores of Dynamic compression plate group (II) were 23(76.7%) excellent, 6 (20%) good, and only single case (3.3%) shows poor result.

**Conclusion:** The functional outcome with both modalities were excellent with mean Neer score of respective Nail and DCP with 85.90% and 91.03%.

**Keywords:** Humerus Fracture, Intramedullary Nailing (IMN), Dynamic Compression Plate (DCP), Neer Score.

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### INTRODUCTION

The humeral shaft fractures managed conservatively has good union rate of more than 90%. The non-operative methods of treatment include hanging cast, functional brace, velpau dressing and shoulder spica cast<sup>1,2</sup> Of all the fractures, the humerus diaphyseal account for 3%.<sup>3</sup> The cons of non-operative treatment include shoulder joint stiffness, inconvenience, long period of immobilization and 10% chances of non-union.<sup>2,4</sup> Most

of the surgeons prefer its surgical management mainly due to the advantage of achieving early range of elbow joint motions and ultimately return to work place in time<sup>5</sup>The indication for operative treatment of these fractures include; segmental fracture, open fracture, pathological fracture, polytrauma, bilateral humerus fractures, fracture associated with neurovascular injuries, and failure of conservative management.<sup>6</sup> There are two optimal treatment options for surgical fixation of humeral shaft fractures; Intramedullary interlocking nailing and dynamic compression plate.<sup>7</sup> The plate osteosynthesis is considered gold standard and preferred method of treatment in the management of these fractures with high union rate and no iatrogenic injury to the rotator cuff muscles.<sup>1,8</sup> However, DCP has the disadvantage of extensive dissection, periosteal stripping, damage to radial nerve and mechanical failure to osteopenic bone.<sup>9</sup>

Closed interlocking nailing has the advantage of minimal dissection, no periosteal stripping and preservation of fracture haematoma. On other hand, the cons of nailing are rotator cuff impingement and restricted elbow range of movement.<sup>10</sup>

## METHODS

A randomized control trial was conducted to compare the functional outcome of humerus nail vs DCP from September 15 to March 15, 2020. Non-probability consecutive sampling technique was used to collect the information, The inclusion criteria of the study was; Duration of fracture <1 month. Patients of age 20-60 years of either sex were included in this study. However, the exclusion criteria include; those patients having either previous surgery the ipsilateral upper limb, compound fractures, multiple fractures other than humerus shaft like upper and lower ends, significant medical co-morbidity like CLD (s/bilirubin >2.0 mg/dl), CRF (s/creatinine >1.5 mg/dl), and history of chronic steroid intake. Patients who lost to follow up were also excluded from the study. After permission from the ethical review committee, total number of 60 patients (30 in each group) who admitted to the Department of Orthopedics, Ghurki Hospital, Lahore, fulfilling the inclusion criteria were selected. Informed written consent was taken from every patient. Cases were divided into two groups i.e. A & B. In group A patients, interlocking nailing was done while in group B, dynamic compression plating was done. All patients followed on regular intervals post-operatively and final outcome was noted by the researcher at the end of 3 months as per-operational definition. All this information (age, gender, BMI, duration of fracture, place of living, diabetes mellitus and excellent

functional outcome (yes/no) were collected through pre-designed Performa (attached at the end). The data collected were entered in computer software SPSS version 23. Mean and standard deviation were calculated for age, duration of fracture and BMI. Frequency and percentage were calculated for the gender, place of living (yes/no), diabetes mellitus (yes/no) and excellent functional outcome (yes/no). Chi-square tests was used to compare excellent functional outcome in both groups and p-value  $\leq 0.05$  was taken as significant.

## RESULTS

In our research, 60 patients were included among these majority were male patients as 45(75%), and minority were female patients as 15(25%) with an average age of  $38.7 \pm 12.79$  years. In this study, there were two groups of patients underwent different surgical procedures Interlocking nailing (group A) and decompression locking plate (DCP) (group B), In first group (ILN) (n=30), majority were male patients as 21(79.0%) and fewer were female patients as 9(30.0%) with an average age of  $37.60 \pm 12.72$  years, as compared to 2<sup>nd</sup> DCP group (n=30), majority were male patients as 24(80.0%) and fewer were female patients as 6(20.0%) with an average age of  $39.8 \pm 12.99$  years (Table 1).

Table 2 indicated the distribution of post-operative outcome using Neer Score and the results showed that 43.3% of the patients reveals the excellent outcome in Group A while 76.7% of the patients indicates the excellent outcome in Group B with an average score of  $85.90 \pm 7.85$  and  $91.03 \pm 3.69$  respectively.

Table 1: Distribution of patients in two groups according to Gender and Age

Gender	Group A		Group B		Total (n=60)	
	Interlocking nail (n=30)		DCP (n=30)			
	No. of patients	%age	No. of patients	%age	No. of patients	%age
Male	21	70.0	24	80	45	75.0
Female	9	30.0	6	20.0	15	25.0
Age (Years)	$37.60 \pm 12.72$		$39.8 \pm 12.99$		60	
Mean $\pm$ S.D					100	
Age (Years)	$38.7 \pm 12.79$ years					
Mean $\pm$ S.D						

Table 2: Distribution of patients in two groups according to Neer Score and Excellent outcome

Neer Score Outcome	Group A		Group B		Total (n=60)	
	Interlocking nail (n=30)		DCP (n=30)			
	No. of patients	%age	No. of patients	%age	No. of patients	%age
Excellent	13	43.3	23	76.7	35	70.0
Good	11	36.7	6	20.0	17	28.3
Fair	4	13.3	-	-	5	16.7
Poor	2	6.7	1	3.3	2	3.3
Mean $\pm$ S.D	$85.90 \pm 7.85$		$91.03 \pm 3.69$		60	
					100	

Table 3: Comparison of excellent outcome among two groups based on Gender

Gender	Excellent Outcome	Group A Interlocking nail (n=30)	Group B DCP (n=30)	C chi-square	p-value
Male	Excellent	8(38.1)	19(79.2)	9.658	0.022
	Good	8(38.1)	4(16.7)		
	Fair	4(19)	-		
	Poor	1(4.8)	1(4.2)		
Female	Excellent	5(55.6)	4(66.7)	0.741	0.690
	Good	3(33.2)	2(33.3)		
	Fair	1(11.1)	-		
	Poor	-	-		

The stratification of post-operative functional outcome was assessed based on gender, age, and the results showed that the frequency of excellent was more in Group B and there was statistically association between two groups among male patients as  $p < 0.05$  and insignificant results obtained among female patients.

The frequency of excellent outcome obtained in Group B patients having age between 41-60 years old. On the other hand, the frequency of good outcome was more in Group A patients having age from 20 to 40 years old (Table III).

## DISCUSSION

Intramedullary nail and plate are the 2 most commonly used surgical treatments. Both procedures have certain biomechanical and physiologic advantages and disadvantages.<sup>11</sup> Intramedullary nailing of humeral shaft fractures is load-sharing implant that allows preservation of periosteal blood supply and minimizes disruption of fracture biology. The plate fixation allows direct visualization, anatomic reduction, and rigid fracture fixation of the fracture and facilitates identification, exploration, and protection of the radial nerve. There is no consensus as to whether intramedullary nail or plate is the optimal treatment method.<sup>12,13</sup>

Diaphyseal fractures of the humerus have always been a problem, since these fractures have complications such as nonunion, malunion, delayed union and shortening. Operational treatment should be used to prevent complications such as malunion, delayed unions, revolving movement management, shoulder and elbow discomfort and recovery at an earlier stage.<sup>13</sup>

In this study, 60 patients were included among these majority were male patients as 45(75%), and minority were female patients as 15(25%) with an average age of  $38.7 \pm 12.79$  years. In this study, there were two groups of patients underwent different surgical procedures Interlocking nailing (group A) and decompression locking plate (DCP) (group B) with an average age of In first group (ILN) (n=30), majority were male patients as 21(79.0%) and fewer were female patients as 9(30.0%) with an average age of  $38.60 \pm 12.72$  years, as compared to 2<sup>nd</sup> DCP group (n=30), majority were male

patients as 24(80.0%) and fewer were female patients as 6(20.0%) with an average age of  $39.8 \pm 12.99$  years. In a study conducted by Rathod in 2017 based on the comparison of outcome in interlocking nail and plating and he findings showed that in this study, majority were male patients in ILN and DCP as compared to females as 14(70%) and 13(72.2%) while females in ILN (Group A) was 6(30%) and DCP (Group B) 5(27.8%) respectively. In ILN group, the average age of the patients was  $35.05 \pm 11.44$  and  $37.28 \pm 11.18$  years in DCP group.<sup>14</sup> Another comparative study was conducted by Singh et al. (2016) had the findings that in this study, the male to female ratio was 7:3 with an mean age of 35.77 years in both groups as a whole.<sup>15</sup> Recently same study was conducted in 2019 based on the comparison of functional outcome among ILN and DCP and the results indicated that majority were male in both groups as 14(70%) and 13(72.2%) respectively while fewer were female patients 6(30%) and 5(27.8%) respectively.<sup>16</sup>

In a current study, the results of functional outcome showed that 43.3% of the patients reveals the excellent outcome, 36.7% had the good outcome, 16.7% fair and 3.3% reported the poor outcome in Group a (ILN) while 76.7% reported excellent outcome, 20% reported the good and 3.3% reported poor outcome in Group B (DCP).

In another study, interlocking nail shows 75.5% excellent result while dynamic compression plating shows 75.0% excellent result.<sup>17</sup> In a study, Excellent was seen in 20% patients and 46.67% reported the good outcome in ILN group, on the other hand, DCP group majority of the patients showed excellent outcome as 80% and good outcome as 20%.<sup>68</sup> In another study, excellent and good outcome was seen in 10% and 30% patients in ILN group while in DCP group, 44% and 33% of the patients reported the excellent and good outcome respectively. There was less poor outcome reported in case of DCP as 11% while four patients i.e., 20% in ILN group reported the poor outcome.<sup>16</sup> The current study supported the evidence of all above previous researches related to the comparison of functional in two group of patients (ILN and DCP) that majority of the patients who underwent the surgical intervention of DCP reported the excellent outcome as

compare to ILN group.

The study had some limitation like a small sample and lost to follow up the large group of patients but in spite all of these a current study has shown that decompression plating (DCP) is a better surgical option for the management humeral shaft fracture as compared to interlocking nail (ILN).

## CONCLUSION

The study concluded that the functional outcome of IMN and DCP for transverse fracture of humerus shaft is excellent; with later having slight edge over the former in respect of Neer score. Among the patients treated with interlocking nails and compression plates, there is no substantial difference in the radiological union but major decrease in shoulder joint motion; shoulder stiffness and constant shoulders pain in patients treated with interlocking nails. In addition, no single treatment choice for a specific fracture is preferable in all situations and it needs to be individualized in each situation.

Figure 1 & 2 showing the radiology of humerus fracture pre and postoperatively (Nail)

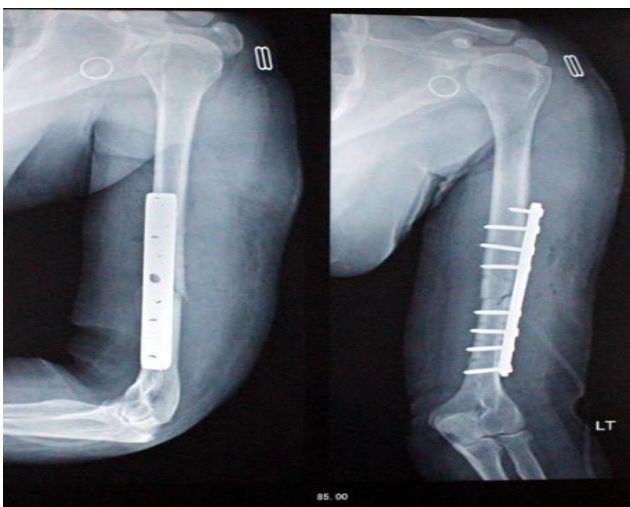
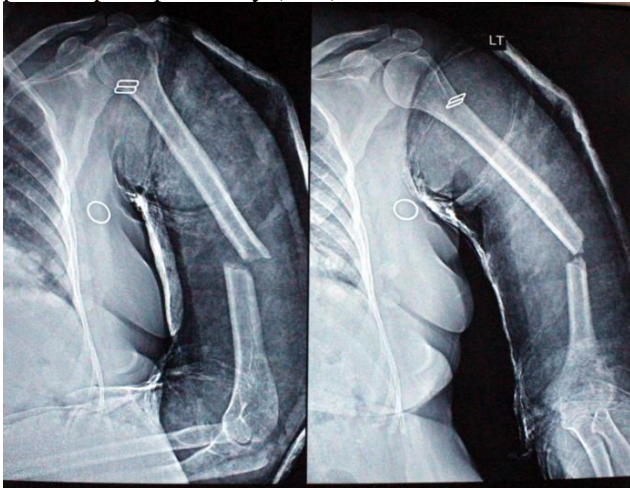
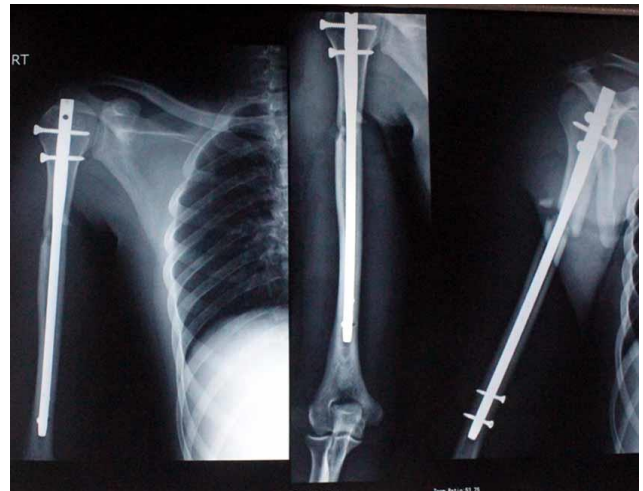
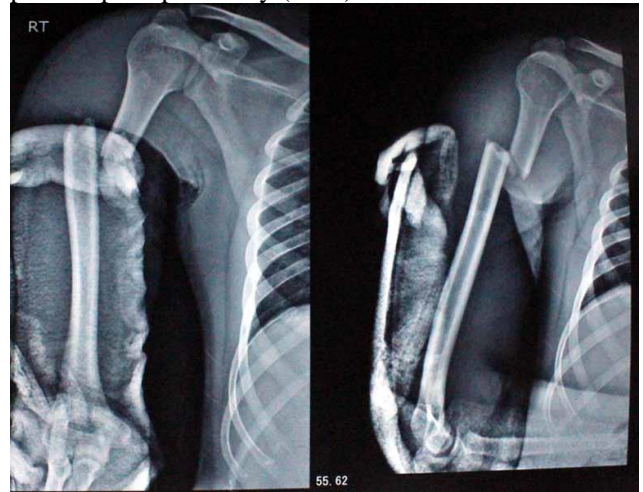


Figure 3 & 4 showing the radiology of humerus fracture pre and postoperatively (DCP)



## ETHICAL REVIEW BOARD APPROVAL

The study was approved from Institutional Review Board of Ghurki Trust Teaching Hospital, Lahore, via reference No. 2021/04/25 dated April 6,2021.

## REFERENCES

1. Madhan J, Chaudhari K, Ajay SS, Sabarish K, Likhith D. Intramedullary Interlocking Nailing Versus Dynamic Compression Plating In Diaphyseal Humeral Fractures In Adults–A Comparative Study. *Orthop Muscular Syst.* 2019;8:274.
2. Wali MG, Baba AN, Latoo IA, Bhat NA, Baba OK, Sharma S. Internal fixation of shaft humerus fractures by dynamic compression plate or interlocking intramedullary nail: a prospective, randomised study. *Strategies in Trauma and Limb Reconstruction.* 2014 Nov 1;9(3):133-140.
3. Crenshaw AH, Perez EA. Fractures of the shoulder, arm and forearm. In: Campbell WC, Canale ST, Beaty JH, eds. *Campbells Operative Orthopedics* 13th edition 17
4. Foulk DA, Szabo RM. Diaphyseal humerus fractures: natural history and occurrence of non-union. *Orthopedics.* 1995 Apr 1;18(4):333-335.

5. Chaudhary P, Karn NK, Shrestha BP, Khanal GP, Rijal R, Maharjan R, Kalawar R. Randomized controlled trial comparing dynamic compression plate versus intramedullary interlocking nail for management of humeral shaft fractures. *Health Renaissance*. 2011;9(2):61-66.
6. Rathod J, Patil P, Kanake V, Kawalkar U. Comparison between Interlock Nailing and Plating for Fracture Shaft Humerus.
7. Kurup H, Hossain M, Andrew JG. Dynamic compression plating versus locked intramedullary nailing for humeral shaft fractures in adults. *Cochrane Database of Systematic Reviews*. 2011(6).
8. Rb C, Brien D, Buckley RE, Mckee MD. Fixation of fractures of the shaft of humerus by dynamic compression plate or intermedullary nail a prospective randomized trial. *JBJS*. 2000;82:336-339.
9. Singiseti K, Ambedkar M. Nailing versus plating in humerus shaft fractures: a prospective comparative study. *International orthopaedics*. 2010 Apr 1;34(4):571-576.
10. Papasoulis E, Drosos GI, Ververidis AN, Verettas DA. Functional bracing of humeral shaft fractures. A review of clinical studies. *Injury*. 2010 Jul 1;41(7):e21-27.
11. Reddy BJ, Athmaram M, Swaroop VS. A clinical study of fixation of fracture of shaft of humerus with interlocking nail. *J Evol Med Dental Sci*. 2015;4:2172-2179.
12. Vijayvargiya M, Pathak A, Gaur S, Outcome analysis of locking plate fixation in proximal humerus fracture. *J Clini Diagnos Res*. 2016;10(8):1-5.
13. Zhao JG, Wang J, Wang C, Kan SL. Intramedullary nail versus plate fixation for humeral shaft fractures: a systematic review of overlapping meta-analyses. *Med*. 2015;94(11):e599.
14. Rathod, J., Patil, P., Kanake, V., Kawalkar, U. Comparison between Interlock Nailing and Plating for Fracture Shaft Humerus. *International Journal of Contemporary Medical Research*. 2017;4(3):587-590.
15. Singh P, Gandhi V, Bansal D. Comparative Study of Compression Plating vs Interlocking Nail in Fracture Shaft of Humerus. *International Journal of Contemporary Medical Research*. 2016;3:3385-3388.
16. Naga Raju Gude, Srinivas Rao Kolati, Yesaswini Bonda. Comparative study of functional outcome of dynamic compression plating with interlocking nailing for fracture shaft humerus in adults. *IAIM*, 2019; 6(8): 102-116.
17. Rudramuni AK, Shekhar S, Manu BB, Goud VA. Comparative study of shaft of humerus fractures fixation between intramedullary interlocking nailing and locking compression plate. *Orthopaed Surg Traumatol*. 2018;2:292-301.