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The outcome of plate fixation for displaced olecranon fractures

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Abstract

Objectives: To evaluate the outcome of plate fixation for displaced olecranon fractures

Materials and Methods: the present retrospective study was conducted in the Department of Orthopedics. Total 25 patients who underwent plate fixation of displaced olecranon fractures were reviewed by two surgeons were independently.

Results: mean arc of elbow motion 106.2° with range of motion from 10.2°-116.7° and excellent clinical outcome was reported among 76% cases as per Broberg and Morrey scale. 22 patients achieved fracture union during 6 months follow up period.

Conclusion: locking plate fixation is a safe and effective option for the treatment of comminuted olecranon fractures.

Keywords: olecranon, fracture, plate fixation, ulna

Introduction

Proximal one third ulna fractures are common adult injuries around the elbow, which comprise broad spectrum of injuries including olecranon fractures and Monteggia fractures.

The management of complex, comminuted fracture of the olecranon can be extremely difficult, especially when it is combined with fracture of the radial head and/or coronoid process of the ulna or injury of the collateral ligament of the elbow joint [1, 2].

The treatment goals are to obtain anatomic reduction that remains stable over time, bone healing and functional recovery. To allow early functional mobilization and to prevent stiffness of the elbow joint, the fracture fixation has to provide secure stability [3,4]. Tension band wiring is frequently recommended for non-comminuted fractures [5, 6]. Plate fixation is commonly employed for comminuted fractures, because subchondral bony comminution opposite the tension band will cause failure in compression [7, 8]. Plate fixation also has been recommended for the management of simple olecranon fractures.

Very few reports have specifically addressed the treatment outcomes of comminuted fractures of the olecranon. Hence the present study was conducted with the aim to evaluate clinical outcome of locking plate fixation in cases of comminuted olecranon.

Material & Methods

Study Design

The present retrospective study was conducted in the Department of Orthopedics. Total 25 patients who underwent plate fixation of displaced olecranon fractures were reviewed by two surgeons were independently.

Ethical approval and Informed consent

The study protocol was reviewed by the Ethical Committee of the Hospital and granted ethical clearance. After explaining the purpose and details of the study, a written informed consent was obtained.

Inclusion criteria

- Patient who signed the “informed consent” form

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- Patients ≥ 18 years of age
- Patients with displaced olecranon fractures less than one month old

Exclusion criteria

- Patients <18 years of age
- Patients with additional ipsilateral upper extremity injury
- Patients who were unfit for surgery

Methodology

Pre-operatively the neurovascular status and radiological assessment of the fractured limb was done. The decision of the exact modality of surgery and fixation was made. Surgical antibiotic prophylaxis was given within one hour of surgery. Patients were given general or regional anaesthesia. Position of the patient was lateral decubitus with arm over padded bar allowing elbow flexion. Image intensifier was kept for intra-operative imaging if required. Posterior midline approach was used for olecranon fracture.

Postoperatively antibiotics were given as per hospital protocol. Analgesics and other supportive management were given according to the patient need. The patients were discharged according to the overall well-being of the patient, preferably on third or fourth day with medications convenient to be taken at home. Range of motion exercises of the shoulder and elbow was begun within 2 weeks.

Outcome assessment

All patients were asked to attend for routine review at three months and 6 month Standard The clinical results were assessed according to the Broberg and Morrey scale [9], which categorizes results as excellent (95 points), good (80 to 94 points), fair (60 to 79 points) and poor (59 points). Analysis of any complications observed in terms of loss of reduction, infection, problems of union and implant failure.

Statistical Analysis

The recorded data was compiled and entered in a spreadsheet computer program (Microsoft Excel 2010) and then exported to data editor page of SPSS version 19 (SPSS Inc., Chicago, Illinois, USA). Descriptive statistics included computation of percentages. The statistical test applied for the analysis was Pearson’s chi-square test (χ^2). The confidence interval and p-value were set at 95% and ≤ 0.05 respectively.

Results

Table 1: Age and gender profile of the study population

Variables	N (%)
Gender	
Male	19 (76.0%)
Female	6 (24.0%)
Age	
18-27 Years	6 (24.0%)
28-37 Years	11 (44.0%)
38-47 Years	5 (20.0%)
>47 Years	3 (12.0%)
Total	25 (100.0%)
Mean ± SD	45.76±3.81

Table 2: distribution patients as per laterality and Mayo classification

Variables	N (%)
Laterality	
Right	9 (36.0%)
Left	16 (64.0%)
Mayo Classification	
IIA	16 (64.0%)
IIB	5 (20.0%)
IIIA	4 (16.0%)
Total	25 (100.0%)

Table 3: Range of Motion at 3 months and 6 months follow-up

Variables	3 months	6 months
Mean Flexion Extension Arc	92.8 ⁰	106.2 ⁰
Mean Flexion Extension Range	11.8 ⁰ -105.2 ⁰	10.2 ⁰ -116.7 ⁰

Table 4: clinical outcome according to Broberg and Morrey scale

Broberg and Morrey scale	N (%)
Excellent	19 (76.0%)
Good	4 (16.0%)
Fair	2 (8.0%)
Poor	0 (0.0%)

Table 5: distribution of complication

Complications	N (%)
Loss of reduction	0 (0.0%)
Infection	0 (0.0%)
Implant failure	0 (0.0%)
Delayed Union	3 (12.0%)

Discussion

Open reduction and stable internal fixation with the goal of anatomical reduction of the articular surface is the gold standard for olecranon fracture treatment. Non-comminuted olecranon fractures can be treated by tension band wiring or plating. In cases of comminute fractures of proximal ulna it has many pitfalls like loss of fixation, prominence of hardware, impingement and synostosis.

Use of locking plate avoids these complications and can also be used in comminuted as well as non-comminuted fractures. It also provides structural stability, resists ulnar angulation, and restores ulna length. In addition, plate fixation lowers the risk of fatigue failure caused by extreme bending stresses.

Operative treatment by plating has been shown to provide more predictable alignment and immediate fracture stability, allowing early elbow mobilization.

There are many reports of favorable results using a plate and screws system for stabilizing olecranon fractures. Anderson *et al.* reported 92% (22 of 24) good or excellent results after congruent plate fixation of olecranon fracture [10].

In the present study mean arc of elbow motion 106.2⁰ with range of motion from 10.2⁰-116.7⁰ and excellent clinical outcome was reported among 76% cases as per Broberg and Morrey scale. Ring *et al.* reported 88% (15 of 17) good or excellent results after plate fixation of trans-olecranon fracture dislocations, with a mean flexion of 14⁰ to 127⁰18 [11]. Seyed *et al.* treated eight patients with trans-olecranon fracture dislocations; all seven treated with plating had a good or excellent result [12].

To our knowledge, few reports have specifically addressed the treatment outcomes of comminuted fractures of the olecranon. Ikeda *et al.* treated ten patients with comminuted fractures of the olecranon by multiple tension-band wiring and a graft from the iliac crest. They reported that 100% of their patients had an excellent or good result, with a mean flexion of 15° to 135° [13].

Conclusion

The present study concluded that locking plate fixation is a safe and effective option for the treatment of comminuted olecranon fractures. Any concomitant injuries of the coronoid process and radial head should be properly managed.

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