A CLINICAL STUDY ON SURGICAL MANAGEMENT OF OLECRANON FRACTURES

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ABSTRACT

BACKGROUND

Olecranon fractures are one of the most commonly seen orthopaedic injuries in the emergency room. Fractures of the Olecranon process of the Ulna typically occurs as a result of a motor-vehicle or motorcycle accident, a fall, or assault. The accepted management for Olecranon fractures is for non-displaced fractures short immobilization followed by gradually increasing range of motion. When displaced, open reduction and internal fixation with k-wires and figure of eight tension band wiring for simple transverse fractures and olecranon hook plate for comminuted fractures The present study is undertaken to evaluate the results of surgical management, the merits and demerits and to asses elbow joint motion and stability after the procedure.

MATERIALS AND METHODS

The present study consists of 25 cases of fracture olecranon treated by Tension band wiring with Kirschner wire for Simple transverse fractures and Olecranon hook plate for Comminuted fractures.

RESULTS

The results were evaluated according to the Mayo elbow performance score. The results obtained in our series were excellent in 18 (72%) patients, good in 4 (16%) patients, fair in 3 (12%) patients and no poor results.

CONCLUSION

From the present study it is concluded, that the technique of open reduction and internal fixation with Kirschner wires and tension band wiring for simple transverse and oblique fractures and olecranon plate fixation for comminuted fractures are effective means and gold standard technique of treating fractures of olecranon and is based on sound biomechanical principle.

KEYWORDS

Olecranon Fractures, Tension Band Wiring, Olecranon Hook Plate.

HOW TO CITE THIS ARTICLE: Basha AMI, Reddy KBV, Vishal K. A clinical study on surgical management of olecranon fractures. J. Evid. Based Med. Healthc. 2017; 4(56), 3389-3392. DOI: 10.18410/jebmh/2017/674

BACKGROUND

Olecranon fractures are one of the most commonly seen orthopaedic injuries in the emergency room. Fractures of the Olecranon process of the Ulna typically occurs as a result of a motor-vehicle or motorcycle accident, a fall, or assault.

Non displaced fractures can be treated with a short period of immobilisation followed by gradually increasing range of motion.

When displaced, open reduction and internal fixation are usually required to obtain anatomical realignment of the articular surface and restore normal elbow function. The fixation should be stable, allow active elbow flexion and extension and promote union of the fracture.[1]

Financial or Other, Competing Interest: None.
Submission 20-06-2017, Peer Review 26-06-2017,
Acceptance 03-07-2017, Published 11-07-2017.
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DOI: 10.18410/jebmh/2017/674

In the past, closed reduction and plaster cast application was the treatment for fracture of olecranon. But, prolonged immobilization with its own complications increased the morbidity and mortality of patients.[2]

So keeping this in consideration, it has become important to intervene surgically. The active mobilisation after surgery will restore the patient to normal function as early as possible. The early and active movement not only prevents the tissue from fracture disease but greatly influences the quality and rapidity of fracture union.

Stable internal fixation with figure-of-eight tension band wire fixation for simple transverse fractures allows early motion to minimise stiffness. The K- wire used in AO tension band technique resist shearing force better than the figure of eight wire alone. So this gives a good result by converting tensile force to compressive at the fracture site.[1,3,4]

For comminuted fractures, distal fractures involving coronoid process, oblique fractures, plate fixation is most appropriate mode of treatment. For comminuted fractures and non-unions, a dorsally applied Olecranon hook plate is used1.[4,5]

Aims and Objectives

1. To Clinically evaluate the result of tension band technique for simple transverse fracture & plate fixation for comminuted fracture of olecranon.
2. To discuss the merits and demerits of this procedure.
3. To assess elbow joint motion and stability after the procedure.

MATERIALS AND METHODS

The present study consists of 25 cases of fracture olecranon treated by Tension band wiring with Kirschner wire for Simple transverse fractures and Olecranon hook plate for Comminuted fractures at the Government General Hospital Kurnool between December 2014 to November 2016.

Study was conducted with due emphasis for clinical observation and analysis of results after surgical management of fractures of olecranon by Kirschner wires with Tension band wiring and Olecranon hook plate.

Inclusion Criteria

1. Age of the patient less than 60 years.
2. Closed injuries.
3. Comminuted and intraarticular fractures.

Exclusion Criteria

1. Age of the patient more than 60 years**.**
2. Compound injuries.
3. Medically comorbid patients.

METHODS

Surgical Procedure- Tension Band Wiring

a) Anaesthesia - General anaesthesia or brachial block.

b) Position and Tourniquet - Mid arm tourniquet was applied with patient in supine or lateral position. Site of the surgery was thoroughly painted with iodine and spirit and draped.

c) Exposure - Exposure of the olecranon was done by Campbell's posterolateral approach. A vertical incision was taken over the posterior aspect of the elbow about 2.5cms proximal to olecranon, curving distally along the lateral aspect of olecranon reaching the subcutaneous border of the ulna and extending distally for about 7.5 cms distal to olecranon. Fascia was incised along the line of skin incision and fracture site was exposed. Fracture haematoma was cleared off and the fracture site was gently curettage. Accurate anatomical hairline reduction was achieved and held with either reduction clamp or long towel clip. 2 K-wires is introduced parallel from the tip of the olecranon i.e., the proximal fragment across the fracture site to the distal fragment. Periosteum was stripped from the shaft of ulna distal to fracture site and a transverse hole was drilled approximately 3 to 5 cms distal to fracture site.

d) A No. 18 stainless steel malleable wire was passed through this transverse hole and crossed over the posterior surface of olecranon in a figure-of-eight manner and then passed around the protruding Kirschner wires and tightened using AO tensioner and then secured with a twist. Bend the proximal ends of the Kirschner wires 1800 and tap the cut ends back into the proximal fragment. Accuracy of reduction was checked and stability was tested by moving the joint. Wound closed in layers and sterile dressing applied.

Surgical Procedure- Olecranon Hook Plate

Exposure - For comminuted olecranon fracture, Exposure of the olecranon was done by Campbell's posterolateral approach. A vertical incision was taken over the posterior aspect of the elbow about 2.5 cms proximal to olecranon, curving distally along the lateral aspect of olecranon reaching the subcutaneous border of the ulna and extending distally for about 7.5 cms distal to olecranon. Fascia was incised along the line of skin incision and fracture site was exposed. Fracture haematoma was cleared off and the fracture site was gently curettage. Accurate anatomical hairline reduction was achieved and held with either reduction clamp olecranon hook plate was applied on the posterior surface with cortical screws after drilling and tapping, through wash was given, wound closed in layers and sterile dressing was applied.

RESULTS

Study consists of 25 cases of fractures of the olecranon treated by Tension band wiring with Kirschner wire for simple transverse fractures and Olecranon hook plate for comminuted fractures in Kurnool medical college and General Hospital, Kurnool between December 2014 to November 2016. All cases were followed up periodically during the period 2014-2016. The following are the observations made and the available data are analysed as follows.

Age in Years	21-30	31-40	41-50	51-60
No. of Cases	7	8	4	6
Percentage	28%	32%	16%	24%

Table 1. Age Incidence

Sex	Number of Cases	Percentage
Male	19	76%
Female	6	24%

Table 2. Sex Incidence

Side Involved	Number of Cases	Percentage
Right	17	68%
Left	8	32%

Table 3. Side Involvement

Mechanism of Injury	Number of Cases	Percentage
Accidental fall	13	52%
Road Traffic Accidents	11	44%
Assault	1	4

Table 4. Mode of Injury

Type of Fracture	No. of Cases	%
I. Un-displaced and stable Fractures	-	-
II. Displaced Fractures		
a. Avulsion Fractures	1	4
b. Oblique and Transverse Fractures	19	76
c. Comminuted Fractures	5	20
d. Fracture – Dislocation	-	-

Table 5. Type of Fractures- (Colton's Classification)

Complications	No. of Cases	%
Superficial Infection	3	12
Symptomatic Metal Prominence	4	16

Table 6. Complications of this Procedure

Mayo Elbow Performance Score (MEPS).[6]

Score	Pain Intensity	No. of Cases	%
45	None	18	72
30	Mild	7	28
15	Moderate	-	-
-	Severe	-	-

Table 7. Section 1 - Pain Intensity

Score	Range of Motion	No. of Cases	%
20	Arc of Motion greater than 100 degrees	22	88
15	Arc of Motion between 50 & 100 degrees	3	12
5	Arc of Motion less than 50 degrees	-	-

Table 8. Section 2 - Range of Motion

Score	Stability	No. of Cases	%
10	Stable	23	92%
5	Moderate instability	2	8%

Table 9. Section 3 - Stability

Score	Function	No. of Cases	%
5	Can comb hair	22	88%
5	Can eat	25	100%
5	Can perform hygiene	25	100%
5	Can don shirt	23	92%
5	Can don shoe	25	100%

Table 10. Section 4 - Functional Evaluation

Grading	No. of Cases	%
Excellent (score Greater than 90)	18	72%
Good (score 75-89)	4	16%
Fair (score 60-74)	3	12%
Poor (score below 60)	-	-

Table 11. Interpreting the Mayo Elbow Performance Score

DISCUSSION

In our study 25 cases of fractures of the olecranon were treated with Tension band wiring and Kirschner wires for simple transverse and oblique fractures and. olecranon hook plate for comminuted fractures. Our experience with this method of fixation has given favourable results. The findings, the end results and various other data will be analysed and compared in the following discussion.

Age Incidence- The average age incidence, in the present study was found to be 39.52 years. This is well in accordance with the authors Jiang Xieyuan (2000).[7] is his study average age was 38 years and Macko Donald and Szabo " California (1985).[8] average age was 35.5 years (15-76 years).

Sex Incidence- The present study of fracture olecranon revealed greater incidence in males (76%). Similarly male predominance was found in the study of Jiang Xieyuan.[7], Hume and Wiss.[9] and Garry Wolfgang et al[10] series.

Side Incidence- Involvement of right side (17 patients (68%)) was seen more frequent than left side. But according to author Wolfgang G. et al,[10] study right side is more and according to author Hume and Wiss.[9] left is more.

Mechanism of Injury- The patients with accidental fall were 13 (52%) patients, with Road traffic accident were 11 (44%) patients and 1 (4%) patient was Assault. Whereas, according to Jiang Xieyuan.[7] series, the patients with road traffic accidents were 9(60%) and patients with accidental fall were 6 (40%) and according to Wolfgang et al,[10] 22 (48.88%) patients were accidental fall 20 (44.44%) were due to motor vehicle accident 3 (6.66%) were due to direct blow.

Type of Fracture- In the present series 14 (56%) transverse fractures, 6 (24%) oblique fractures and 5 (20%) comminuted fractures. In Jiang Xieyvan[7] study 1 (6.67%) oblique fractures and 14 (93.34%) comminuted fractures. In Murphy et al[11,12] series 26 (57.5%) transverse fracture 12 (26.7%) oblique fractures 7 (15.6%) comminuted fractures.

Complications

Superficial infection in 3(12%) patients, which was seen in diabetic patients probably due to decreased immunity which was treated with broad spectrum antibiotic. The symptomatic metal prominence in 4 (16%) whereas, complications in Murphy et al[11,12] is only symptomatic metal prominence 3 (6.66%).

RESULTS

The results were evaluated according to the Mayo elbow performance score. The results obtained in our series were excellent in 18 (72%) patients, good in 4 (16%) patients, fair in 3 (12%) patients and no poor results

CONCLUSION

From the present study it is concluded, that the technique of open reduction and internal fixation with Kirschner wires of treating fractures of olecranon and is based on sound biomechanical principle and tension band wiring for simple transverse and oblique fractures and olecranon plate fixation for comminuted fractures are effective means and gold standard technique

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