

A Comparative Analysis of Interlocking Nail and Dynamic Compression Plating as Treatment Modality of Humeral Shaft Fractures

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ABSTRACT

Background: Aim: To compare interlocking nail and dynamic compression plating as treatment modality of humeral shaft fractures. **Methods:** 52 cases of humeral shaft fractures (30 males and 22 females) were included in the study. They were randomly divided into two groups. Group A patients were treated with humeral interlocking nail and group B patients were treated with dynamic compression plating. Treatment outcome were compared. **Results:** It was found that average duration between trauma and fixation found to be 17.2 weeks in group A and 14.3 weeks in group B patients. In most of the cases, mode of injury was road traffic accident in group A (70%) and group B (62%) followed by fall seen in 21% in group A and 24% in group B and physical violence in 9% in group A and 14% in group B patients. A significant range of motion was seen pre-operatively and post-operatively in both groups. In group A patients, shortening was seen in 4 and implant failure in 3 and in group B was non-union in 2 and infection in 2 patients. A significant difference was seen in both groups ($P < 0.05$). **Conclusion:** Dynamic plating resulted in lesser union time, complications and better range of motion.

Keywords: Humeral shaft, Dynamic plating, interlocking nail, implant failure.

INTRODUCTION

Humeral shaft fractures are commonly seen among individuals. It comprised of 3%- 5% of all bony fractures. Most of orthopaedic surgeons come across cases of humeral shaft fractures. It has bimodal age distribution. It is mostly seen among young patients with high-energy trauma and in case of elderly it is usually seen among osteopenic patients with low-energy injuries.^[1] Patients experience severe pain and extremity weakness. Humeral shaft fractures are the result of direct and indirect trauma. Though it is usually seen with direct trauma, but indirect forces such as fall on outstretched hand or elbow are also common causes of shaft humerus fracture.^[2] OTA classification of humerus shaft fracture includes bone number, fracture location, fracture pattern 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] Management includes both conservative and non-conservative modality. However, most humeral shaft fractures can be managed non-operatively exhibiting excellent results.^[4] Earlier 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. Healing of the fracture site depends upon blood supply.^[5] There can be various complications in conservative management such as non-union, malunion, limitation of joint motion and progressive degenerative arthritis. The superior results that have been observed with recent advances in internal fixation techniques and latest instrumentation have led to an expansion of surgical indications for such fractures.^[6] The present study aimed at comparing interlocking nail and dynamic compression plating as treatment modality of humeral shaft fractures.

MATERIALS AND METHODS

52 cases of humeral shaft fractures visiting the orthopaedics department including 30 males and 22 females were included in the study. All patients agreed to participated in the study.

A case history proforma was developed and parameters related to them were recorded. History as well as clinical evaluation was performed. All cases were examined radiographically with the help of AP view and CT scan. Patients were randomly divided into two groups. Group A patients were treated with humeral interlocking nail and group B patients were treated with dynamic compression plating using anterior approach. Factors such as mode of injury, range of motion, average duration between trauma and fixation and complications between both techniques were recorded and compared. Patients were prescribed post-operative antibiotics, anti-inflammatory and analgesics. Radiographs were

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taken to see improvement on follow ups. Results of the present study was tabulated and studied using Amann Whitney U test. The software IBM SPSS version 21.0 was used for analysis. Level of significance was below 0.05.

RESULTS

Table 1: Grouping of patients

Groups	Group A	Group B
Technique Used	Interlocking nail	Dynamic compression plating
Male	16 (30.7%)	14 (26.9%)
Female	10 (19.2%)	12 (23%)

There were 16 (30.7%) male and 10 (19.2%) in group A and 14 (26.9%) male and 12 (23%) in group B [Table 1].

Table 2: Comparison of factors in both groups

Variables	Parameters	Group A	Group B	P value
Average duration between trauma and fixation (Weeks)		17.2	14.3	Significant t <0.05
Mode of injury	RTA	70%	62%	Significant t <0.05
	Fall	21%	24%	
	Physical violence	9%	14%	
Range (Degree)	Pre- op	7- 131	4-132	Significant t <0.05
	Post- op	4-134	5-132	

Table 3: Complications in both groups

Complications	Group A	Group B	P value
Non- union	3	2	Non- significant >0.05
Shortening	4	1	Significant <0.05
Infection	1	2	Non- significant >0.05
Implant failure	3	0	Significant <0.05
Neurological deficit	2	1	Non- significant >0.05

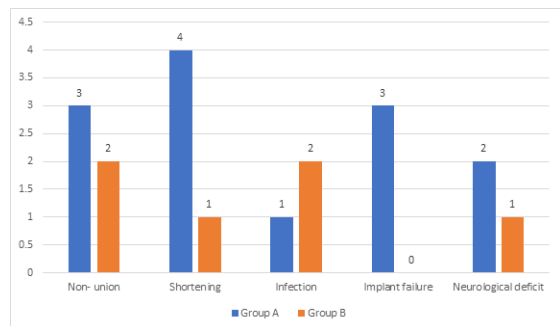


Figure 1:

Average duration between trauma and fixation found to be 17.2 weeks in group A and 14.3 weeks in group B patients. In most of the cases, mode of injury was road traffic accident in group A (70%) and group B (62%) followed by fall seen in 21% in group A and 24% in group B and physical violence in 9% in group A and 14% in group B patients. A significant range of

motion was seen pre- operatively and post- operatively in both groups (P< 0.05) [Table 2].

Most common complication recorded in group A patients was shortening in 4 and implant failure in 3 and in group B was non- union in 2 and infection in 2 patients. A significant difference was seen in both groups (P< 0.05).

DISCUSSION

Fracture of humeral shaft is a common phenomenon. Various treatment modalities have been suggested.^[7] Each has its advantages as well as disadvantages. The benefits of operative management are early mobilization and patient comfort.^[8] However, risk of technical errors, infections and nerve injuries etc are common with operative technique. The choice of treatment for such cases is a matter of debate. Both dynamic plating and intramedullary nailing have been proposed.^[9] Dynamic compression plating offers satisfactory results but requires widespread dissection, and meticulous radial nerve protection whereas intramedullary nailing require less invasive surgery, an undisturbed fracture hematoma and use of a load sharing device support.^[10] Considering this the present study aimed at comparing interlocking nail and dynamic compression plating as treatment modality of humeral shaft fractures among 52 patients (males- 30, females- 22).

It was observed that mode of injury was road traffic accident in group A (70%) and group B (62%) followed by fall seen in 21% in group A and 24% in group B and physical violence in 9% in group A and 14% in group B patients. Average duration between trauma and fixation found to be 17.2 weeks in group A and 14.3 weeks in group B patients. We found that in group B patients there was superior range of motion as compared to group A patients and a significant difference was seen. Sawant et al,^[11] recorded functional outcome in DCP and the IMN in diaphyseal fractures of the humerus in 30 patients. The functional outcome was determined using “Disabilities of Hand, Shoulder and Elbow (DASH) Questionnaire” where a better response was seen with DCP as compared to interlocking nailing. A statistically significant mean DASH score in DCP (20.93) and in IMN group (32.13) was observed. Primary radial nerve palsy was seen in 2 patients of DCP group and 1 patient of IMN group. The average time taken for union was 14.5 weeks in the DCP group and 17.31 weeks in IMN group. 2 cases in IMN remained ununited. The complication with interlocking nail group were more as compared to DCP group.

In this study, common complications observed were non- union, shortening, infection, implant failure and neurological deficit seen in 3 and 2, 4 and 1, 1 and 2, 3 and 0 and 2 and 1 patients in group A and B respectively. Singh et al,^[12] conducted a study on 30

cases of fracture shaft humerus which were divided into close ILN and open DCP group. The average age of patients was 35.77 years, with male female ratio 7:3. 63.33% cases were seen in right side, in 63.33% cases RTA was common mode of injury. Common region was middle third seen in 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 revealed 80% cases excellent result with 20% cases shows satisfactory results. Hashib et al,^[13] included 29 cases of shaft of humerus fracture. 15 cases (Group A) underwent humeral interlocking nail and 14 cases (Group-B) underwent dynamic compression plating, with or without bone grafting. Bone grafting was done in 8 cases of Group A and 5 cases of group B. The functional result was good in 92.3% of cases and poor in 7.7% of cases of either group. 30.8% cases in group B developed infections. 1 patient (7.7%) of group A developed deep seated infection and subsequent non-union. 3 cases of group A (23.1%) developed shortening ranging from 1.5 cm to 4 cm. All these cases were cases of old non-union with sclerotic bone ends which had to be nibbled and refreshed. Shortening developed in 2 cases (15.4%) in group B. 1 case of non-union was seen in each group. 1 patient in group A experienced loosening of implant, axillary nerve injury was seen in 1 case in group A.

CONCLUSION

Both techniques offer few advantages and disadvantages. Dynamic plating resulted in lesser union time, complications and better range of motion. However, interlocking nail can be used in cases of non- union and comminuted fractures.

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