

ORIGINAL RESEARCH

Comparison of open reduction and internal fixation by tension band wiring and hook plate in olecranon fracture cases

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ABSTRACT

Background: Fractures of the olecranon are a relatively common injury in adults. The present study was conducted to compare open reduction and internal fixation by tension band wiring and hook plate in olecranon fracture cases. **Materials & Methods:** 50 olecranon fracture cases of both genders were divided into 2 groups of 25 each. Group I patients were treated with tension band wiring and group II patients with hook plate. Parameters such as side, mode of injury, MAYO classification, average time taken from injury to surgical management (days), associated injury, duration of surgery, radiological union and complications were recorded. **Results:** There were 15 males and 10 females in group I and 12 males and 13 females in group II. In group I and II, side involved was right in 13 and 11 and left in 12 and 14. Mode of injury was sports in 2 and 5, assault in 3 and 4 and road side accident in 20 and 16 respectively. MAYO classification IA was seen in 3 and 1, IB in 2 and 4, IIA in 12 and 11 and IIIA in 8 and 10 respectively. Average time taken from injury to surgical management was 0-1 days in 13 and 11, 1-3 days in 7 and 8 and 4-7 days in 5 and 6. Associated injury was fracture shaft of femur in 1 and 0, fracture inter trochantric femur in 2 and 1 and fracture both bone legs in 1 and 0. Duration of surgery (min) was 40.2 and 53.6. Radiological union was 6 weeks in 4 and 6, 12 weeks in 6 and 7, 18 weeks in 10 and 8 and 24 weeks in 5 and 4 respectively. Complications were superficial infection in 1 and 1, deep infection in 2 and 0 and wire migration in 1 and 1 respectively. The difference was significant ($P < 0.05$). **Conclusion:** Tension band wiring is a simple, inexpensive technique and effective means of fixing olecranon fractures.

Key words: olecranon, tension band wiring, hook plate

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INTRODUCTION

Fractures of the olecranon are a relatively common injury in adults; its subcutaneous location leaves it vulnerable to injury from a direct blow.¹ 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.²

Olecranon fractures typically involve the articular surface of the elbow. Posttraumatic arthritis occurs in approximately 20% of cases and persistent mal-reduction >2mm of the articular surface is associated with this outcome.³ In fractures with significant comminution, inadvertent mal-reduction by narrowing

the greater sigmoid notch may further predispose the patient to arthritis. The triceps muscle (innervated by the radial nerve) inserts onto the olecranon, blending with the periosteum.⁴ A displaced fracture interrupts the extensor mechanism resulting in loss of active elbow extension. The pull from the triceps is the key deforming force, pulling the separated fragment superiorly. Greater displacement suggests tearing of the fibrous sheath over the olecranon. The olecranon confers stability to the elbow joint, acting as a block to the anterior translation of the ulna in relation to the distal humerus.⁵ Olecranon fractures can have associated with ligamentous injury (the medial and lateral collateral ligaments stabilize against valgus and varus stress respectively), coronoid process, and radial head fractures. Unstable injuries require reduction and stable fixation of the olecranon to restore elbow stability. The ulnar nerve lies on the medial aspect, posterior to the medial collateral ligament before crossing anteriorly to run alongside the ulnar artery.

Awareness of these structures is key when operating in this region.⁶ The present study was conducted to compare open reduction and internal fixation by tension band wiring and hook plate in olecranon fracture cases.

MATERIALS & METHODS

The present study consisted of 50 olecranon fracture cases of both genders. All gave their written consent to participate in the study.

Data such as name, age, gender etc. was recorded. Patients were divided into 2 groups of 25 each. Group I patients were treated with tension band wiring and group II patients with hook plate. Parameters such as side, mode of injury, MAYO classification, average time taken from injury to surgical management (days), associated injury, duration of surgery, radiological union and complications was recorded. Data thus obtained were subjected to statistical analysis. P value < 0.05 was considered significant.

RESULTS

Table I Distribution of patients

Groups	Group I	Group II
Method	tension band wiring	hook plate
M:F	15:10	12:13

Table I shows that there were 15 males and 10 females in group I and 12 males and 13 females in group III.

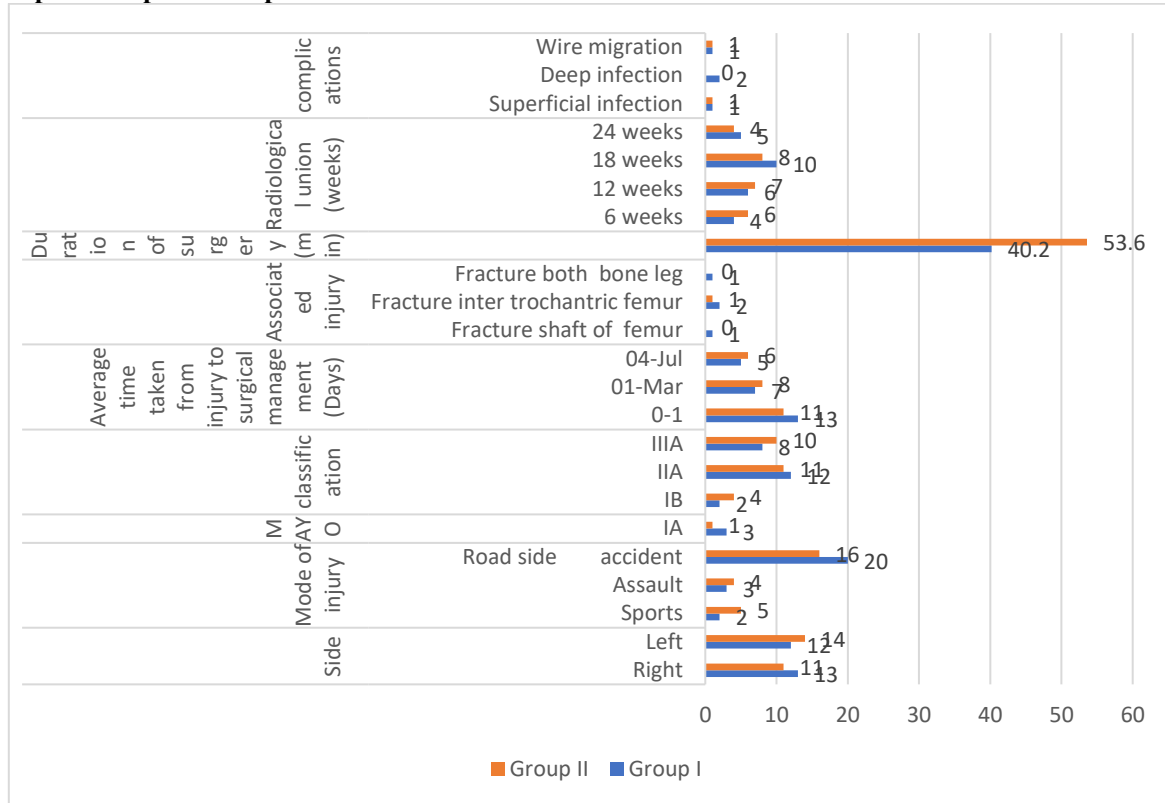
Table II Comparison of parameters

Parameters	Variables	Group I	Group II	P value
Side	Right	13	11	0.91
	Left	12	14	
Mode of injury	Sports	2	5	0.02
	Assault	3	4	
	Road side accident	20	16	
MAYO classification	IA	3	1	0.84
	IB	2	4	
	IIA	12	11	
	IIIA	8	10	
Average time taken from injury to surgical management (Days)	0-1	13	11	0.75
	1-3	7	8	
	4-7	5	6	
Associated injury	Fracture shaft of femur	1	0	0.05
	Fracture intertrochantric femur	2	1	
	Fracture both bone leg	1	0	
Duration of surgery (min)		40.2	53.6	0.02
Radiological union (weeks)	6 weeks	4	6	0.93
	12 weeks	6	7	
	18 weeks	10	8	
	24 weeks	5	4	
complications	Superficial infection	1	1	0.82
	Deep infection	2	0	
	Wire migration	1	1	

Table II, graph I shows that in group I and II, side involved was right in 13 and 11 and left in 12 and 14. Mode of injury was sports in 2 and 5, assault in 3 and 4 and road side accident in 20 and 16 respectively. MAYO classification IA was seen in 3 and 1, IB in 2 and 4, IIA in 12 and 11 and IIIA in 8 and 10 respectively. Average time taken from injury to surgical management was 0-1 days in 13 and 11, 1-3 days in 7 and 8 and 4-7 days in 5 and 6. Associated

injury was fracture shaft of femur in 1 and 0, fracture inter trochantric femur in 2 and 1 and fracture both bone legs in 1 and 0. Duration of surgery (min) was 40.2 and 53.6. Radiological union was 6 weeks in 4 and 6, 12 weeks in 6 and 7, 18 weeks in 10 and 8 and 24 weeks in 5 and 4 respectively. Complications was superficial infection in 1 and 1, deep infection in 2 and 0 and wire migration in 1 and 1 respectively. The difference was significant (P < 0.05).

Graph I Comparison of parameters



DISCUSSION

Patients with undisplaced olecranon fractures can be routinely managed nonoperatively. The aims of treatment for displaced olecranon fractures are the restoration of function and stability to the elbow joint.⁷ The technique employed should allow preservation and reconstruction of the articular surface with minimal associated complications. Tension-band wiring (TBW) is the most recognised and commonly used fixation method, although plate fixation and intramedullary screw fixation are noted alternatives.⁸ Potential problems with the TBW technique are wound breakdown, infection, prominent metalwork, malunion and non-union and long-term outcome data is lacking. Plate fixation is considered superior in distal/comminuted/oblique fractures and fracture-dislocations, with superior fracture reduction and fixation results, as well as a lower rate of reoperation.⁹The present study was conducted to compare open reduction and internal fixation by tension band wiring and hook plate in olecranon fracture cases.

We found that there were 15 males and 10 females in group I and 12 males and 13 females in group III. Hewins et al¹⁰in their study 17 patients were treated for an intra-articular distal humeral fracture using open reduction internal fixation, and the utilisation of plate fixation after olecranon osteotomies was studied. All osteotomies in their series were combined. In one patient, a screw that had pierced the proximal radio-ulnar joint needed to be shortened as soon as possible. Only one patient (6%), with a mean follow-up of 32

months, asked to have the plates removed. Given that the plate is positioned on the dorsal ulna, which has been shown to provide greater strength than the dual medial-lateral plating approach, the main apparent complication associated with plate fixation is conspicuous metalwork.

We found that in group I and II, side involved was right in 13 and 11 and left in 12 and 14. Mode of injury was sports in 2 and 5, assault in 3 and 4 and road side accident in 20 and 16 respectively. MAYO classification IA was seen in 3 and 1, IB in 2 and 4, IIA in 12 and 11 and IIIA in 8 and 10 respectively. Average time taken from injury to surgical management was 0-1 days in 13 and 11, 1-3 days in 7 and 8 and 4-7 days in 5 and 6. Associated injury was fracture shaft of femur in 1 and 0, fracture inter trochantric femur in 2 and 1 and fracture bothbone legs in 1 and 0. Duration of surgery (min) was 40.2 and 53.6. Radiological union was 6 weeks in 4 and 6, 12 weeks in 6 and 7, 18 weeks in 10 and 8 and 24 weeks in 5 and 4 respectively. Complications was superficial infection in 1 and 1, deep infection in 2 and 0 and wire migration in 1 and 1 respectively. Hume and Wiss¹¹ randomly assigned 41 patients to either TBW (n = 19) or plate fixation (n = 22). Included were fractures that were comminuted and open. The main findings of this study were that, at six months, elbow motion was not significantly different between the two groups, but that TBW was more frequently associated with post-operative fracture reduction loss and apparent bothersome metalwork.

The limitation the study is small sample size.

CONCLUSION

Authors found that tension band wiring is a simple, inexpensive technique and effective means of fixing olecranon fractures.

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