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Tension Band Wiring and Olecranon Plating For Treatment of Olecranon Fractures-A Prospective Randomised Comparative Study Assessing Clinical and Radiological Outcome

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ABSTRACT

Introduction-Olecranon fractures are one of the most commonly seen orthopedic injuries and account for approximately 10% of all proximal forearm fractures.Operative treatment is open advocated in fractures with an articular incongruity of more than 2 mm, hence only a minority of patients are treated conservatively.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

Materials and methods-Current study was conducted in a tertiary care center from July 2019 to July 2021. Study compromises of 50 patients operated for olecranon fracture.

Implant used -tension band wiring with 2 k wire ,1 ss wire and olecranon plate

Classification used -Schatzker classification

Clinical and functional outcome were assessed using mayo elbow performance score

Results and observations-Study consists of 50 cases of fractures of the olecranon treated by Tension band wiring with Kirshner wire and Olecranon plate.The results were evaluated according to the Mayo elbow performance score. The results obtained in our series were excellent in 41 (82%) patients, good in 6 (12%) patients, fair in 3 (6%) patients and no poor results.

Conclusion-it is concluded that the technique of open reduction and internal fixation with Kirschner wires and tension band wiring and olecranon plate fixation are effective means of treating fractures of olecranon

Keyword-Olecranon, TBW, Olecranonplating

I. INTRODUCTION

Olecranon process is the proximal most expanded part of ulna bone which takes part in the formation of elbow joint. Olecranon process articulates with trochlea of distal end of humerus. Movement between these two structures forms the mainstay of elbow flexion and extension. Also, olecranon process is the major contributor to the stability of the elbow joint.Olecranon fractures affect both the sexes however there is slight male predominance. Undisplaced fractures can be treated with a short period of immobilization followed by gradually increasing range of motion. Those displaced, intra articular fractures require an anatomic or nearly normal surface reduction to reach satisfactory clinical outcomes.The fixation should be stable and anatomical to allow active elbow flexion and extension and promote union of the fracture.In the past, closed reduction and plaster cast application was the treatment for olecranon fracture. But prolonged immobilization with its own complications increased the morbidity and mortality of patients.

So keeping this in consideration, it has become important to intervence surgically. Operative treatment is open advocated in fractures with an articular incongruity of more than 2 mm, hence only a minority of patients are treated conservatively.

The purpose of this study is directed towards the clinical evaluation of surgical management of Olecranon fracture treated by tension band wiring & olecranon Plate fixation.

II. MATERIAL AND METHODS

Present study consisted of 50 cases of fracture of olecranon treated by tension band wiring with Kirshner (K) wire and olecranon plating as per random number table. The study was carried out at Maharishi Markandeshwar Institute of Medical Sciences and Research(Mullana)Ambala, Haryana, India from July 2019 toJuly 2021. This is a prospective study to compare the clinicaloutcome of tensionband wiring with K-wire versus olecranon

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plating for olecranon fractures.When the patients were seen for the first time after injury, a thorough history was taken regarding time of injury, mechanism, first aid received and significant past. Patients were assessed as per the ATLS guidelines and resuscitated whenever required the clinical diagnosis was confirmed by routine anteroposterior and lateral radiographs of elbow with arm and forarm. X-rays were assessed for comminution, involvement of joint, displacement and extension of fracture to the shaft. The fractures were classified according to theSchatzker classification.

Inclusion Criteria

1. Age > 16 year
2. Isolated olecranon fracture
3. Presentation within 3 week of injury

Exclusion criteria

1. Age <16 year.
2. Presentation after 3 weeks.
3. Established Non union of fracture olecranon.
4. Surgical site infection.
5. Fracture with elbow dislocation.
6. Olecranon fracture associated fractures of the coronoid radial head, and/ or distal humerus.
7. Open olecranon fracturePathological fracture

On admission each patient was diagnosed using ananteroposterior 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 Xray were done.

Out of the total 50 patients, 25 were treated with tension band wiring with K wire and 25 were treated with plating as per random number table. Each patient was operated within average of 3 days from admission. Patient were followed up for 6 monthswith serial X-rays and clinical examination on each and every follow up. Each patient was evaluated using Mayoelbow score and was documented for the same. Furthermore, complications such as superficial infection and symptomatic metal prominence were also observed in follow ups andwere dealt accordingly.

Grading	No. of cases		Percentage
	TBW	Plate	
Excellent (score greater than 90)	22	19	82
Good(Score 75-89)	3	3	12
Fair (Score 60-74)	-	3	6
Poor (Score below 60)	-	-	

III. RESULTS

Out of the 50 patients the The age of patients ranged From 21-60years,withfracture association being most common in 3rd decade i.e. 18 cases (36%) and mean age of 40.5 years.In this series 13(26%) patients between 21-30 years, 18(36%) patients between 31-40 years, 9(18%) patients between 41-50 years and patients between 51-60 years were 10(20%).Males were 37(74%) and females were 13(26%) with M: F ratio of 2.8:1.The fracture of olecranon on right side of the patient in 39(78%) cases and left side of patients in 11(22%) cases.

In present study 21 cases (42% were due to road traffic accidents. 26 cases (52%) were due to fall and 3(6%) patient due to assault.

Out of 50 patients,33(66%) olecranon fractures were oblique and transverses fracture, and 17(34%) olecranon fractures were comminuted fractures. No cases of UN displaced fractures and fracture-. The patients were operated upon with an average period 3.48 days after the injury dislocation was observed.In this series 37(74%) patients had sound union in less than 4 months, 13(26%) had union between 4-6 months and no patient developed non union.

The patients were evaluated based on mayo elbow performance score.Out of total 50 patients, 25 were operated with TBW k Wire and 25 patients were operated with plating. Out of the 25 operated with tension-band wiring (TBW) K wire on follow up 22 showed excellent score on Mayoelbow score, 3had good results .However, in patients operated with plating 19showed excellent result on follow up and 3 showed good result and 3 showed fairresult. No patient had poor score

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In the present series of study the patients with excellent results were 41(82%), 6(12%), with good results, fair results was noticed in 3(6%). No cases seen in poor results.

COMPLICATIONS OR DEMERITS OF THIS PROCEDURE:

Complications	No. of Cases		Percentage (%)
	TBW	Plate	
Superficial infection	-	3	6
Symptomatic metal prominence	5	1	12

The complications of the present study, superficial infection was seen in 3(6%) patients with transverse fracture which were operated by olecranon plating, which was treated with broad spectrum antibiotics. The symptomatic metal prominence was seen noticed in 6(12%) patients,out of which 5 patient with communited fracture were treated by TBW and 1 patient with oblique fracture was treated by plating.

IV. 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 fractures 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. Tension band wiring with 2 Intramedullary Kirshner wires provides the strength of fixation i.e. by converting tensile force into compressive force at the fracture site.

In our study 50 cases of fractures of the olecranon were treated with Tension band wiring and Olecranon plate as per random number table. Our experience with this method of fixation has given favorable results

The average age incidence; in the present study was found to be 40.5(21-60) years,and it was more common in males.Out of 50, 17(34%) transverse fractures, 16 (32%) oblique fractures and 17(34%) comminuted fractures.

The xrays showing both the procedure are

OLECRANON FRACTURE

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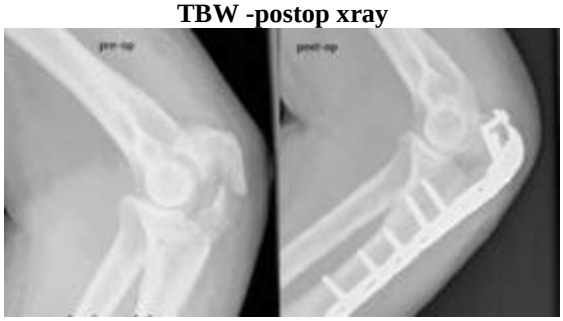
TBW -postop xray



OLECRANON PLATING

POSTOPERATIVE COMPLICATIONS OR DEMERITS OF THIS PROCEDURE:

Complications	Present study	Murphy et al[37]
Superficial infection	3(6%)	-
Symptomatic metal prominence	6(12%)	3 (6.6%)

In the present series superficial infection was seen in 3(6%) PATIENTS (0 cases in TBW and 3 in plate), which was seen in diabetic patients (probably) due to decreased immunity which was treated with broad spectrum antibiotic and local debridement. The symptomatic metal prominence was seen in 6 (12%) patient (5 cases in TBW and 1 case of Plate) whereas complications in Murphy was al is only symptomatic metal prominence 3 (6.66%).

V. RESULTS:

Study	Results in percentage			
	Excellent	Good	Fair	Poor
Murphy et al[37,38]	60	10	30	-
Jiang Xieyuan[68]	53.33	40	6.66	-
Present study	82	12	6	

The results were evaluated according to the Mayo elbow performance score. The results obtained in our series were excellent in 41 (82%) patients, good in 6 (12%) patients, fair in 3 (6%) patients and no poor results.

The results in our series in almost accordance with the studies of Murphy et al and Jiang Xieyuan

VI. CONCLUSION

From the present study it is concluded that the technique of open reduction and internal fixation with Kirschner wires and tension band wiring and olecranon plate fixation are effective means of treating fractures of olecranon and is based on sound biomechanical principle.

The 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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