

Determination of Functional Outcomes of Displaced Olecranon Fracture Fixed with Intermedullary Partially Threaded Screw Augmented with Tension Band Wiring

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ABSTRACT

Introduction: Orthopaedic injuries involving the olecranon are among the most often encountered in the emergency department.

Objective: To determine the functional outcomes of displaced olecranon fracture fixed with intermedullary partially threaded screw augmented with tension band wiring

Material and methods: This Descriptive/multicentric case series was conducted in Department of Orthopedics, Bahawal Victoria Hospital/Civil (Sadiq Abbasi) Hospital, Bahawalpur during June 2019 to June 2021. Patients who came through the emergency department and met the inclusion criteria were enrolled and given informed permission after clearance from the hospital's ethics committee. During general anesthesia or a Bier's block, all patients received tension band wire and intramedullary screw fixation.

Results: Functional outcomes of displaced olecranon fracture fixed with intermedullary partially threaded screw augmented with tension band wiring 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 that functional outcomes of displaced olecranon fracture fixed with intermedullary partially threaded screw augmented with tension band wiring is good; however, validation is required through other local studies.

Key words: Olecranon fracture, Intramedullary partially threaded screw, Tension band wiring, and Campbell's posterolateral approach

INTRODUCTION

Olecranon fractures are one of the most common fractures observed in the emergency room. It is responsible for ten percent of all fractures of the upper extremities.¹ Olecranon fractures are most often caused by a direct strike during a fall or an indirect blow during a car collision following a severe triceps contraction. Elbow fractures are less common; however they can happen if the elbow is overextended.² Olecranon is located beneath the skin, making it vulnerable to fractures. Olecranon fractures in young individuals following high energy trauma like a car accident and low energy trauma such a fall in the elderly. An Olecranon fracture usually occurs by itself, but it's important to check for any additional wounds or broken bones on the ipsilateral side as well. Fracture dislocation may occur as a result, changing the treatment strategy.³

In order to have a successful functional outcome, the articular surface must be anatomically restored, the elbow extensor mechanism repaired, joint stability and motion restored, and stiffness and other problems avoided. Olecranon fracture therapy now includes a variety of options.⁴

In general, the TBW principle states that when muscles contract, compressive and tensile pressures are generated on the affected bone. Whenever a bone is fractured, it causes a gap on the side of the bone that is receiving traction. With a TBW, the tensile forces are

neutralized and compressed. This procedure ensures that the bone pieces are compressed dynamically and heal quickly.⁵ Complications might arise, the most prevalent of which include hardware prominence that needs to be removed, mobility loss and fixation loss.

Present study was conducted aimed to determine of functional outcomes of displaced olecranon fracture fixed with intermedullary partially threaded screw augmented with tension band wiring

MATERIAL AND METHODS

This Descriptive case series was conducted in Department of Orthopedics, Bahawalpur victoria Hospital/Civil (Sadiq Abbasi) Hospital, Bahawalpur during June 2019 to June 2021. The data was collected through non-probability consecutive sampling technique.

Inclusion Criteria

- Patients having age between 15-60 years of both genders.
- Patients having Transverse type of olecranon fracture.

Exclusion criteria:

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

Data Collection Procedure: Patients who came through the emergency department and met the inclusion criteria

were enrolled and given informed permission after clearance from the hospital's ethics committee. General anesthesia or a Bier's block was used to perform intermedullary partially threaded screw augmented with tension band wiring fixation on all of the patients. The anesthesiologist administered the anesthesia. Campbell's posterolateral technique was used to expose the olecranon. Senior consulting orthopedic surgeon did the operation. During the first day, the patient was asked to move his or her fingers by elevating the injured limb. After the third postoperative day, elbow movements were encouraged. After six weeks of treatment, the functional outcome was evaluated using the Broberg and Morrey grading method.

Motion, strength, stability, and pain are all included in this part. There was no pain, mild pain with exercise but no medicine was required, moderate pain with or after activity, severe pain at rest, continual medication was required, and the pain was disabled. To get the clinical and biomechanical evaluations, researchers used a hand goniometer to measure motion, the elbow's flexion/extension, and the forearm's pronation/supination. A torque dynamometer custom-made for this purpose was used to gauge the hand's grip strength. Varus-valgus instability was used to assign a grade to the overall stability of the system.

No instability was found; mild, if the patient perceives instability; moderate, if unequivocal instability is discovered; severe, if the physician detects and perceives noticeable varus or valgus laxity.

Data analysis: SPSS V-25 was used to examine all of the data. All quantitative factors, such as age and BMI, were given a mean and standard deviation. All qualitative factors, such as gender and functional result, were tallied using frequencies and percentages. Age, BMI, and gender were all used as effect modifiers in a post-stratification chi-square test. The significance level was set at P-values less than 0.05.

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.

Table 01: Determination of functional outcomes of displaced olecranon fracture fixed with intermedullary partially threaded screw augmented with tension band wiring (n=115)

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

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 outcomes of displaced olecranon fracture fixed with intermedullary partially threaded screw augmented with

tension band wiring was recorded as excellent in 57.39% (n=66), 32.17% (n=37) had good outcome, 10.44% (n=12) had fair 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.

Table 02: Stratification for determination of functional outcomes of displaced olecranon fracture fixed with intermedullary partially threaded screw augmented with tension band wiring with regards to age (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 03: Stratification for determination of functional outcomes of displaced olecranon fracture fixed with intermedullary partially threaded screw augmented with tension band wiring with regards to gender (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. 04: Stratification for determination of functional outcomes of displaced olecranon fracture fixed with intermedullary partially threaded screw augmented with tension band wiring with regards to BMI (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	

DISCUSSION

Among orthopaedic injuries observed in emergency rooms, olecranon fractures are a prevalent occurrence⁷⁻⁸. The articular surface and normal elbow function must be restored when they are dislocated through open reduction and internal fixation. Stability of the fixation, active elbow flexion and extension, and fracture union are all important.

Tension band wiring, intra fragmentary screws with or without wires, wires alone, and bone fragment excision with reattached triceps are a few of the ways that have been discussed in detail⁹⁻¹⁰. In the treatment of olecranon fractures, the majority of research has focused on tension band wiring and intramedullary screw fixation¹¹.

In Pakistan as well as worldwide in the last 5 years, however, the literature is lacking in assessing the functional outcome of combining these two operations for olecranon fracture. Research in this field can use the findings of this study as local references, and they will be helpful in the care of patients who have olecranon procedures because

of the functional outcomes¹². 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% patients⁶. There was no poor results non is good, however, validation is required through other local studies.

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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