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A study of the Surgical Outcome Of Intercondylar Fractures Of Distal Humerus Treated With Orthogonal Plating

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Abstract

Distal Humerus fractures are commonly multifragmented and have complex anatomy with limited options for internal fixation. A painless, stable and mobile elbow joint is desired as it allows the hand to conduct the activities of daily living. Few studies have evaluated the functional outcome of orthogonal plating of these articular fractures

Objectives

This study was conducted to evaluate the surgical outcome of intercondylar fractures of the distal humerus treated by orthogonal plating by using the Mayo Elbow Performance Score

Materials and methods

A total of 20 cases were treated by ORIF with orthogonal plates and screws to distal humerus and the MEPS was calculated at 3 months and at 6 months and compared from June 2019 to May 2021.

Results

In our study maximum incidence was in the young population and RTA was the most common mode of injury. At 3 months the majority of the patients (89%) had a fair score and at 6 months this improved and 90% had an excellent score. The average mayo elbow score at 3 months was 65.5 and median was 65, at 6 months average score was 96 while median score was 100. At 3 months the majority of the patients (70%) had a range of motion of 50 to 100 degrees which subsequently improved and at 6 months 80% of the patients had greater than 100 degrees of range of motion.

Conclusion

Orthogonal fixation of intercondylar fractures of the humerus is a safe and viable modality of treatment for these fractures

Keywords: NIL

Introduction

Distal Humerus fractures remain some of the most challenging injuries to manage. They are commonly multifragmented and have complex anatomy with limited options for internal fixation. Treatment outcomes are often associated with elbow stiffness, weakness and pain.

A painless, stable and mobile elbow joint is desired as it allows the hand to conduct the activities of daily living.

Therefore starting with a highly traumatized distal humerus and managing with a stable, mobile and pain free elbow requires a systematic approach.

Thought is required in determining the operative indications, managing the soft tissues, selecting a

surgical approach, obtaining anatomic articular reduction and creating a fixation construct that is rigid enough to tolerate early range of motion.

In young adults, the fractures are typically caused by high-energy injures, such as motor vehicular collisions, falls from height, sports, industrial accidents, and firearms. In contrast, greater than 60% of distal humerus fractures in the elderly occur from low-energy injuries, such as a fall from a standing height.

Methods

During the study period of June 2019 to October 2021, 20 patients with intercondylar fractures of distal humerus were studied at the Department of Orthopedics at Kempegowda Institute of Medical Sciences, Bangalore. Written and informed consent was taken. All the patients underwent ORIF with orthogonal plates and screws to distal humerus and were assessed post operatively based on the Mayo Elbow Performance Score. Regular OPD follow up was done on 2 weeks, 6 weeks, 12 weeks, and 24 weeks. The range of age was between 23 years to 68 years and the average age was 45.9 while the median age was 41.5. The maximum incidence was noted in the young age group (18 to 40). The male to female ratio was 1:1.86.

Left sided involvement was more common. 80% of the patients presented due to an alleged history of RTA.

Surgical Procedure

The patient was placed in the lateral decubitus position or the prone position. Using a midline incision, with or without a curve over the tip of the olecranon, the ulnar nerve is dissected free from the medial edge of the triceps and from the medial epicondyle. The vascular structures that supply the ulnar nerve is preserved. Laterally, the triceps is dissected off the lateral intermuscular septum. The joint is exposed by incising the interval between the triceps and anconeus muscles. Ensure that the medial and lateral olecranon articular surface can be seen. A distally oriented chevron osteotomy is made with an oscillating saw directed toward the sulcus of the articular surface of the olecranon. Using an osteotome the osteotomy is carefully completed. The triceps is raised with the proximal olecranon and the triceps musculature is directed off the humerus, preserving the periosteum. Using threaded Kirschner wires as joysticks to manipulate the medial and lateral condyles the fracture is reduced and a Weber clamp and Kirschner wires are used for provisional fixation. Reconstructing the articular surface “around the clock,” we provisionally fix the reconstructed fragments, and reduced the remaining condyle to the shaft and applied plate fixation having ensured that the screws do not cross the articular surface. We then repaired the olecranon osteotomyand close the incision in layers.

Fig 1-Surgical Incision

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Fig 1.2A - Identification of the Ulnar Nerve

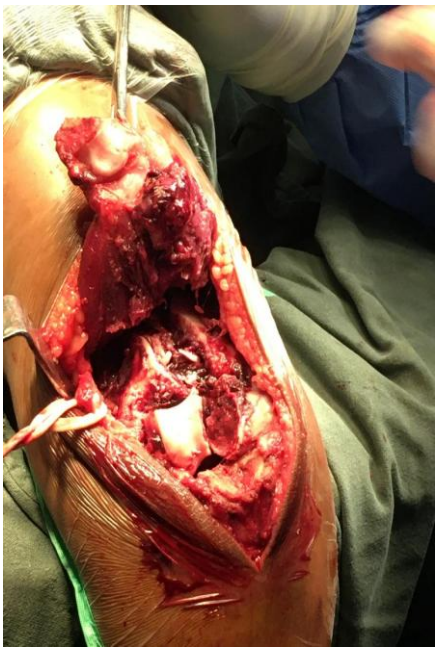

Fig 1.2B - Identification of the Ulnar Nerve

Fig 1.3A - Provisional Fixation with K Wires

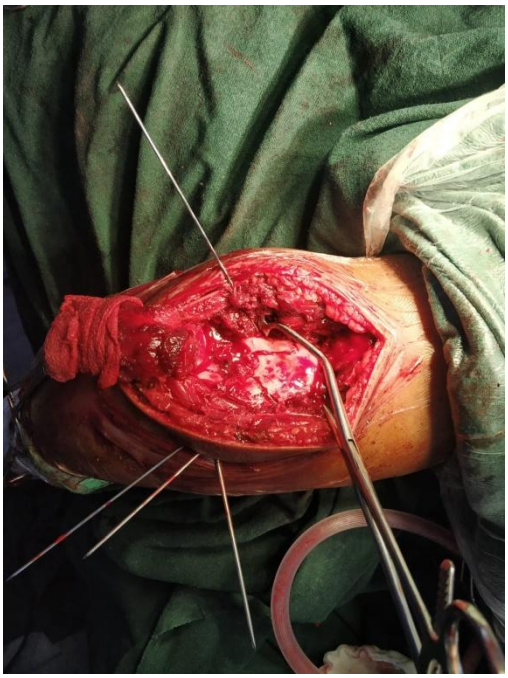

Fig 1.3B - Provisional Fixation and Introduction of the plate

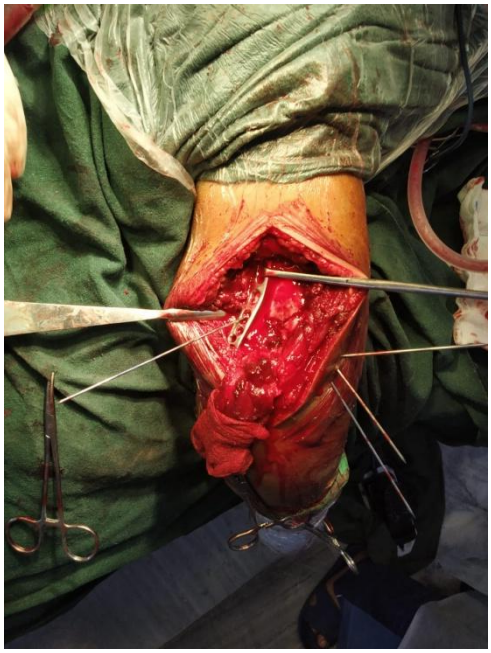

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Fig 1.4A - Final Fixation with locking plates in orthogonal technique

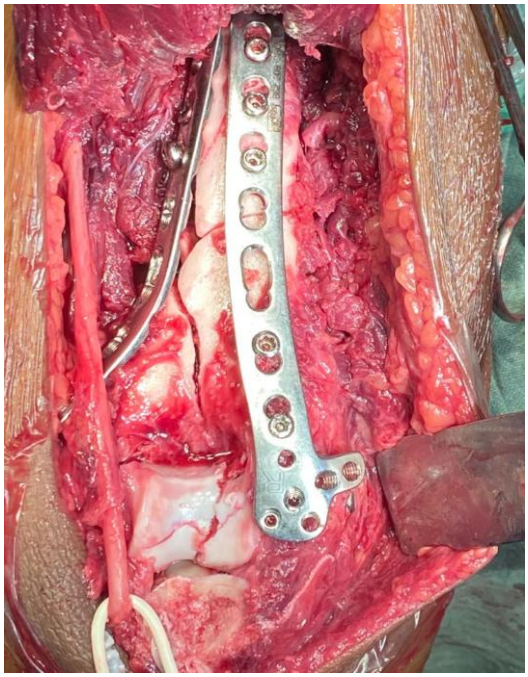

Fig 1,4B - Final Fixation of the fracture

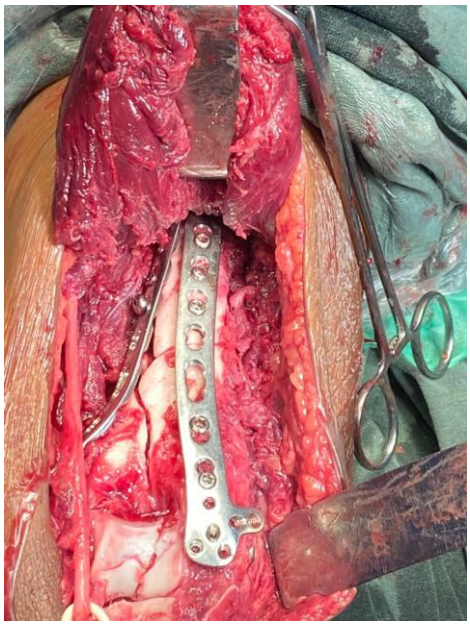

Fig 1.5 - Wound Closed in Layers

Results

This study consists of 20 cases of intercondylar fractures of the distal humerus treated by open reduction and internal fixation with orthogonal plating. Maxium incidence was noted in the young age group (18 to 40 years). Left sided involvement was more common and the fracture was found to be more common in females. The most common mode of injury was found to be road traffic accidents. The Mayo Scores were charted as follows.

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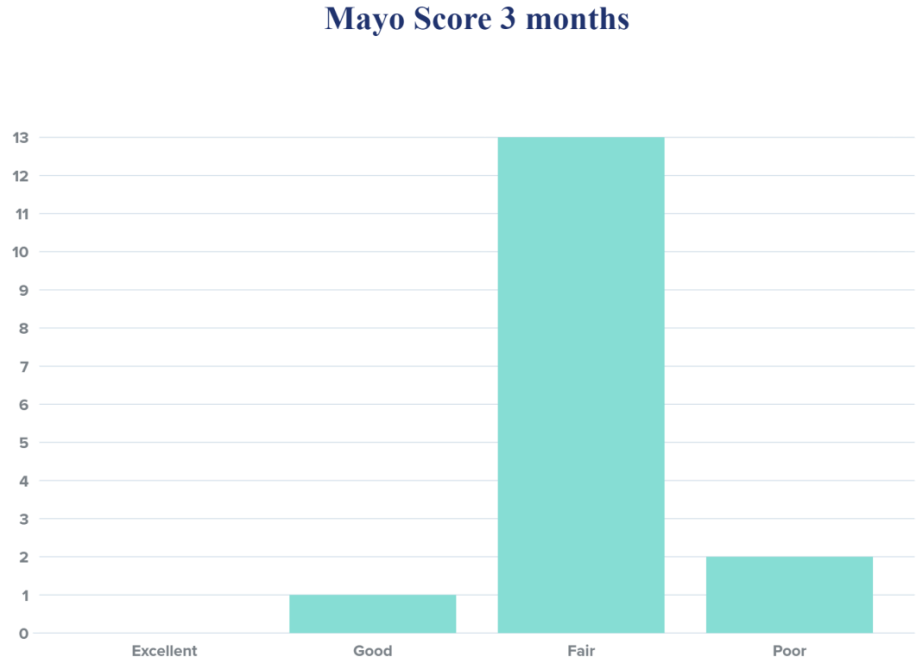
Table 1- Mayo Scores

Mayo Score	3 Months	6 Months
Excellent (>90)	0	18 (90%)
Good (75 to 89)	2 (10%)	2 (10%)
Fair (60 to 74)	16 (80%)	0
Poor (<60)	2 (10%)	0



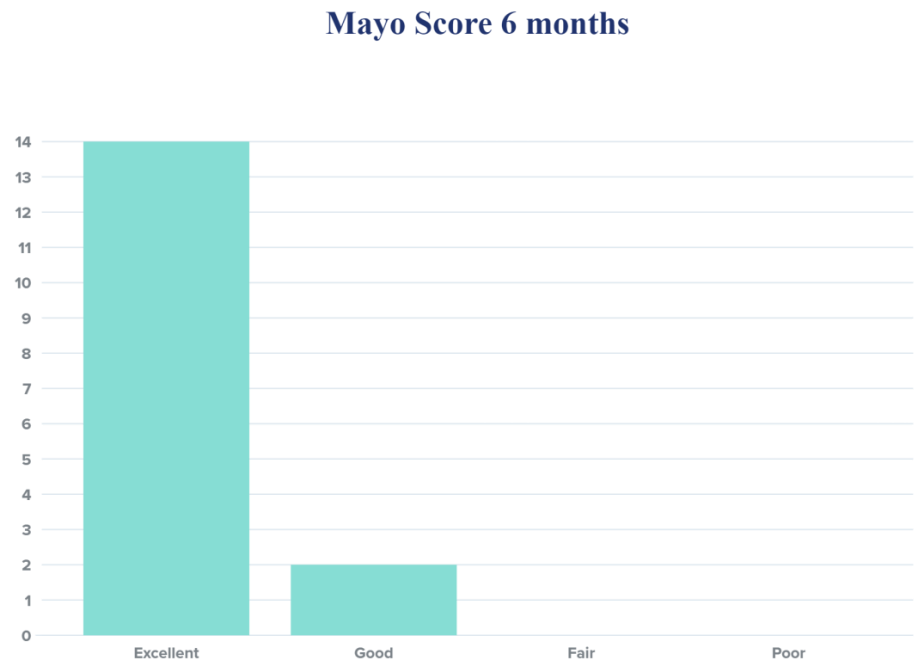


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Table 2.1 – Range of motion

Range Of Motion	3 Months	6 Months
>100 degrees	5 (25%)	16 (80%)
50 to 100 degrees	14 (70%)	4 (20%)
<50 degrees	1 (5%)	0

Table 2.2 – Functional Outcome

Functional Outcome	Able to do Comfortably at 3 months	Able to do comfortably at 6 months
Able to comb hair	9/20 (45%)	17/20 (85%)
Able to feed oneself	12/20 (60%)	20/20 (100%)
Able to perform personal hygiene tasks	14/20 (70%)	20/20 (100%)
Able to put on shirt	10/20 (50%)	18/20 (90%)
Able to put on shoes	12/20 (60%)	20/20 (100%)

Discussion

In our study 20 patients with intercondylar fractures of the distal humerus were treated with open reduction and internal fixation with orthogonal plates. These patients were then subsequently immobilized with plaster of paris for 3-4 weeks. This was followed by physiotherapy and elbow range of motion exercises. In our study the average age was 45.9 and the median age was 41.5.

In our study we noticed a female predominance with male to female ratio of 1:1.86 with left sided involvement being more common. The most common mode of injury in our study was road traffic accidents with 16 (80%) patients and 4 (20%) patients had a history of self-fall. Mei ZF et al[5] found that such fractures treated with orthogonal plating with olecranon osteotomy provided good fracture union and functional results. Zhong XY et al[4] found that rigid fixation, and early functional exercise is important for successful operation and satisfactory functional recovery in intercondylar fracture of the humerus. In their study Santosh Thappa[15] et al found 8 patients (44.44%) obtained excellent results, 7 (38.89%) had good results and 3 (16.7%) had fair

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results with the average mayo elbow score being 83.33. In their study Neetin P Mahajan et al[16] they found 13 patients (37.14%) had excellent outcome, 17 (48.58%) had good outcome, 4 (11.42%) had fair outcome and 1 (2.86%) had poor outcome. Shin SJ et al[2] in their study compared perpendicular to parallel plating and of the 17 patients treated by perpendicular plating the average arc of motion was 106 degrees +/- 23 degrees. In our study 2 patients (10%) had a mayo elbow score of good while 16 patients (80%) had a score of fair and 2 patients (10%) had a score that was poor at 3 months. This subsequently improved and at 6 months 18 patients (90%) had an excellent mayo elbow score and 2 patients (10%) had a good mayo elbow score. The average mayo elbow score at 3 months was 65.5 and 96 at 6 months

Conclusion

This study was conducted to evaluate the functional outcome of intercondylar fractures of the distal humerus treated with open reduction and internal fixation with orthogonal plating with olecranon osteotomy. We conclude that

Intercondylar fractures were common in younger patients between the ages of 18 to 40 years

Road traffic accidents was the most common cause of injury

In our study females were more susceptible to these fractures

Left sided fractures were more common

The surgery is technically challenging. Olecranon osteotomy, anatomic reduction of the fracture and stable fixation with orthogonal anatomical locking plates is key to obtaining excellent fracture union

The procedure has shown excellent results in terms of fracture union

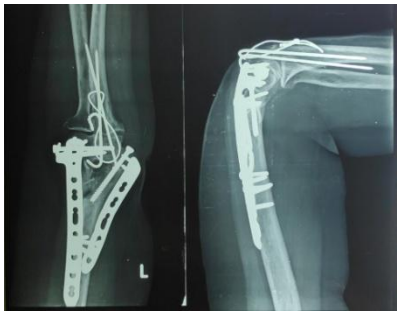
Early and adequate physiotherapy plays a very important role in restoring elbow range of motion and is required to gain a good functional outcome.

Orthogonal fixation of intercondylar fractures of the humerus is a viable modality of treatment for these fractures.

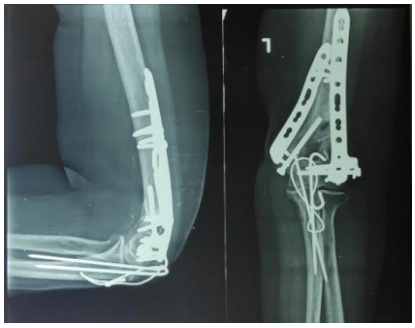
Sample Case 1

Pre op

Post Op



Follow up 6 weeks



Follow up 12 weeks

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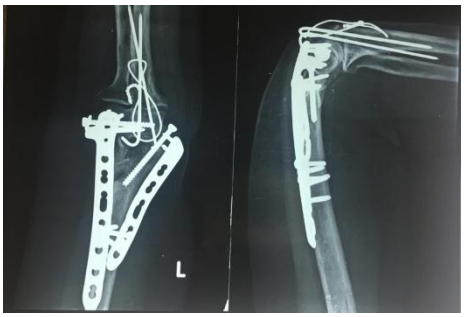

Follow up 24 weeks

Flexion at 6 months

Extension at 6 months

Sample Case 2

Pre op x ray

Post op x ray **Follow up 6 weeks**

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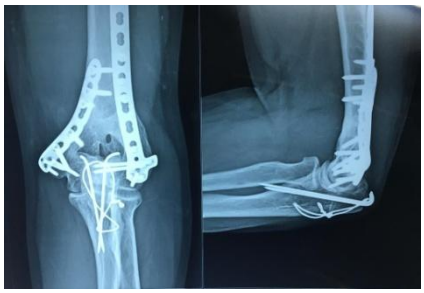
Follow up 12 weeks



Follow up 24 weeks

Flexion at 6 months

Extension at 6 months

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