

Original Research Article

A study of comparison of tension band wiring versus plating for olecranon fractures

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ABSTRACT

Background: Olecranon fractures are one of the common fractures around the elbow, comprising around 37% of all fractures occurring around the elbow. Olecranon fractures are commonly treated with either plating or tension band wiring. The purpose of current study is to compare the clinical and radiological outcome of tension band wiring and plate fixation in patients operated for olecranon fractures.

Methods: Current study was conducted in a tertiary care center from May 2017-2019. Study comprises of 30 patients operated for olecranon fractures. Clinical and radiological outcome of patients treated with tension band wiring or plating and assessed using the Mayo's elbow score at 6 months follow up.

Results: Out of the 30 patients, 15 were treated with tension band wiring and 15 were treated using open reduction and plating. Out of the 15 operated with tension-band wiring (TBW) K wire on follow up 11 showed excellent score on Mayo elbow score, 2 had good results and 2 had fair results. In patients operated with Plating 12 showed excellent result on follow up and 3 showed good result. No patient had fair or poor score.

Conclusions: Both tension band wiring and plate fixation are effective methods for treatment of olecranon fractures however complications regarding symptomatic metal prominence and superficial infection were higher in patients treated with tension band wiring as compared to plate fixations.

Keywords: Olecranon, TBW, Olecranon-plating

INTRODUCTION

Olecranon fracture is a common fracture of the upper limb. They constitute around 37% of all the fractures occurring around the elbow joint. Olecranon fractures affect both the sexes however there is slight male predominance.¹ Olecranon fractures usually occur by violent injury or by road traffic accident. Olecranon is a part of the elbow joint and hence olecranon fractures cause instability of the joint.²

A classification of Olecranon adapted in the clinical practice is the Mayo classification.³ Olecranon fractures are intra articular fractures and so they are usually treated

operatively in order to restore congruency of the joint surface and avoid post traumatic degeneration of the joint.⁴

Numerous surgical techniques have been described to treat olecranon fractures including tension band wiring, plating, intramedullary screw fixation.^{4,5} Tension band wiring is the most commonly used technique for fixation of simple isolated, displaced fractures of the olecranon. In contrast, pre-contoured anatomical plate fixation is believed to provide better fracture reduction and fixation for comminuted, unstable and oblique fractures.⁶

Aim of the present study was therefore to compare the clinical and radiographic outcome of TBW K-wire and

pre-contoured locked plate fixation in surgically treated patients with an isolated olecranon fracture.

METHODS

Present study consisted of 30 cases of fracture of olecranon treated by tension band wiring with Kirshner (K) wire or olecranon plating. The study was carried out at Surat municipal institute of medical education and research, Surat, Gujarat, India from May 2017 to 2019. This is a prospective cohort study to compare the clinical and radiological outcome of tension band wiring with K-wire versus olecranon plating for olecranon fractures.

Inclusion criteria

Age 18-65 years, limited degree of comminution, closed fractures, skeletally mature patients.

Exclusion criteria

Other ipsilateral fractures, cerebral palsy, open fractures. Patients of extremes of age and the patients in whom operative risk was great were not taken up for surgery.

On admission each patient was diagnosed using an anteroposterior and lateral elbow radiograph, and the elbow was immobilized in an above elbow slab. The affected limb was kept elevated and appropriate analgesics were given. All pre anesthetic checkup routine investigations like complete blood count, HIV, HBsAg, ECG, and chest X-ray were done.

Out of the total 30 patients, 15 were treated with tension band wiring with K wire and 15 were treated with plating. Each patient was operated within average of 3 days from admission. Patient were followed up for 6 months' maximum with serial X-rays and clinical examination on each and every follow up. Each patient was evaluated using Mayo elbow score and was documented for the same. Furthermore, complications such a superficial infection and symptomatic metal prominence were also observed in follow ups and were dealt according with

antibiotics or removal of implants. Unpaired t test was used to compare the results of the two groups at the end of the study.

RESULTS

Out of the 30 patients the mean age was years with age range being from 18 years to 59 years. There were 20 males and 10 females thus a 2:1 Male to Female ratio there was male predominance seen. 16 were transverse fractures, 10 oblique and 4 comminuted fracture patterns.

Out of total 30 patients, 15 were operated with TBW k Wire and 15 patients were operated with plating. Out of the 15 operated with tension-band wiring (TBW) K wire on follow up 11 showed excellent score on Mayo elbow score, 2 had good results and 2 had fair results. However, in patients operated with plating 12 showed excellent result on follow up and 3 showed good result. No patient had fair or poor score (Table 1).

Table 1: Mayo elbow score on follow up.

Grading	No. of TBW cases	No. of plating cases
Excellent (score greater than 90)	11	12
Good (score 75-89)	2	3
Fair (score 60-74)	2	0
Poor (score below 60)	-	-

Table 2: Complications.

Complications	No. of TBW cases	No. of plating cases
Superficial infection (SI)	3	1
Symptomatic metal prominence (SMP)	2	1

Table 3: Comparison between outcome analysis of TBW and plating cases.

Variables	TBW		Plating		P value
	Mean	SD	Mean	SD	
Pain	41	6.86	42	6.21059	0.678929
Motion	19	2.07	19.33	1.759329	0.638432
Stability	9.33	1.75	10	0	0.164318
Function	24	2.80	24.33	1.759329	0.699973
Result	93.33	11.75	95.67	9.232448	0.550513

TBW K-wire patients on follow up 3 patients showed superficial infection and 2 patients showed symptomatic metal prominence. Complications were dealt with accordingly on follow up. Out of the patients operated with plating only 1 patient showed superficial

infection and 1 followed up with symptomatic metal prominence (Table 2).

The results were evaluated according to the Mayo elbow performance score. The results obtained in our series were

excellent in 23 (76%) patients, good in 5 (16%) patients, fair in 2 (6.66%) patients and no poor results.

Also, when we compared TBW K-wire technique with Plating for treatment of olecranon fractures using statistical data and unpaired t test p value was >0.05 which means there is no significant difference in the outcome (Table 3).

DISCUSSION

The main aim of the treatment of fracture is not only achieving union but to preserve the optimum function of the adjacent soft tissues and joints. In the management of intra articular fractures like of the olecranon, a perfect anatomical reduction of the fragments to obtain articular congruity and rigid fixation of the fragments is of utmost importance, if early movements are to be instituted to prevent complications like traumatic arthritis and joint stiffness.

In our study 15 cases of fracture olecranon were treated with tension band wiring with K-wire and 15 patients were treated by plate fixation. The finding, the end result and various other data will be analysed and compared in the following discussion.

The mean age of our study was around 40 years which was comparable to the study conducted by Schlemann and Rashke, in which average age was around 43 years (Table 4).¹⁹ There was a male predominance seen in our study with 66.6% males and 33.3% females in the study. In a study conducted by Hume and Weiss they showed male predominance with 73% of males.¹¹ Also a study conducted by Schliemann and Rashke showed male predominance (Table 5).¹⁹

Table 4: Comparison of age.

Series	Average age (years)
Jiang et al ⁷	38
Macko et al ⁸	35.5
Schliemann et al ⁹	43
Core et al ¹⁰	47
Present study	40

Table 5: Comparison of gender predominance.

Series	Male N (%)	Female N (%)
Jiang et al ⁷	10 (66.66)	5 (33.33)
Hume et al ¹¹	30 (73.17)	11 (26.82)
Wolfgang et al ¹²	27 (60)	18 (40)
Schliemann et al ⁹	13 (50)	13 (50)
Present study	20 (66.66)	10 (33.33)

In the present series superficial infection in 3 patients, which was seen in diabetic patients probably due to

decreased immunity which was treated with broad spectrum antibiotic. Superficial infection was seen more in patients operated with TBW K-Wire and was less common in patients operated with plating.^{1,3} The symptomatic metal prominence in 3, TBW and plating.^{1,2} Complications in Murphy et al is only symptomatic metal prominence 3 (6.66%).¹³

Also, when we compared TBW K-wire technique with plating for treatment of olecranon fractures using statistical data and unpaired t test p value was >0.05 which means there is no significant difference in the outcome. This result is in accordance with the studies conducted by Schliemann et al and Core et al.^{9,10}

However, plating provides a slight advantage over TBW k-wire in terms of less complications and better fixation. Limitations of our study: retrospective design with relatively short follow up (average 6 months). Also, multiple surgeons operated in our institute each with their own operative techniques. Also, the sample size is small compared to other studies. Larger randomized controlled trials with long follow up and functional scoring are required to further clarify these strengths and outcomes of tension band wiring and plate fixation in treatment of olecranon fractures.

CONCLUSION

From the present study and statistical analysis, we could conclude that both plate/tension band wiring is equally effective for management of olecranon fracture. However, the plate has slight advantage over TBW K-wire in terms of early mobilization and less complications like SMP and SI compared to plating in olecranon fractures.

Considering all the distinct advantages Kirschner wires with tension band wiring for transverse and oblique fractures and olecranon plate for comminuted fractures is the choice of treatment for fractures of the olecranon.

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