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Determine the Functional Outcome of Tension Band Wiring Combined with Intramedullary Screw Fixation for Treatment of Fracture of Olecranon.

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Abstract

Introduction*: Olecranon fractures are one of the most commonly seen orthopaedic injuries in the emergency room.*

Objective: *To determine the functional outcome of tension band wiring combined with intramedullary screw fixation for treatment of fracture of olecranon.*

Material and Methods: *This Descriptive case series was conducted in Department of Orthopedics, Allied hospital, Faisalabad during 26-06-2020 to 25-12-2020. After taking approval from hospital ethical committee, patients coming through the emergency department who fulfilled the inclusion criteria were enrolled and informed consent were taken from them. All the patients were treated with tension band wiring combined with intramedullary screw fixation under general anaesthesia or a brachial block.*

Results*: Functional outcome of tension band wiring combined with intramedullary screw fixation for treatment of fracture of olecranon was recorded as excellent in 57.39%(n=66), 32.17%(n=37) had good outcome, 10.44%(n=12) had fair outcome.*

Conclusion*: We concluded that the functional outcome of tension band wiring combined with intramedullary screw fixation for treatment of fracture of olecranon is good, however, validation is required through other local studies.*

Key words: *Fracture of olecranon, treatment, tension band wiring combined with intramedullary screw fixation, functional outcome.*

Introduction

Among the fractures encountered at emergency room olecranon fractures are one of the most commonly seen. It accounts for 10% of all upper extremity fractures.[1] The most common cause of olecranon fractures are direct blow during fall or indirectly during road traffic accident after forceful contraction of the triceps against resistance. Less commonly, it may also fractured when the elbow is hyper extended.[2] Olecranon lies subcutaneously and it is therefore liable to have open fractures.[3] Young patients presented with olecranon fractures after high energy trauma like road traffic accident while elderly patients with low energy trauma like fall. Olecranon mostly fractured alone but it is essential to look for other injuries and fractures especially the ipsilateral extremity. There may be associated fracture dislocation, which may change the plan of management.[2]

Successful functional outcome is directly correlated with anatomic restoration of the articular surface, repair of the elbow extensor mechanism, restoration of joint stability and motion, and prevention of stiffness and other complications. Several options have been introduced for the treatment of olecranon fractures.[4]

In general, the principle of the TBW means, that under axial load by muscle tension always compressive and tensile forces arises on the involved bone. In the case of a fractured bone, this always leads to a gap of the fracture on the traction side. The tensile forces can be neutralized with a TBW and converted into compressive forces. This technique ensures a dynamic compression of the fragments and a rapid healing of the bone.[5] But it is not free of complications, the most common being hardware prominence which requires removal, loss of motion and loss of fixation.[6]

Objective

To determine the functional outcome of tension band wiring combined with intramedullary screw fixation for treatment of fracture of olecranon.

Material and methods

This Descriptive case series was conducted in Department of Orthopedics, Allied hospital, Faisalabad during 26-06-2020 to 25-12-2020. The data was collected through non-probability consecutive sampling technique.

Inclusion Criteria

- Patients having age between 15-60 years of both genders.
- Patients having fracture of olecranon as per operational definition.

Exclusion criteria:

- Patients having comminuted fractures of olecranon.
- Patients with avulsion fractures of olecranon.
- Patients with fracture dislocation.

Data Collection Procedure:

After taking approval from hospital ethical committee, patients coming through the emergency department who fulfilled the inclusion criteria were enrolled and informed consent were taken from them. All the patients were treated with tension band wiring combined with intramedullary screw fixation under general anaesthesia or a brachial block. Anesthesia was given by anesthesiologist. The exposure of the olecranon was achieved by using Campbell's posterolateral approach. The procedure was performed by senior consultant orthopedic surgeon. The affected limb was elevated and the patient was asked to perform finger movements on day one. Elbow movements were advised from the 3rd postoperative day. Functional outcome was assesses after 6 weeks of treatment by using Broberg and Morrey rating system.

It consists of four sections: motion, strength, stability and pain. Pain was rated as none; mild with activity but requiring no medication; moderate with or after activity; severe at rest, requiring constant medication, and disabling. The clinical and biomechanical assessments were obtained measuring motion with a hand goniometer and assessing flexion/extension of the elbow and pronation/supination of the forearm. The grip strength of the hand was measured with a specially designed torque dynamometer. Stability was graded by varus–valgus instability.

This instability was graded as follows: none; mild, if a perception of instability is observed by the patient; moderate, if definite instability is observed; severe, if perceptible varus/valgus laxity was detected by the physician and perceived by the patient. Follow up was done by taking patient's contact number. All the information was collected on performa by myself.

Data analysis

All the data was analyzed using SPSS V-25. Mean ± Standard Deviation was calculated for all quantitative variables like age and BMI. Frequency and percentages were calculated for all qualitative variables like gender and functional outcome. Effect modifiers like age, BMI and gender were stratified and post-stratification chi-square test was applied. P-value ≤ 0.05 was considered significant.

Results

A total of 115 cases fulfilling the selection criteria were enrolled to determine the functional outcome of tension band wiring combined with intramedullary screw fixation for treatment of fracture of olecranon. Age distribution shows that 80%(n=92) were between 15-40 years of age whereas 20%(n=23) were between 41-60 years of age, mean+sd was calculated as 31.75+9.50 years.

Gender distribution shows that 78.26%(n=90) were male and 21.74%(n=25) were females. Mean Body mass index was calculated as 29.55+2.91. Functional outcome of tension band wiring combined with intramedullary screw fixation for treatment of fracture of olecranon was recorded as excellent in 57.39%(n=66), 32.17%(n=37) had good outcome, 10.44%(n=12) had fair outcome.

Functional outcome	No. of patients	%
Excellent	66	57.39
Good	37	32.17
Fair	12	10.44
Poor	0	0
Total	**115**	**100**

Effect modifiers like age, BMI and gender were stratified and post-stratification chi-square test was applied. P-value ≤ 0.05 was considered significant.

Table No. 01: Functional outcome of tension band wiring combined with intramedullary screw fixation for treatment of fracture of olecranon (n=115)

Functional outcome	Age (in years)		P value
	15-40	41-60	
Excellent(n=66)	50	16	0.19
	42	7	
Good(n=37)	32	5	0.23
	60	18	
Fair(n=12)	10	2	0.76
	82	21	

Table No. 02: Stratification for functional outcome of tension band wiring combined with intramedullary screw fixation for treatment of fracture of olecranon with regards to age (n=115)

Functional outcome	Gender		P value
	Male	Female	
Excellent(n=66)	51	15	0.77
	39	10	
Good(n=37)	27	10	0.34
	63	15	
Fair(n=12)	12	25	00
	78	0	

Table No. 03: Stratification for functional outcome of tension band wiring combined with intramedullary screw fixation for treatment of fracture of olecranon with regards to gender (n=115)

Functional outcome	BMI		P value
	Upto 30	>30	
Excellent(n=66)	36	30	0.78
	28	21	
Good(n=37)	21	16	0.87
	43	35	
Fair(n=12)	7	5	0.84
	57	46	

Table No. 04: Stratification for functional outcome of tension band wiring combined with intramedullary screw fixation for treatment of fracture of olecranon with regards to BMI (n=115)

Discussion

Olecranon fractures are one of the most commonly seen orthopaedic injuries in the emergency room. When they are displaced, open reduction and internal fixation are usually required to obtain an anatomical realignment or the articular surface and to restore the normal elbow function. The fixation should be stable, it should allow an active elbow flexion and extension and it should promote union of the fracture.

Many methods which have been described are tension band wiring, intra fragmentary screws with or without wires, wires alone, plates, rush pin with tension band wiring, intramedullary screws with or without tension bands and bone fragment excision with reattachment triceps. Most of the studies had been conducted on tension band wiring and intramedullary screw fixation for treatment of fracture of olecranon. But the literature is deficient in determining the functional outcome of combination of these two procedures for fracture of olecranon in Pakistan and also in recent 5 years internationally. So, the results of this study can be used in local references by research working in this field and useful in management of patients undergoing olecranon surgeries in terms of functional outcome. In our study, of 115 cases, 80%(n=92) were between 15- 40 years of age whereas 20%(n=23) were between 41-60 years of age, mean+sd was calculated as 31.75+9.50 years, 78.26%(n=90) were male and 21.74%(n=25) were females. Functional outcome of tension band wiring combined with intramedullary screw fixation for treatment of fracture of olecranon was recorded as excellent in 57.39%(n=66), 32.17%(n=37) had good outcome, 10.44%(n=12) had fair outcome. These findings are in agreement with a study, showing that excellent results were achieved in 60% patients, good results were achieved in 12% patients and fair results were achieved in 28% patients. There was no poor results.**[**6**]**

Conclusion

We concluded that the functional outcome of tension band wiring combined with intramedullary screw fixation for treatment of fracture of olecranon is good, however, validation is required through other local studies.

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