ORIGINAL RESEARCH

Comparison of management in Olecranon fractures by Tension band wiring versus Transcortical screw fixation procedure

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Received: 09 December, 2016 Accepted: 14 January, 2017

ABSTRACT
Background: Olecranon fractures are relatively common injuries, accounting for approximately 10% of upper extremity fractures in adults. Hence; the present study was conducted for comparing the management in Olecranon fractures by Tension band wiring versus Transcortical screw fixation procedure. **Materials & methods:**The prospective randomized study was conducted on 20 patients with olecranon fractures. Patients were divided in 2 groups 1 and 2. Group 1 patients were managed by Tension band wiring and Group 2 patients were managed by Transcortical screw fixation.The limb was kept elevated in posterior slab for the first two days.Initial follow up was done at 1, 4 and 6 weeks after discharge and then subsequently every 2 months. All patients were followed up for 6 months. **Results:**Mean duration of surgery among the patients of the tension band wiring group and transcortical screw fixation group was 38.3 minutes and 49.4 minutes respectively. While comparing the mean duration of surgery among the patients of both the study groups, 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 10.8 days respectively. Non- significant results were obtained while comparing the mean time for complete union among the two study groups.While assessing and comparing the outcome in between the two study groups, non-significant results were obtained. **Conclusion:**Tension band wiring showed better results.
Key words: Olecranon, Tension Band wiring, Transcortical Screw

INTRODUCTION

Olecranon fractures are relatively common injuries, accounting for approximately 10% of upper extremity fractures in adults. These fractures may result from a direct blow to the proximal ulna, or indirectly, via the forceful contraction of the triceps against resistance (typically, during a fall onto an outstretched hand). Less commonly, the olecranon may fracture when the elbow is hyperextended, as the bone is impacted against the olecranon fossa of the distal humerus. For unstable injuries, operative fixation typically is required. Even after recovery, loss of ROM is not uncommon.[1- 3]

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.[4- 6]Hence; the present study was conducted for comparing the management in Olecranon fractures by Tension band wiring versus Transcortical screw fixation procedure.

MATERIALS & METHODS

The prospective randomized study was conducted on 20 patients with olecranon fractures. 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. This was followed by primary treatment in form of splintage to affected limb(s), analgesics, intravenous fluids, antibiotics and prophylaxis for tetanus.

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 in 2 groups 1 and 2. Group 1 patients were managed by Tension band wiring and Group 2 patients were managed by Transcortical screw fixation.The limb was kept elevated in posterior slab for the first two days.Initial follow up was done at 1, 4 and 6 weeks after discharge and then subsequently every 2 months. All patients were followed up for 6 months. Radiological, clinical and functional assessment was done using Mayo Elbow Performance Score.All the results were analyzed by SPSS software.

RESULTS

Mean age of the patients of the tension band wiring group and transcortical screw fixation group was 42.4 years and 44.5 years respectively. 80 percent of the patients of the Tension band wiring group and 70 percent of the patients of the transcortical screw fixation group were males while the remaining were females.In 70 percent of the patients of the tension band wiring group and 60percent of the patients of the transcortical group, right side was involved.Mean duration of surgery among the patients of the tension band wiring group and transcortical screw fixation group was 38.3 minutes and 49.4 minutes respectively. While comparing the mean duration of surgery among the patients of both the study groups, 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 10.8 days respectively. Non-significant results were obtained while comparing the mean time for complete union among the two study groups.While assessing and comparing the outcome in between the two study groups, non-significant results were obtained.

Table 1: Comparison of outcome

Mayo elbow performance score grading	Tension Band Wiring		Transcortical Screw Fixation	
	Number of patients	Percentage	Number of patients	Percentage
Excellent	8	80	9	90
Good	1	10	1	10
Fair	1	10	0	0
Total	10	100	10	100

DISCUSSION

The olecranon is the region of the proximal ulna that extends from the tip of the ulna to the coronoid process. Three main anatomic features must be recalled when treating fractures of the olecranon. First, the olecranon is the site of insertion of the triceps—a muscle whose action would tend to displace a fracture. Second, the trochlear notch of the olecranon forms a cavity in which the distal humerus sits, and thus all olecranon fractures, by definition, are intraarticular injuries. Third, the posterior process of the olecranon prevents posterior translation of the humerus (just as the coronoid process prevents anterior translation) and thus displacement can lead to elbow instability.[4- 6]

Approximately 10% of fractures about the adult elbow consist of fractures of the olecranon process of the ulna and range from simple nondisplaced fractures to complex fracture-dislocations of the elbow. Several treatment options for internal fixation have been described, including tension-band wiring, plate fixation, intramedullary screw fixation, and triceps advancement after fragment excision. The method of internal fixation is chosen based primarily on fracture type. Because olecranon fractures are all intra-articular injuries, they require anatomic or essentially normal surface reduction and trochlear notch contour for predictable outcomes. In addition, fixation must be stable enough to permit early mobilization to avoid significant elbow stiffness. Given the variability in fracture patterns, the complex anatomy, and associated injuries, treating surgeons must be familiar with multiple treatment methods and follow a systematic surgical strategy to avoid complications and achieve reliable outcomes.[7- 10]Hence; the present study was conducted for comparing the management in Olecranon fractures by Tension band wiring versus Transcortical screw fixation procedure.

Mean age of the patients of the tension band wiring group and transcortical screw fixation group was 42.4 years and 44.5 years respectively. 80 percent of the patients of the Tension band wiring group and 70 percent of the patients of the transcortical screw fixation group were males while the remaining were females.In 70 percent of the patients of the tension band wiring group and 60 percent of the patients of the transcortical group, right side was involved.Mean duration of surgery among the patients of the tension band wiring group and transcortical screw fixation group was 38.3 minutes and 49.4 minutes respectively. While comparing the mean duration of surgery among the patients of both the study groups, 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 10.8 days respectively. Non-significant results were obtained while comparing the mean time for complete union among the two study groups.While assessing and comparing the outcome in between the two study groups, non-significant results were obtained.

Gruszka D et al compared the stability of the TBW versus an alternative, novel low-profile olecranon tension plate (OTP) with angular stable screws in a simulated complex fracture model. Nine fresh-frozen pairs of cadaver proximal ulnae with an oblique osteotomy and an additional wedge fragment simulating an unstable fracture were tested. The TBW and OTP were implanted pairwise. The elbow motion was simulated in a single-muscle model and ranged from full extension to 90° of flexion. The pulling force of the triceps tendon ranged from 50 to 200 N. The displacement of the fracture fragments was measured with a video motion analysis system over 304 cycles. Data were assessed statistically using the Wilcoxon signed-rank test. The cyclic loading tests showed mean loosening of the fracture fragments at the articular surface of 0.56 mm using TBW (SD 0.65) and 0.15 mm for OTP (SD 0.39). There was no statistical significance in loosening between the two constructs ($p = 0.31$). No plate breakage or screw loosening occurred. They concluded that the low-profile OTP, using the principles of pre-tensioning, lag, cortical, and angular stable screws together, demonstrated similar stability after olecranon fracture fixation when compared with the TBW technique and a lag screw in the olecranon fracture model with a third wedge fragment.[10]Kirtan Tankshali et al did comparative study on 35 cases for different methods of olecranon fracture fixation and found that treatment of choice for olecranon fracture depends on fracture type. Simple two-part transverse fracture is best treated with K-wiring and tension band wiring whereas oblique or comminuted fractures are best treated with olecranon plating.[11]Duckworth AD compared the outcomes of tension-band wire (TBW) and plate fixation for simple isolated, displaced fractures of the olecranon. They performed a prospective randomized trial involving 67 patients who were ≥16 to <75 years of age and had an acute isolated, displaced fracture of the olecranon. Patients were randomized to either TBW (n = 34) or plate fixation (n = 33) and were evaluated at 6 weeks, 3 months, 6 months, and 1 year following surgery. The primary outcome measure was the Disabilities of the Arm, Shoulder and Hand (DASH) score at 1 year. The baseline demographic and fracture characteristics of the 2 groups were comparable, except for age, which was lower in the TBW group. The 1-year follow-up rate was 85% (n = 57), with 84% (n = 56) completing the DASH. There was a significant improvement in the DASH score over the 1-year period following surgery. At 1 year, the DASH score for the TBW group (12.8) did not differ significantly from that of the plate group (8.5). The groups also did not differ significantly in terms of range of motion, the Broberg and Morrey score, the Mayo Elbow Score, or the DASH at all assessment points over the 1 year. Complication rates were significantly higher in the TBW group, predominantly because of a significantly higher rate of metalwork removal in symptomatic patients. Four infections occurred, all in the plate group, as did 3 revision surgeries. In conclusion, among active patients with a simple isolated, displaced fracture of the olecranon, no difference was found between TBW and plate fixation in the patient-reported outcome at 1 year following surgery. The complication rate was higher following TBW fixation and was due to a higher rate of implant removal in symptomatic patients. However, the more serious complications of infection and the need for revision surgery occurred exclusively following plate fixation in this trial.[12]

CONCLUSION

Tension band wiring showed better results.

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