## Journal of Advanced Medical and Dental Sciences Research

@Society of Scientific Research and Studies

Journal home page: WWW.jamdsr.com doi: 10.21276/jamdsr Index Copernicus value = 85.10

(e) ISSN Online: 2321-95

(p) ISSN Print: 2348-6805

# **Original Research**

## Comparison of functional outcome in Olecranon fracture managed by tension band wiring and transcortical screw fixation

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#### ABSTRACT:

Background: Isolated olecranon fractures can be identified appropriately with standard AP and lateral radiographs of the elbow. Plate and screw fixation is recommended for unstable fracture patterns with significant comminution or a fracture line exiting distal to the semilunar notch and fracture-dislocations. Intramedullary nails are now available and may be suitable for some fracture types. Hence; the present study was undertaken for assessing and comparing Functional outcome in Olecranon fracture managed by tension band wiring and transcortical screw fixation. Materials & methods: 20 patients with olecranon fractures, admitted in the department of Orthopaedics were analysed. Patients were divided into two study groups with 10 patients in each group as follows: Group 1 patients were managed by Tension band wiring and Group 2 patients managed by Transcortical screw fixation. Initial radiographs were done taking true antero-posterior and lateral views of the elbow. All the patients were treated according to their respective study groups. The limb was kept elevated in posterior slab for the first two days. Radiological, clinical and functional assessment was done using Mayo Elbow Performance Score. Results: Mean time for complete union among the patients of tension band wiring group and transcortical screw fixation group was 11.3 days and 10.2 days respectively. Non- significant results were obtained while comparing the mean time for complete union among the two study groups. Mean mayo elbow performance score among the patients of group 1 at 1<sup>st</sup> week postoperative, 4<sup>th</sup> week postoperatively and 6<sup>th</sup> month postoperatively was 46.2, 63.5 and 88.1 respectively. Mean mayo elbow performance score among the patients of group 2 at 1<sup>st</sup> week postoperative, 4<sup>th</sup> week postoperatively and 6<sup>th</sup> month postoperatively was 43.1, 60.4 and 86.8 respectively. Non-significant results were obtained while comparing the mean Mayo elbow performance score among patients of the two study groups. Conclusion: Tension band wiring is better than transcortical screw fixation, especially in communited fractures, in terms of duration of surgery. However; further studies are recommended with

Key words: Olecranon fracture, Tension band

Received: 4 April, 2021

Accepted: 10 May, 2021

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This article may be cited as: Dwivedi VK. Comparison of functional outcome in Olecranon fracture managed by tension band wiring and transcortical screw fixation. J Adv Med Dent Scie Res 2021;9(5):115-118.

#### INTRODUCTION

Fractures around the elbow represent approximately 5.5% of fractures of the entire skeleton of which radial head fractures are seen most frequently (2.8%), followed by fractures of the olecranon and radial neck (1% each), the distal humerus (0.5%), and extraarticular fractures of the proximal radius and ulna (0.2%). The common causes of Olecranon fractures are mostly due to self-fall, motor vehicle crash, fall from a height, or a direct blow to the elbow and are commonly observed orthopedic injuries in the emergency room.Olecranon fractures typically involve the articular surface of the elbow.<sup>1-3</sup>

Isolated olecranon fractures can be identified appropriately with standard AP and lateral radiographs of the elbow. It is essential to obtain a true lateral radiograph of the elbow to evaluate the extent of the fracture, degree of displacement and comminution, and the degree of articular surface involvement. Radiographs should be examined carefully for evidence of coronoid process fracture, dislocation of the elbow, and radial head injury. More advanced imaging rarely is indicated for isolated olecranon fractures.  $^{\rm 4-\,6}$ 

The goals of treating olecranon fractures are 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. Treatment options include immobilization, surgical reduction and fixation with tension-band wiring or plate osteosynthesis, and excision of the proximal fragment with triceps advancement.<sup>5-7</sup>

Plate and screw fixation is recommended for unstable fracture patterns with significant comminution or a fracture line exiting distal to the semilunar notch and fracture-dislocations. Intramedullary nails are now available and may be suitable for some fracture types. Intramedullary devices may avoid the wound complications related to the superficial location of traditional hardware used to treat olecranon fractures.Patients usually have a good functional outcome after treatment of an olecranon fracture.<sup>4-6</sup>Hence; the present study was undertaken for assessing and comparing Functional outcome in Olecranon fracture managed by tension band wiring and transcortical screw fixation.

### **MATERIALS & METHODS**

The present study was undertaken for assessing and comparing Functional outcome in Olecranon fracture

#### RESULTS

managed by tension band wiring and transcortical screw fixation. 20 patients with olecranon fractures, admitted in the department of Orthopaedics were analysed. The patients on admission after taking care of ABC of trauma management were examined carefully to rule out any head, neck, chest, abdominal and pelvic injuries.Open fractures were irrigated thoroughly with normal saline, cleaned with povidone iodine solution, suturing will be done if possible otherwise loose stitches were applied. Detailed history, general physical examination, systemic and local examination and tests were recorded as per the proforma. Lateral, anteroposterior graphic views of the elbow was taken. Patients were divided into two study groups with 10 patients in each group as follows: Group 1 patients were managed by Tension band wiring and Group 2 patients managed by Transcortical screw fixation.Initial radiographs were done taking true antero-posterior and lateral views of the elbow. All the patients were treated according to their respective study groups. The limb was kept elevated in posterior slab for the first two days. Radiological, clinical and functional assessment was done using Mayo Elbow Performance Score.All the results were analyzed by SPSS software. Chi- square test and student t test were used for assessment of level of significance. P- value of less than 0.05 was taken as significant.

Mean age of the patients of the tension band wiring group and transcortical screw fixation group was 41.8 years and 42.4 years respectively. 70 percent of the patients of the Tension band wiring group and 60 percent of the patients of the transcortical screw fixation group were males while the remaining were females. Road traffic accident was the most common etiologic factor. In 80 percent of the patients of the tension band wiring group and 70 percent of the patients of the transcortical group, right side was involved. Mean duration of surgery among the patients of group 1 and group 2 was 32.6 minutes and 45.8 minutes respectively. Significant results were obtained while comparing the mean duration of surgery among the patients of the two study groups. Mean range of motion on follow-up among the patients of the tension band wiring group and transcortical screw fixation group was 103.2° and 102.1° respectively. While comparing the mean range of motion among the patients of both the study groups, non-significant results were obtained. Mean time for complete union among the patients of tension band wiring group and transcortical screw fixation group was 11.3 days and 10.2 days respectively. Non- significant results were obtained while comparing the mean time for complete union among the two study groups. Mean mayo elbow performance score among the patients of group 1 at 1<sup>st</sup> week postoperative, 4th week postoperatively and 6th month postoperatively was 46.2, 63.5 and 88.1 respectively. Mean mayo elbow performance score among the patients of group 2 at 1st week postoperative, 4th week postoperatively and 6th month postoperatively was 43.1, 60.4 and 86.8 respectively. Non-significant results were obtained while comparing the mean Mayo elbow performance score among patients of the two study groups.

#### Table 1: Duration of surgery

2			
Duration of	Group	Group	p- value
surgery	1	2	
(Minutes)			
Mean	32.6	45.8	0.00 (Significant)
SD	3.1	4.3	

#### Table 2: Range of motion on follow-up

Range of motion on follow-up	Group 1	Group 2	p- value
Mean	103.2°	102.1°	0.19
SD	5.4°	6.8°	

chomance score at unrerent time intervals						
Mean Mayo	elbow	Group 1	Group 2	p- value		
performance score						
1 <sup>st</sup> week postoperatively		46.2	43.1	0.51		
4 <sup>th</sup> week postoperatively		63.5	60.4	0.36		
6 <sup>th</sup> month postoperatively		88.1	86.8	0.74		

Table 3: Mayo elbow performance score at different time intervals

#### DISCUSSION

Undisplaced fractures are Mayo Type IA fractures and these are exceptional and can be managed conservatively. However, most olecranon fractures are displaced, considered as Mayo Type II Band Type III, and in such cases operative treatment is recommended. The main objective of operation is to achieve adequate reduction and rigid fixation, allowing early mobilization in an attempt to reduce morbidity due to stiffness. The primary objective of operative treatment of olecranon fractures is anatomic restoration of the trochlear notch.<sup>6-10</sup>

In the present study, mean duration of surgery among the patients of group 1 and group 2 was 32.6 minutes and 45.8 minutes respectively. Significant results were obtained while comparing the mean duration of surgery among the patients of the two study groups. Mean range of motion on follow-up among the patients of the tension band wiring group and transcortical screw fixation group was 103.2° and 102.1° respectively. While comparing the mean range of motion among the patients of both the study groups, non-significant results were obtained. Hsu KL et al conducted retrospective cohort study recruited consecutive patients underwent surgical fixation for patellar fractures using modified tension band technique. Different factors in this procedure, including the bending manner of the Kirschner wires, their depth, and location of the tension band with respect to the superior and inferior border of the patella were recorded and analysed. The primary outcome was early loss of fixation. The secondary outcomes were minor loss of reduction, implant breakage, deep infection, and the need for implant removal. The study included 170 patients with patellar fractures. Regarding the bending method, similar results were obtained with bilaterally or proximally bent Kirschner wires. Regarding length, the tension band was placed closely (within 25% of the patella length) in 124 patients and distantly in 46 patients. They concluded that the modified tension band technique for transverse patella fractures provides favorable clinical outcomes, with low failure (5%) and infection (2%) rates. Implant irritation is the major complication, and almost half of cases require implant removal. The location of the tension band with respect to the superior and inferior border of the patella plays an important role in clinical outcomes. Placing the wire close to the patella may prevent major loss of reduction and implant breakage. Superficially placed Kirschner wires also affect clinical outcomes by increasing the rate of minor loss of reduction.<sup>10</sup>

In the present study, mean time for complete union among the patients of tension band wiring group and transcortical screw fixation group was 11.3 days and 10.2 days respectively. Non- significant results were obtained while comparing the mean time for complete union among the two study groups. Mean mayo elbow performance score among the patients of group 1 at 1<sup>st</sup> week postoperative, 4<sup>th</sup> week postoperatively and 6<sup>th</sup> month postoperatively was 46.2, 63.5 and 88.1 respectively. Mean mayo elbow performance score among the patients of group 2 at 1st week postoperative, 4<sup>th</sup> week postoperatively and 6<sup>th</sup> month postoperatively was 43.1, 60.4 and 86.8 respectively. Non-significant results were obtained while comparing the mean Mayo elbow performance score among patients of the two study groups.Powell, AJ et al compared clinical outcomes, morbidity and the cost of treatment of TBW versus pre-countered low-profile locking plates for the treatment of Mayo 2A fractures. All olecranon fractures admitted to our unit between 2008 and 2014 were identified (n = 129). Patient notes and radiographs were studied from presentation to final follow-up. Patient outcomes were recorded using the QuickDASH (Disabilities of Arm, Shoulder and Hand) score. Patient demographics and nature of complications were recorded as were the rate and nature of any repeat operation. Eighty-nine patients had Mayo 2A fractures (69%). Sixty-four underwent TBW (n=48) or locking plate fixation (n=16). The mean ages of both groups were similar at 57 (15-93) and 60 (22-80), respectively. In the TBW group, the mean post-injury QuickDASH was 12.9, compared with 15.0 for the locking plate group. There was no statistically significant difference between the outcomes for either group. Nineteen of the 48 TBW patients had complications (39.6%). Sixteen of the 48 TBW patients had reoperations (33.3%). In particular, we would highlight that 13 (27.1%) of patients treated with TBW underwent subsequent removal of metalwork for hardware irritation. There were no complications and or reoperations in the 16 patients who received locking plate fixation. Both complication and reoperation rates were statistically significantly different. Despite being initially more expensive, when the cost of reoperation for TBW group was included, locking plates were found to be on average £236.33 less per patient than for TBW. They concluded that locking plates are superior to TBW concerning post-operative morbidity, reoperation rate and cost for Mayo 2A fractures.<sup>11</sup>

#### CONCLUSION

Tension band wiring is better than transcortical screw fixation, especially in communited fractures, in terms of duration of surgery. However; further studies are recommended with larger sample size for better exploration of results.

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