



STUDY OF DISPLACED MIDSHAFT CLAVICLE FRACTURES TREATED WITH INTRA MEDULLARY TITANIUM ELASTIC NAIL SYSTEM AND ITS FUNCTIONAL OUTCOME

Orthopaedics

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ABSTRACT

Introduction: Fractures of the clavicle, which primarily occur in young males, constitute 2.6–4% of all fractures in adults. A male dominance of approximately 70% has been reported. The most frequent injury mechanism is a direct fall on the shoulder. Fractures are often sustained during sports activities or traffic accidents. The majority (69–82%) of fractures occur in the mid-shaft of the clavicle, followed by 12–26% in the lateral part and 2–6% in the medial part. **Aims:** This study is aimed to assess the functional Outcome of intramedullary titanium elastic nail system for Displaced Clavicle Fracture. **Materials And Methods:** The present study was analytical study. This Study was conducted from one and half year at Department Of Orthopaedics Jagannath Gupta Institute Of Medical Sciences And Hospital, Kolkata. **Result:** In our study, 1 (5.0%) patient had Bb Leg Injuries and 2 (10.0%) patients had I/L Scapula Spine in Associated Injuries which was not statistically significant ($p=0.6530$). **Conclusion:** We found that, ESIN is safe and minimally invasive with good patient satisfaction, cosmetic appearance, and overall outcome.

KEYWORDS

Clavicle fracture, elastic stable intramedullary nailing, midshaft fractures.

INTRODUCTION

The clavicle is easily fractured because of its subcutaneous, relatively anterior location and frequent exposure to transmitted forces. The middle third, or mid-shaft, is the thinnest, least medullous area of the clavicle, and thus the most easily fractured; the lack of muscular and ligamentous support makes it vulnerable to injury.¹ The muscle attachments often cause a dislocation of the major fragments in clavicle fractures and a shortening of the clavicle, particularly in mid-shaft fractures¹. This can be anatomically explained by the fact that the medial and lateral parts of the clavicle are firmly secured by strong ligaments and muscles, whereas the middle part of the clavicle lacks any strong attachments and thus is more vulnerable to trauma. The muscle attachments often cause a dislocation of the major fragments in clavicle fractures and a shortening of the clavicle, particularly in mid-shaft fractures².

Historically, non-operative treatment of mid shaft clavicular fractures was considered the gold standard of care. There is solid evidence in favour of non-operative treatment for fractures with a displacement of less than 2cm and remaining contact of the bone fragments².

The clavicle has many important functions: it connects the axial skeleton to the upper extremity; it contributes to the motion and stability of the upper extremity; and, with the sub-clavius muscle, it provides protection to the underlying neurovascular structures (i.e., sub-clavian vessels and brachial plexus). Malunion may impair these functions. In addition, callus formation or displacement can lead to thoracic outlet compression.

Initially the aim of treatment was union of fracture in whatsoever position fracture unites. Many methods of conservative treatment namely triangular sling, cuff and collar sling, three sling method, figure of eight bandage, figure of eight POP shoulder Spica, clavicular brace, arm shoulder pouch and many others have been described from time to time³. All these methods did not involve the reduction of fracture or unable to hold the fracture reduced hence the end results were malunion/nonunion in various cases. Malunion resulted in shortening, deformation, disfigurement and poor cosmeses shortening (reduced distance between sternoclavicular joint to the shoulder joint) resulted in biomechanical disadvantage, persistence of pain, limitations of functions and reduction of strength in upper limb in some of these cases³.

AIMS AND OBJECTIVE

- This study is aimed to assess the functional Outcome of intramedullary titanium elastic nail system for Displaced Clavicle Fracture.
- To observe the incidence of immediate post-operative

complications.

MATERIALS AND METHODS

Study Population: All patients were conducted in Department Of Orthopaedics Jagannath Gupta Institute Of Medical Sciences And Hospital, Kolkata.

Study Design: An analytical study.

Period Of Study: one and half year

Study Group: 25 patients were taken and divided in two groups

Selection Criteria

Inclusion Criteria

- All skeletally mature patients.
- All the displaced diaphyseal non commented /simple comminution clavicle fractures (>2cm displacement) – AO B1 and B2 fractures.
- Fractures with shortening of over 20 mm
- Fractures within one week

Exclusion Criteria

- Fractures with marked comminution.
- Brachial plexus injuries
- Paediatric fractures
- Pathological fractures
- Open fractures Congenital anomaly or bone disease

RESULT AND DISCUSSION

In our study, 10 (40.0%) patients were 21-30 years old, 6 (24.0%) patients were 31-40 years old, 7 (28.0%) patients were 41-50 years old and 2 (8.0%) patients were >51 years old. The mean Age (mean $\pm$ s.d.) of patients was 34.7600 ± 10.0635 yrs. In this study male population [17 (68.0%)] was higher than the female population [8 (32.0%)].

In our study in Excellent Outcome, the mean Age (mean $\pm$ s.d.) of patients was 33.9000 ± 10.2746 yrs and in Good Outcome, the mean Age (mean $\pm$ s.d.) of patients was 38.2000 ± 9.3648 yrs which was not statistically significant ($p=0.4043$).

Our study showed that in Excellent Outcome, the mean Days Before Surgery (mean $\pm$ s.d.) of patients was 3.5000 ± 1.4690 days and in Good Outcome, the mean Days Before Surgery (mean $\pm$ s.d.) of patients was $3.8000 \pm .8367$ which was not statistically significant ($p=0.6678$).

McKee MD et al⁴ (2006) found that the range of motion was well maintained, with flexion averaging $170^\circ \pm 20^\circ$ and abduction averaging $165^\circ \pm 25^\circ$. Compared with the strength of the uninjured shoulder, the strength of the injured shoulder was reduced to 81% for maximum flexion, 75% for endurance of flexion, 82% for maximum abduction, 67% for endurance of abduction, 81% for maximum

external rotation, 82% for endurance of external rotation, 85% for maximum internal rotation, and 78% for endurance of internal rotation ($p < 0.05$ for all values). The mean Constant score was 71 points, and the mean DASH score was 24.6 points, indicating substantial residual disability.

Present study showed that the mean Flexion (mean $\pm$ s.d.) of patients was higher in patients with Excellent Outcome [168.0000 $\pm$ 5.9383] compared to patients with Good Outcome [146.0000 $\pm$ 2.2361] which was statistically significant ($p < 0.0001$).

Our study showed that the mean Abduction (mean $\pm$ s.d.) of patients was higher in patients with Excellent Outcome [169.0000 $\pm$ 7.5394] compared to patients with Good Outcome [145.0000 $\pm$ 5.0000] which was statistically significant ($p < 0.0001$).

Bithrey JW et al⁵ (2017) found that the difference in Constant shoulder scores between the affected and unaffected shoulders for 14 patients was below 11 at 12 weeks' follow-up and all patients were satisfied with their scar after 12 weeks.

We also found that the mean Constant Score (mean $\pm$ s.d.) of patients was higher in patients with Excellent Outcome [90.4500 $\pm$ 2.9465] compared to Good Outcome patients [82.8000 $\pm$ 1.6432] which was statistically significant ($p < 0.0001$).

CONCLUSION

- In our study, patients were 21-30 years old, patients were 31-40 years old, 7 patients were years old and patients were >51 years old.
- In our study, patients were Female and patients were Male.
- In our study, patients were Excellent Outcome and patients were Good Outcome.
- Excellent outcome was more in male but good outcome was more in female which was statistically significant.
- Associated Injuries was not significantly related with outcome.
- Days before Surgery was not significantly associated with outcome but Excellent Outcome patients were higher Follow Up in Months.
- In our study, the mean Time for Shoulder Movements Union In Week of patients were 8.5200 $\pm$ 2.0841. The mean Flexion of patients were 163.6000 $\pm$ 10.4602. The mean Abduction of patients were 164.2000 $\pm$ 12.0485. The mean External Rotation of patients were 71.2000 $\pm$ 6.5000. The mean Internal Rotation of patients were 73.0000 $\pm$ 5.4006 and the mean Constant Score of patients were 88.9200 $\pm$ 4.1324.

- Time for Shoulder Movements Union in Week was higher in excellent outcome patient compared to good outcome patient though it was not significantly associated with outcome.
- Excellent Outcome patients had higher flexion which was statistically significant.
- Abduction, External Rotation and Internal Rotation were significantly higher in excellent outcome patient compared to good outcome patient.
- We found that Constant Score was higher in excellent outcome patient compared to good outcome patient.

Table: Association between Mode Of Injury, Limb Involved and Ao Classification: Outcome

		Excellent	Good	Total	Chi-square value	p-value
Mode Of Injury	Ffh	2	0	2	6.3889	0.0410
	Row %	100.0	0.0	100.0		
	Col %	10.0	0.0	8.0		
	Foosh	2	3	5		
	Row %	40.0	60.0	100.0		
	Col %	10.0	60.0	20.0		
Limb Involved	Rta	16	2	18	0.0000	1.0000
	Row %	88.9	11.1	100.0		
	Col %	80.0	40.0	72.0		
	Total	20	5	25		
	Row %	80.0	20.0	100.0		
	Col %	100.0	100.0	100.0		
Ao Classification	Left	8	2	10	3.5156	0.0607
	Row %	80.0	20.0	100.0		
	Col %	40.0	40.0	40.0		
	Right	12	3	15		
	Row %	80.0	20.0	100.0		
	Col %	60.0	60.0	60.0		
	Total	20	5	25		
	Row %	80.0	20.0	100.0		
	Col %	100.0	100.0	100.0		
	B1	11	5	16		
	Row %	68.8	31.3	100.0		
	Col %	55.0	100.0	64.0		
	B2	9	0	9		
	Row %	100.0	0.0	100.0		
	Col %	45.0	0.0	36.0		
	Total	20	5	25		
	Row %	80.0	20.0	100.0		
	Col %	100.0	100.0	100.0		

Table: Difference of mean Days before Surgery, Time for Shoulder Movements Union in Week, Abduction and Constant Score: Outcome

		Number	Mean	SD	Minimum	Maximum	Median	p-value
Days Before Surgery	Excellent	20	3.5000	1.4690	1.0000	6.0000	3.5000	0.6678
	Good	5	3.8000	.8367	3.0000	5.0000	4.0000	
Time For Shoulder Movements Union In Week	Excellent	20	8.9000	2.1250	6.0000	12.0000	8.5000	0.0669
	Good	5	7.0000	1.0000	6.0000	8.0000	7.0000	
Abduction	Excellent	20	169.0000	7.5394	150.0000	180.0000	170.0000	<0.0001
	Good	5	145.0000	5.0000	140.0000	150.0000	145.0000	
Constant Score	Excellent	20	90.4500	2.9465	86.0000	94.0000	90.0000	<0.0001
	Good	5	82.8000	1.6432	81.0000	85.0000	82.0000	

REFERENCES

- Nowak J, Mallmin H, Larsson S. The aetiology and epidemiology of clavicular fractures. A prospective study during a 2-year period in Uppsala, Sweden. *Injury*. 2000;31(5):353-8.
- Robinson CM. Fractures of the clavicle in the adult. Epidemiology and classification. *J Bone Joint Surg Br*. 1998;80(3):476-84.
- Nordqvist A, Petersson C. The incidence of fractures of the clavicle. *Clin Orthop Relat Res*. 1994;300:127-32.
- McKee MD, Pedersen EM, Jones C, Stephen DJ, Kreder HJ, Schemitsch EH, Wild LM, Potter J. Deficits following nonoperative treatment of displaced midshaft clavicular fractures. *JBJS*. 2006 Jan 1;88(1):35-40.
- Bithrey JW, van der Merwe JF. Outcomes of treatment of displaced midshaft clavicle fractures in adolescents using titanium elastic nails. *SA Orthopaedic Journal*. 2017 Sep;16(3):55-61.