



**ORIGINAL RESEARCH PAPER**

**Medical Science**

**A COMPARATIVE STUDY OF PLATING VERSUS NAILING IN MIDDLE THIRD CLAVICLE FRACTURE.**

**KEY WORDS:**

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**INTRODUCTION:**

The clavicle/collar bone is S-shape long bone which by its horizontal orientation forms a structure between sternum & scapula. Clavicular injuries common in active and young grow. The most common mechanism of fracture is direct blow on shoulder/fall on out stretched arm. Functional outcome of mid shaft fracture not related to its union but also to its length<sup>1</sup>. More recent data reported non union rate of 4.29%<sup>2</sup> & mal union rate 14.36%<sup>3</sup> with displaced clavicle fracture one study demonstrated that shoulder by mechanics where significantly altered by mal union by clavicle<sup>4</sup>. Two recent published randomized trials have proven superiorly of plate fixation of elastic stable intramedullary nail over non-operative treatment of displaced middle third clavicle fracture in term of outcome & pain relief<sup>5</sup>. Biomechanical study shows that plate fixation provide rigid stabilization compared to intramedullary nail. On other hand intramedullary nail advantage of preserving soft tissue envelope, periosteum & vascular integrity of fracture side. Therefore inflection rate decrease and fracture callus formation enhanced<sup>6</sup>. Hence the presence study was done at our tertiary care centre to evaluate functional outcome of plating & intramedullary nailing in fracture mid-shaft clavicle & to study various complication.

**MATERIAL & METHOD:**

A prospective study conducted on 48 adult patient, 24 for plating & 24 for nailing with closed displaced mid shaft fracture study was conducted for a period of 18 months at tertiary care centre. The patients satisfying the inclusion criteria underwent the procedure and were followed up for period of 18 months. Assessment of outcome was done with help of DASH score.

**INCLUSION CRITERIA:**

- Male or female between 18-60 years of age with middle third fracture clavicle.
- No vascular nerve injury.
- Complete fracture fragment displacement of greater than 2cm with no cortical contact.
- Patient with Robinson type 2B1 & 2B2.

**EXCLUSION CRITERIA:**

- Established case of non union from previous fracture clavicle.
- Fracture of greater than 1 month duration.
- Fracture other than middle third.
- Pediatric patients.



**SURGICAL PROCEDURE:**

**• Plating:-**

Position of patient in beach chair. Longitudinally incision in larger line. Skin, subcut, fascia & periosteum elevated. Fracture assessment was done if there is a tranverse fracture then anatomic reduction is performed & fixation with pre-contoured plate placed superiorly. A minimum of 6 intact cortices medial and lateral to fracture side are purchased. For more oblique fracture a 3.5mm cortical lag screw is placed across fracture side & then plating was done.



**Nailing:-**

Patient positioned and draped as same as clavicle plating. A 1cm transverse incision is taken about lateral to sternoclavicular joint. Interior cortex is opened using sharp pointed awl. Titanium nail is bent at tip about 15o to facilitate insertion. A close reduction is performed under fluoroscopic control using two percutaneously introduce pointed clamp. If close reduction is failed an additional incision is made above fracture side for direct manipulation of main fragment. Nail advanced across the fracture side into lateral fragment until it is just medial to acromioclavicular joint. After reaching end point, nail is cut to entry point to minimize soft tissue irritation, at same time leaving sufficient length behind for easy extraction. The fascia and skin were closed.





**OUTCOME ASSESMENT:**

**DASH score:–**

- 1. Excellent – 0-20 points
- 2. Good – 21-40 points
- 3. Fair – 41-60 points
- 4. Poor – greater than 60 points

**STATISTICAL ANALYSIS:**

The data obtained from the study was analyzed with help of RCT and unpaired T-test 'P' value less than 0.05.

**RESULTS:**

1. Mean time taken for radiological union in both groups (In weeks).

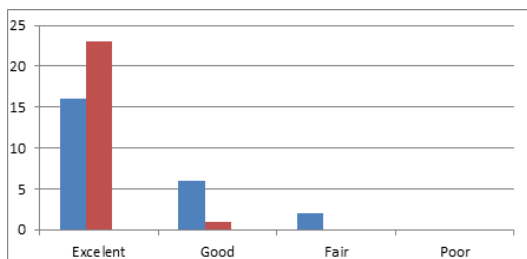
Type of Treatment				'P' value
Plating		Nailing		
Time taken for radiological union		Time taken for radiological union		< 0.01
Mean	SD	Mean	SD	
24	6.67	16	3.70	

Above table shows that there was significant statistical difference between mean time taken for radiological union in both treatment groups. Plating approach takes more time for radiological union than nailing approach.

2. Distribution of study subjects according to DASH score & type of treatment.

DASH score grades	Types of treatment		Total
	Plating	Nailing	
Excellent	16	23	39
Good	06	01	07
Fair	02	00	02
Poor	00	00	00
Total	24	24	48

F.E. = 0.01, P = 0.02



From above table it was observed that proportion of study subjects having excellent DASH grading was 41.46% & 58.54% in plating & nailing group respectively. This difference was statistically significant as compared with remaining grades.

3. Distribution of study subject according to postoperative complications and type of treatment

Postoperative complications	Type of treatment		Total
	Plating(n=24)	Nailing(n=24)	
Superficial Infection	3	0	3
Drooping shoulder	0	0	0
Implant prominence	4	3	7

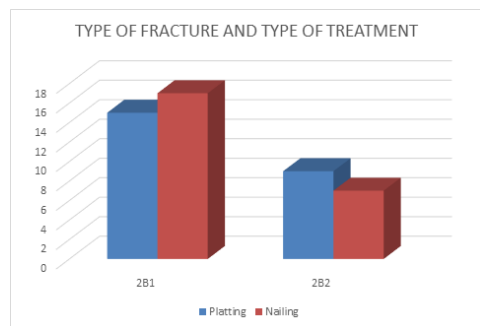
Nonunion	0	0	0
Malunion	1	2	3
Incisional Numbness	4	0	4
Total	12	5	17

Above table shows that there was total 17 complications. Out of this 17, 12 were present in plating group and 5 were present in nailing group. Infection was most common complication in plating group while malunion most common in nailing group.

4. Distribution of study subjects according to type of treatment and type of fracture (Robinson's classification)

Type of fracture	Type of treatment		Total
	Plating	Nailing	
2B1	15	17	32
2B2	9	7	16
Total	24	24	48

X<sup>2</sup> = 0.37, P = 0.54



Above table shows that proportion of study subjects having 2B1 fracture was 45.45% and 54.55% in plating and nailing groups respectively. This observed difference was not statistically significant as compared to 2B2 fractures.

For most mid-shaft clavicle fracture that do not have excessive comminution or obliquity to fracture planes it is our preference to use intramedullary nail fixation to minimize fragment stripping, avoid supraclavicular nerves, achieve relative stability and improve cosmesis. In more comminuted fracture pattern, segmental fractures or fracture with large amount of obliquity, plate fixation is used.

Management of patient of displaced middle third clavicle fracture has evolved over last 10 years with more away from non operative treatment to the use of various fixation devices including the intramedullary nail and plate fixation. But there is no scenario for ideal treatment of those fractures. We compared intraoperative variable, complications, function and fracture in patient treated with intramedullary nail and anatomic contoured plates determine.

Both surgical procedure have own disadvantage. Plate fixation is easy to perform and long experience is available with improved implants, prophylactic antibiotic and better soft tissue handling, plate fixation has been reliable and reproducible technique.

Typical complication of plate fixation include infection, hypertrophic scars, implant loosening, nonunion and re-fracture after implant removal.

We studied 48 patients of displaced middle third clavicle fracture 24 each in either group of nailing and plating. In our study plating group has 16 male and 8 female while nailing group has 18 male and 6 female. From this data we get p value of 0.90. So there is no significant difference between two treatment groups for proportion of males as compared to females. We used envelop method for distribution of patient in either group. We have taken males and females of age group between 18 to 60 years of age. Mean age of plating and nailing is 38 and 37 respectively. There is no significant difference in mean age between two treatment groups as p value is >0.5.

In our study group 58 % of people are from lower economic strata which make major part of patients. Nailing and plating are both cost effective treatment for these financially poor people.

Most of patient visited to our OPD has history of fall followed by RTA. We have found that there is no significant difference of proportion of study subject according various mode of injury between two treatment groups. Right sided fracture in plating and nailing group was 45.16% and 54.84% respectively. This difference was not statically significant as compared to left side fractures.

We have included type 2B1 and 2B2 fracture of Robinson's classification. We used envelop method for distributing patient in both plating and nailing group so there is equal chance of patient to fall in plating and nailing group.

We follow up patient on 4 and 24 weeks to look for radiological union, any complications occurred postoperatively and functional outcome of patient by DASH score. We have found that mean time for radiological union of plating and nailing was 24weeks and 16 weeks respectively. Nailing group had faster healing rate as compared to plating group. Younger patient heals rapidly than that of older age group. Infection was most common complication in plating group. 4 had implant prominence and 1 had malunion in plating group. No patient had nonunion in either group. Incisional numbness which is commoner complication among platers. 4 of our patient had incisional numbness. DASH score calculated by questionnaire filled by patient which is based on functions of hand shoulder and arm. From this questionnaire we classify DASH score as excellent, good, and fair.

23 patients had excellent and 1 had good outcome in nailing group while 17 excellent, 6 good, and 2 fair in plating group.

#### CONCLUSION:

The incidence of clavicle fractures continues to be highest injury rates around the shoulder. Surgical fixation provides better shoulder function. Both methods of surgical fixation has advantages of its own Titanium elastic nail fixation has its advantage of being less invasive and provide higher patient satisfaction and cosmetically better as compared to plate fixation. TEN fixations have greater implant stress in same loading than that of plate fixation. TEN fixations provide affordability, load sharing properties, shorter hospital stay, less intraoperative blood loss and time, easy implant removal. Plate provides rigid fixation but complications like Incisional numbness, implant prominence superficial infection are more common in this group. Functional outcome and radiological union is much more superior in nailing than plating group. Functional outcome in nailing group of 2B1 fracture is better than 2B2 fracture. While plating provides good outcome in both 2B1 and 2B2 fracture.

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