

Clinical Study of Surgical Management of Olecranon Fractures

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Research Article

Keywords: Olecranon fractures, Tension band wiring, Olecranon hook plate, Open reduction and internal fixation

Posted Date: January 17th, 2022

DOI: <https://doi.org/10.21203/rs.3.rs-1241904/v1>

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Abstract

BACKGROUND AND OBJECTIVE:

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 assess elbow joint motion and stability after the procedure.

MATERIALS AND METHODS:

It is a prospective study which was carried out from September 2010 to September 2012 in Bapuji Hospital and Chigateri General Hospital attached to J.J.M Medical College, Davangere. In this study period of 25 cases of fracture olecranon treated by Tension band wiring with Kirshner wire for Simple transverse fractures and Olecranon hook plate for Communitated fractures

RESULTS:

In our series, majority of the patients were males, middle aged, with road traffic accident being the commonest mode of injury, Most of the cases were Type II B fractures i.e., oblique and transverse fractures according to Colton's classification Surgery was performed with in 3.48 average days, Union was noted clinically and radiologically and functional evaluation was done by Mayo elbow performance score. Excellent results was present in 18 patients (72%), 4(16%) good and 3(12%) fair with no poor results.

INTERPRETATION /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.

Introduction

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 immobilization 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

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 minimize 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 used.^{1,4,5}

This dissertation is directed towards the clinical evaluation of Surgical management of Olecranon fractures by tension band wiring for simple transverse fractures and plate fixation for communitated fractures.

OSSIFICATION CENTRE AROUND THE ELBOW:

Ossification Centre	Appearance	Fusion
1.Capitulum	1 Year	14-16 Yrs.
2.Head of Radius	4 Year	16-18 Yrs.
3.Medial Epicondyle	4 Years (Female) 6 Years (Male)	16-18 Yrs.
4.Trochlea	9 Years (Female) 10 Years(Male)	14-16 Yrs.
5.Olecranon	10 Years	14-16 Yrs.
6.Lateral Epicondyle	12 Years	14-16 Yrs.

CLASSIFICATION & MECHANISM OF INJURY

I. CLASSIFICATION OF OLECRANON FRACTURES :

No generally accepted classification of olecranon fractures has been presented in the orthopaedic literature.

A simple classification of fractures of adult olecranon is proposed by

C.L.Colton and used as a basis for making recommendations about treatment⁵⁵

1. Non displaced or displacement less than 2mm.

2. Displaced fractures

- a. Avulsion Fractures.
- b. Oblique Fractures.
- c. Comminuted Fractures
- d. Fracture –Discolations.

3 Major classification systems,^{1,4}

1. The AO classification system
 2. The Mayo Classification System, and
 3. The Schatzker-Schmeling Classification System, have dominated the published data, with each system having both advantages and disadvantages.
- 1The Schatzker–Schmeling** classification system for olecranon fractures focuses specifically on fracture morphology and the biomechanical concerns related to each type of internal fixation.

II. MECHANISM OF INJURY :

Fractures of the olecranon are usually caused by three main types of injuries :-

- Direct violence, such as falling on the tip of the elbow.
- Indirect violence, such as falling on a partially flexed elbow with indirect forces generated by the strong contraction of the triceps muscle.
- Combination of direct and indirect violence.

Classification of olecranon fractures taken for study⁵⁴,

I) Un displaced and stable fractures:

To be considered un displaced and stable, the fractures must be displaced less than 2 mm, exhibit no change in position with gentle flexion to 90⁰ with extension against gravity.

II) Displaced fractures:

A. Avulsion fractures:

A transverse fracture line separates a small proximal fragment of the olecranon process from the rest of the ulna.

B. Oblique and transverse fractures

The fracture line runs obliquely, starting near the deepest part of the semilunar notch and running dorsally and distally to emerge on the subcutaneous crest of the proximal part of the ulna. This fracture may be a single oblique line, or it may have an element of comminution caused by a fracture in the sagittal plane or

a central area of depression in the articular surface.

C. Comminuted Fractures:

This group includes all the severely comminuted fractures of the olecranon, which usually result from direct trauma to the posterior aspect of the elbow. There are multiple fracture planes, often with severe crushing of many fragments. There may be associated fractures of the distal end of the humerus, the shafts of the forearm bones, or the head of the radius.

D. Fracture-Dislocations:

The olecranon fracture is at or near the level of the tip of the coronoid process, so that a plane of instability is located through the fracture site and the radiohumeral joint as well, resulting in an anterior dislocation of the ulna and radius.

TREATMENT

The treatment of fractures of the olecranon has seen the gamut from early range of motion of the elbow without regard for the fracture to precise and open anatomic reduction of the fracture site.

Before the era of aseptic surgery and the discovery of roentgenography, olecranon fractures were treated by splinting the elbow in full extension for 4 to 6 weeks². This usually resulted in a stiff elbow with loss of flexion. Later the practitioners slowly began to use the position of mid-flexion but, this frequently led to nonunion because of wide separation of fracture fragments, resulting in decreased power of the triceps mechanism¹³.

The dilemma for nonunion and stiffness led Lister to choose the fracture of olecranon to be the first fracture treated by open reduction and internal fixation using his method of asepsis with a wire loop². Modifications of this technique, which was the forerunner of the tension band technique advocated by the AO group are now in use.

Multiple methods of internal fixation have been proposed for olecranon fractures and the commonly used are-

1. Open reduction and fixation with a figure- of-eight wire loop.
2. Intramedullary fixation.
3. A combination of medullary pin or screw and tension bands.
4. Ao plate fixation.

The choice of the method of internal fixation depends on the nature and location of the fracture, the amount of comminution and the age of the patient.

The advantages of open reduction and internal fixation include-

1. This method provides an anatomical reduction of the fracture and a congruous articular surface.
2. Rigid fixation allows for an early range of motion.
3. Elbow stability is preserved.
4. The extensor power of the triceps muscle is maintained.

Methodology

The present study consists of 25 cases of fracture olecranon treated by *Tension band wiring with Kirshner wire for Simple transverse fractures and Olecranon hook plate for Communited fractures* at the Chigateri General Hospital and Bapuji Hospital, Davangere between September 2010 to September 2012.

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

IMMEDIATE MANAGEMENT :

Immediately on arrival of the patient, if he/she was in shock, the level of shock was noted and managed accordingly. X-ray of the part was taken and the elbow was immobilized in whatever the position patients presence in a A/E POP posterior slab. The affected limb was kept elevated. Analgesics and antibiotics were given if necessary. Patient was then prepared for surgery and anaesthesia after the pre-anaesthetic checkup.

HISTORY :

A detailed history was elicited from the patients. The duration of injury and mechanism of injury, whether due to direct or indirect violence was noted. Whether trauma was due to traffic accidents, assault, fall from a height, industrial injury or domestic accident were specifically asked and also other associated injuries were noted. Enquiry was made to note the severity of pain and swelling and also about the active movements of the affected joint and external wound.

SELECTION OF CASES FOR KRISHNER WIRES WITH TENSION BAND WIRING AND OLECRANON HOOK PLATE

Following points were considered -

- a) Age of the patient
- b) Extent of damage to the articular surface
- c) Degree of comminution.

The patients of extremes of age and the patients in whom operative risk was great were not taken up for surgery.

METHODS :

1) SURGICAL PROCEDURE :

- a) Anaesthesia - The operation was performed under 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 5cms distal to fracture site. 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 Krishna wires 180° 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 and compression bandage given.

For **communitated 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 2.5cms 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 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.

2) POSTOPERATIVE MANAGEMENT :

- a) All the patients were treated with Inj. Cefotaxime 1gm twice daily for 5 days followed by Tab Cefixime 200mg daily for 5 days. Some cases were treated with Inj. Amikacin 500mg daily for 3 days.
- b) Anti inflammatory analgesics, Inj. Dicofenac for 3 days followed by Tab Diclofenac 50mg twice daily.
- c) Affected limb was elevated and patient was asked to perform finger movements on day 1. Elbow movements was advised from 3rd postoperative day.
- d) For comminuted fractures and unstable fixations, the limb was immobilized in A/E POP posterior slab with elbow in 90° flexion for 2 weeks. For other fractures the limb was mobilized by about 3rd postoperative day.

3) FOLLOW UP :

This part of the study should be done very carefully and meticulously. In our study the patients on discharge were advised to report for follow up after 6 weeks and 12 weeks and thereafter every 3 months. The result is assessed 3 months after the procedure. At follow up a detailed clinical examination was done and patient was assessed subjectively for the symptoms like pain, swelling, restriction of joint motion. On clinical examination, swelling of the joint, tenderness, movements of the elbow joint, prominence of head of cancellous screw, nutrition and power of the muscles acting on the joint were noted.

Patients were instructed to carry out physiotherapy in the form of, active flexion-extension and pronation-supination without loading.

Patients were instructed to carry out physiotherapy in the form of active flexion extension and pronation supination without loading.

Check x-ray were taken and when final x-ray showed union, implant was removed. In all patients duration after which they returned to job was noted.

EVALUATION OF RESULTS :

Although there are many methods of evaluation of results given by many authors, the treated olecranon fractures by Tension band wiring and olecranon hook plate were evaluated in our study with Mayo Elbow Performance score (MEPS) (According to Morrey BF, An KN. **Functional evaluation of the elbow.**)⁵⁸ for functional outcome and Standard radiographs for radiological out come.

Results

Study consists of 25 cases of fractures of the olecranon treated by Tension band wiring with Kirshner wire for Simple transverse fractures and Olecranon hook plate for comminuted fractures in Chigateri General Hospital and Bapuji Hospital between September 2010 to September 2012. All cases were followed up periodically during the period 2010-2012. The following are the observations made and the available data are analysed as follows.

1) AGE INCIDENCE:

TABLE –I :SHOWING THE AGE INCIDENCE

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

The age of this patients ranged from 21-60 years, with fracture association being most common in 3rd decade i.e. 8 cases (32%) and mean age of 40.5 years.

In this series, 6(24%) patients between 21-30 years, 8 (32%) patients between 31-40 years, 4 (16%) patients between 41-50 years and patients below 51-60 years were 7(28%).

2) SEX INCIDENCE :

TABLE –II :SEX INCIDENCE

Sex	No.of cases	Percentage
Male	17	68%
Female	8	32%

In the present series, males were 17 (68%) and females were 8 (32%)

with M:F ratio of 2.2:1.

3) SIDE OF INVOLVEMENT:

TABLE –III :SIDE OF INVOLVEMENT

Side involved	No.of cases	Percentage
Right	16	64%
Left	9	36%

In this series, fracture of olecranon on right side of the patient in 16 (64%) cases and left side of patients in 9 (36%) cases.

4) MODE OF INJURY :

TABLE – IV :MODE OF INJURY

Mechanism of injury	No.of cases	Percentage
Road traffic accidents	13	52
Fall from height	11	44
Assault	1	4

In this series 13 cases (52%) were due to road traffic accidents, 11 cases (44%) were due to fall and 1(%) patient due to assault.

5) TYPE OF FRACTURES : (Colton's classification) ⁵⁵

TABLE –V :TYPE OF FRACTURES

Type of fractures	No.of cases	Percentage
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	-	-

In the present series, 19 (76%) olecranon fractures were oblique and transverses fracture, 5(20%)

olecranon fractures were comminuted fractures and 1(4%)avulsion fractures. No cases of un displaced fractures and fracture-dislocation were observed.

6) DURATION :

TABLE –VI :SHOWING THE TIME INTERVAL BETWEEN INJURY AND SURGERY

Duration	No.of Cases	Percentage
2-10 days	25	100%

No case was operated as a surgical emergency. All the cases were operated on our regular operation theatre days, at the earliest possible time. The patients were operated upon with an average period of 3.48 days after the injury.

7) ASSOCIATED INJURY :

TABLE – VI1 :ASSOCIATED INJURY

Associated injuries	No. of cases	Percentage
Radial head fracture	2	8

In the present series ,two patients had radial head fracture ,one patient underwent radial head excision and one patient underwent k-wire fixation.

8) INCISION :

All the cases were operated upon by Campbell's posterolateral approach.

9) IMMOBILIZATION :

Two cases of oblique fractures of the olecranon where in it was difficult to obtain rigid fixation and comminuted fractures were immobilized with A/E posterior P.O.P. slab for a period of two weeks.

All the other cases were encouraged active elbow motion from the third postoperative day.

10) DURATION OF FRACTURE UNION

The fracture was considered united when clinically there was no tenderness and no subjective complaints and radiologically when the fracture line was not visible.

Fractures, which healed 6 months later without an additional operative procedure was considered as delayed union. Fractures which did not unite after 6 months or that needed additional operative procedure to unite was considered nonunion.

TABLE-VIII :TIME OF UNION

Time of union	No. of cases	Percentage
< 4 months	17	68
4-6 months	8	32
6months- 1year	-	-
Non union	-	-
Total	25	100

In this series 17(68%) patients had sound union in less than 4months, 8(32%) had union between 4-6 months and no patient developed non union.

11. MAYO ELBOW PERFORMANCE SCORE (MEPS) ⁵⁸ Section -1 PAIN INTENSITY

TABLE-IX : PAIN INTENSITY

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

In the present series 18(72%) patients were pain free and 7(28%) patients had mild aching pain. No patients had moderate or severe pain.

Section-2 RANGE OF MOTION

TABLE -X :RANGE OF MOTION

Score	Range of motion	No.of cases	Percentage
20	Arc of motion greater than 100 degrees	22	88
15	Arc of motion between 50 and 100 degree	3	12
5	Arc of motion less than 50 degrees	-	-

In the present series 22(88%) patients were having Arc of motion greater than 100 degrees, 3(12%) patients were having Arc of motion between 50 and 100 degrees and no patients with Arc of motion less than 50 degrees.

Section-3 STABILITY

TABLE -XI : STABILITY

Score	Stability	No. of cases	Percentage
10	Stable	23	92
5	Moderate instability	2	8
-	Grossly unstable	-	-

In the present series 23(92%) patients were having stable elbow, 2(8%) had moderate instability and no patient had gross instability.

Section-4 FUNCTIONAL EVALUATION

TABLE-XII : FUNCTIONAL EVALUATION

Score	Function	No. of patients	Percentage
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

In the present series 22(88%) patients can comb hair, 25(100%) patients can eat, 25(100%) patients can perform hygiene, 23(92%) can don shirt, 25(100%) can don shoe.

14) INTERPRETING THE MAYO ELBOW PERFORMANCE SCORE:

TABLE – XIII : RESULTS

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

In the present series of study the patients with excellent results were 18(60%). 4 cases (16%) with good results, fair results was noticed in 3 cases (28%). No cases seen in poor results.

15. COMPLICATIONS OR DEMERITS OF THIS PROCEDURE :

TABLE - XIV

Complications	No.of Cases	
	No. of Cases	Percentage
Superficial infection	3	12
Symptomatic metal prominence	4	16

The complications of the present study, superficial infection was in 3(12%) patients, which was treated with broad spectrum antibiotics. The symptomatic metal prominence was noticed in 4 (16%) patients.

Discussion

The main aim of the treatment of fracture is not only achieving union but to preserve the optimum function of the adjacent soft tissues and joints. In the management of intra articular fractures like fractures of the olecranon, a perfect anatomical reduction of the fragments to obtain articular congruity and rigid fixation of the fragments is of utmost importance, if early movements are to be instituted to prevent complications like traumatic arthritis and joint stiffness. Tension band wiring with 2 intramedullary Kirschner wires provides the strength of fixation i.e. by converting tensile force to compressive force at the fracture site and for comminuted fractures Olecranon hook plate is used.

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.

1) AGE INCIDENCE :

Table showing average age incidence in various study groups

Series	Average age
1) Jiang Xieyuan (2000) ⁵⁹	38 years
2) Macko Donald and Szabo (1985) ²⁹	35.5 years
3) Present study	40.05 years

The average age incidence; in the present study was found to be 40.05 years. This is well in accordance with the authors Jiang Xieyuan (2000) is his study average age was 38 years and Macko Donald and Szabo California (1985) average age was 35.5 years (15-76 years).

2) SEX INCIDENCE :

Series	Male	Female
1) Jiang Xieyan (2000) ⁵⁹	10(66.66%)	5 (33.33%)
2) Hume &Wiss (1992) ⁶⁰	30(73.17%)	11(26.82%)
3) Wolfgang G. et al (1987) ³⁴	27(60%)	18(40%)
4) Present study	17(68%)	8(32%)

The present study of fracture olecranon revealed greater incidence in males (68%). Similarly male predominance was found in the study of Jiang Xieyuan, Hume and Wiss and Garry Wolfgang et al series.

3) SIDE INCIDENCE :

Series	Right	Left
1) Wolfgang G., et al (1987) ³⁴	25(55.55%)	20 (44.44%)
2) Hume and Wiss (1992) ⁶⁰	16(39.2%)	25 (60.9%)
3) Present study	16(64%)	9(36%)

In this study, the involvement of right side [16 patients (64%)] was seen more frequent than left side. But according to author Wolfgang G. et al, study right side is more and according to author Hume and Wiss left is more.

4) MECHANISM OF INJURY :

Series	No.of cases	Percentage
1) Jiang Xieyuan (2000) ⁵⁹		
• Traffic accident	9	60%
• Fall from height	6	40%
2) Wolfgang G., et al (1987) ³⁴		
• Fall	22	48.88%
• Motor vehicle accident	20	44.44%
• Direct blow	3	6.66%
3) Present study		
• Road traffic accident	13	52%
• Fall from height	11	44%
• Assault	1	4%

In this study, the patients with Road traffic accident were 13 (52%) patients, with Fall from height were 11 (44%) patients and 1 (4%) patient was Assault. Where as according to Jiang Xieyuan series, the patients with traffic accidents were 9 (60%) and patients with fall from height were 6 (40%) and according to Wolfgang et al, 22 (48.88%) patients were fall from height 20 (44.44%) were due to motor vehicle accident 4 (6.66%) were due to direct blow.

5) TYPE OF FRACTURE :

Series	No.of cases	Percentage
1) Jiang Xieyuan (2000) ⁵⁹		
• Oblique fracture	1	6.67
• Comminuted fracture	14	93.34
2) Murphy et al (1987) ^{31,32}		
• Transverse fracture	26	57.5%
• Oblique fracture	12	26.7%
• Comminuted fracture	7	15.6%
3) Present study		
• Transverse fracture	14	56%
• Oblique fracture	6	24%
• Comminuted fracture	5	20%

In the present series 14 (56%) transverse fractures, 6 (24%) oblique fractures and 5 (20%) comminuted fractures. In Jiang Xieyuan study 1 (6.67%) oblique fractures and 14 (93.34%) comminuted fractures. In Murphy et al series 26 (57.5%) transverse fracture 12 (26.7%) oblique fractures 7 (15.6%) comminuted fractures.

6) POSTOPERATIVE COMPLICATIONS OR DEMERITS OF THIS PROCEDURE:

Complications	Present study	Murphy et al ³¹
1. Superficial infection	3 (12%)	-
2. Symptomatic metal prominence	4 (16%)	3 (6.6%)

In the present series 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%) where as complications in Murphy et al³¹ is only symptomatic metal prominence 3 (6.66%).

7) RESULTS :

Study	Results in percentage			
	Excellent	Good	Fair	Poor
1) Murphy et al ^{31,32}	60	10	30	-
2) Jiang Xieyuan ⁵⁹	53.33	40	6.66	-
3) Present study	72	16	12	-

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.

The results in our series is almost accordance with the studies of Murphy et al and Jiang Xieyuan.

Summary

Twenty five cases of fractures of the olecranon treated by Kirschner wire with tension band wiring technique for Transverse and Oblique fractures and Olecranon hook plate for Comminuted fractures at the Chigateri General Hospital and Bapuji Hospital, attached to J.J.M. Medical College, Davangere have been presented. Special attention was made to mobilize the affected elbow early.

A review of literature on fractures of the olecranon has been presented.

The anatomy of the elbow joint with particular reference to olecranon has been discussed in detail.

The principle of tension band has been discussed in detail.

The mechanism of injury, classification of olecranon fractures and management have been described.

Patients were diagnosed as having olecranon fractures on the basis of detailed history and thorough examination. Specific investigations like x-ray, (anteroposterior and lateral view) of elbow in all 25 cases, which helped to confirm the diagnosis. Routine investigation like Hb%, urine routine examination and blood urea, serum creatinine were carried out as and when required.

All patients underwent surgery, various parameters like - age, sex, side involvement, mechanism of injury, type of fracture were analysed.

Surgical procedure (K-wires with tension band wiring or Olecranon hook plate) was carried out in 25 patients.

1. In the present study maximum number of patients were found to be in the age group between 21 to 30 years. (8 patients i.e.32%).
2. There was a significant male predominance in the present study (17 patients 68%).
3. Right side 16(64%) olecranon fracture were more common than left side 9(36%) in the present study.
4. In the present study road traffic accident 13(52%) was more common than fall from height 11(44%).
5. In the present study 20 (80%) patients were transverse fractures and oblique fractures, 5 (20%) patients were comminuted fractures.
6. All the patients were operated between 2-10 days with an average period of 3.48 days after the injury.

All the cases were followed up and findings have been recorded regularly. Results were analysed according to Mayo elbow performance score. Excellent results were achieved in 72%, good results in 16% and fair results in 12%. There were no poor results.

The complications like superficial infection and symptomatic metal prominence were noticed in 3 and 4 cases respectively, which were treated accordingly.

Declarations

Ethics: It is pleased to inform that the study entitled Clinical study of management of Olecranon fracture had been approved by JJM medical College ethics committee.

Competing Interest: The authors declare no competing interests.

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Figures

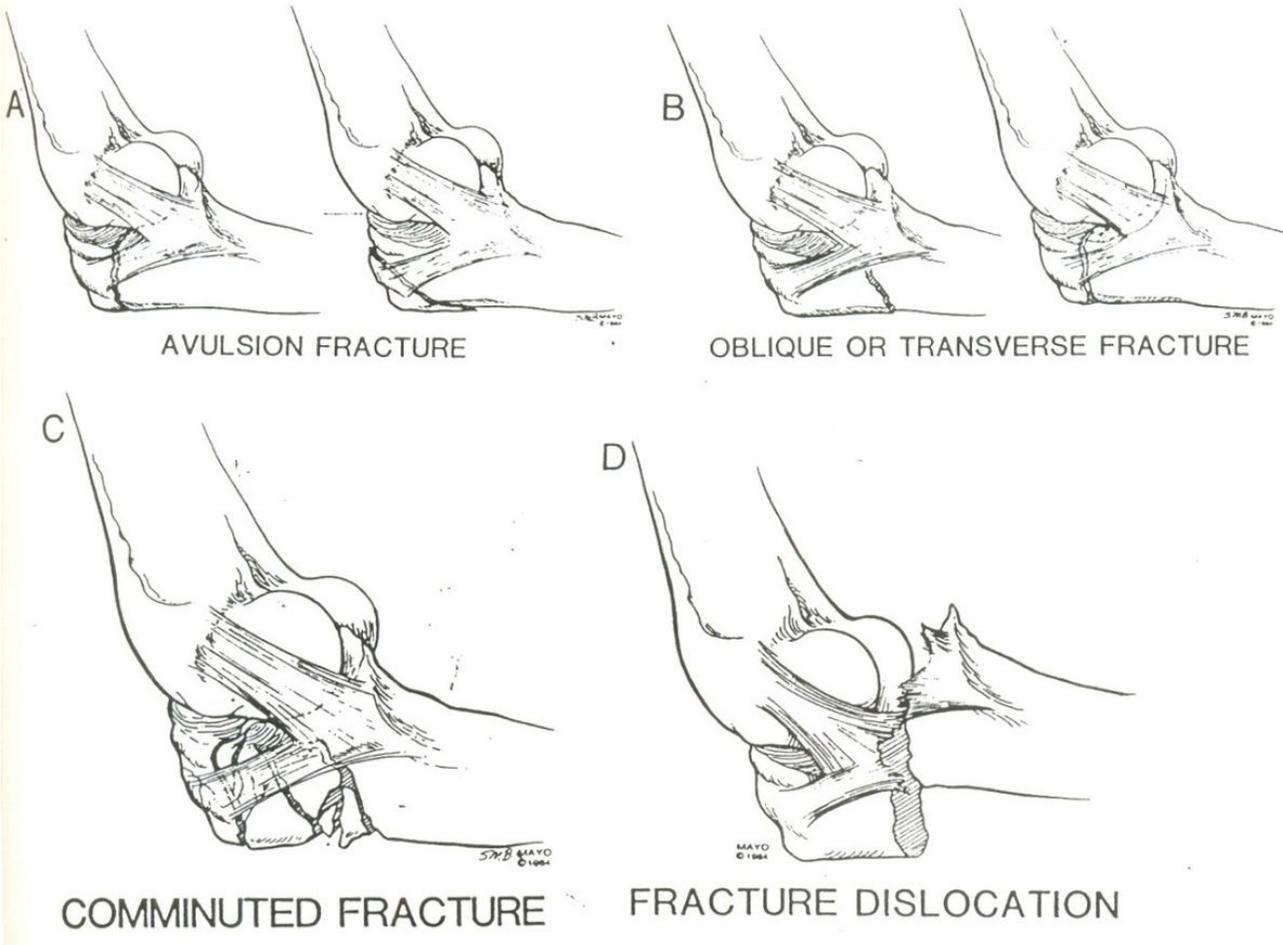


Figure 1

Fig.9 : Olecranon fractures taken for study

Mayo elbow performance score (MEPS) ¹¹	
Section - 1 Pain Intensity	45
None	45
Mild	30
Moderate	15
Severe	-
Section - 2 Motion	20
Arc of motion greater than 100 degrees	20
Arc of motion between 50 and 100 degrees	15
Arc of motion less than 50 degrees	5
Section - 3 Stability	10
Stable	10
Moderate instability	5
Grossly Unstable	-
Section 4 - Function (Tick as many as able)	25
Can comb hair	5
Can eat	5
Can perform hygiene	5
Can don shirt	5
Can don shoe	5
Total	100

Fig-1. Interpreting the Mayo Elbow Performance Score			
Score greater than 90	Score 75-89	Score 60-74	Score below 60
Excellent	Good	Fair	Poor

Figure 2

See image above for figure legend



Figure 3

Fig- Instruments



Figure 4

Lateral positioning of patient



Figure 5

Skin incision posterolateral approach



Figure 6

Exposure of fracture site

Figure 7

Fracture reduction

Figure 8

Transverse drilling for cerclage wire

Figure 9

Cerclage wire passed through drill hole

Figure 10

K-wires through tip of olecranon

Figure 11

Application of tension band wiring in figure
of eight manner

Figure 12

Wound closed in layers

Figure 13

Skin closure

Figure 14

See image above for figure legend

Figure 15

See image above for figure legend

Figure 16

See image above for figure legend

Figure 17

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Figure 18

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Figure 19

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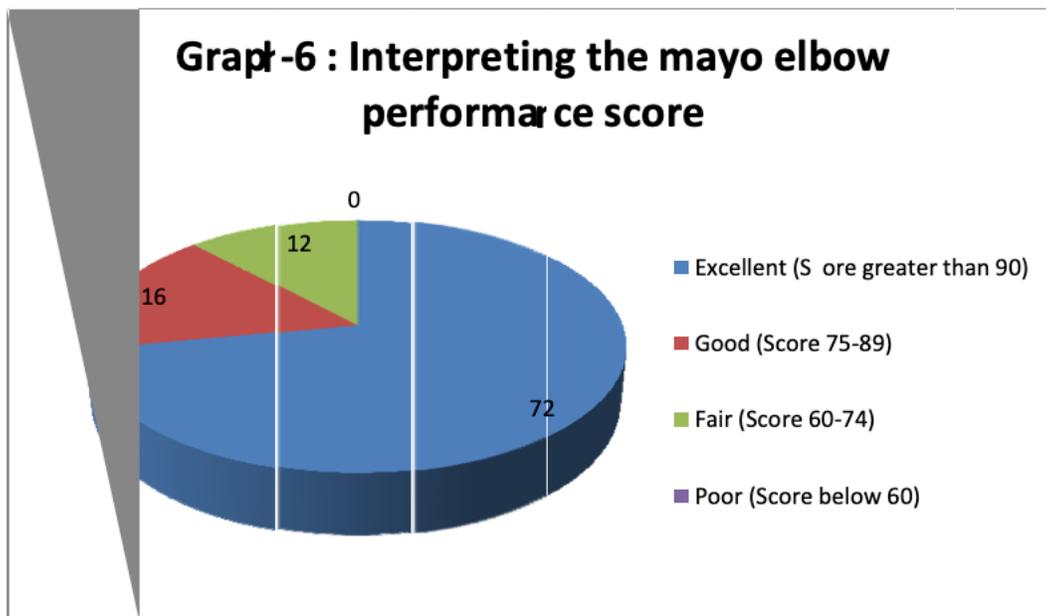


Figure 20

See image above for figure legend

Supplementary Files

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