

**LONG TERM OUTCOME OF SURGICAL MANAGEMENT OF INTERCONDYLAR FRACTURE OF HUMERUS**Ravikant Das<sup>1</sup>, Arunesh Singh<sup>2</sup>, Pranay Shrivastava<sup>3</sup>, Atul Manoharrao Deshkar<sup>4</sup>**HOW TO CITE THIS ARTICLE:**

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**ABSTRACT:** Distal humeral fractures are relatively difficult fractures to treat. It is essentially an intra-articular fracture and accurate reduction and rigid internal fixation is a rule. Even in the best hands the results vary greatly. The treatment of fracture is like solving a jigsaw puzzle. **PURPOSE OF THE STUDY:** The purpose of the study was to analyze the outcome of surgically managed cases of displaced intercondylar fracture humerus operated between December 2003 to 2014. It was retrospective analysis where we compared and assessed result to find out the ideal time of surgery, best approach to the management of this fracture and physiotherapy program to be followed. **MATERIALS AND METHODS:** We included 48 cases of fracture intercondylar humerus operated at Chhattisgarh Institute of Medical Sciences, Bilaspur. The mean age of the patient was 38 ( $\pm 12$ ). The ratio for male to female was 2:1. We operated most of these cases within one week from trauma. The patients were evaluated by the Aitken and Rorabeck criteria. **RESULTS:** Analysis on the basis of activities of daily living revealed that outcome was excellent in 31.2% cases was good in 41.6% cases. The outcome was fair in 14.5% and only 12.5% cases exhibited poor performance in activities of daily living postoperatively. **DISCUSSION:** Transolecranon approach is an extensile approach and gives trouble free exposure. Plates can be applied on the posterior surface of the humerus with little difficulty and provides good results. A delay in the surgery for more than 3 weeks would definitely compromise results. Starting physiotherapy within 3-4 weeks postoperatively yields better results and are without chances of fixation failure.

**KEYWORDS:** Intercondylar fracture, Olecranon osteotomy approach, Physiotherapy.

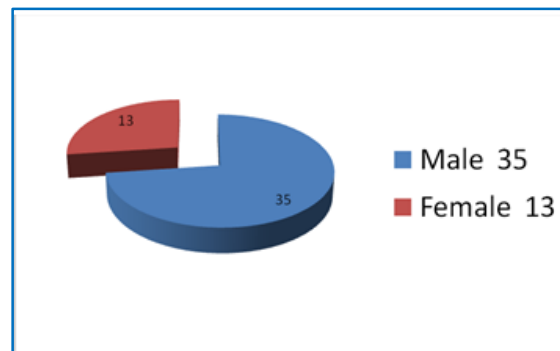
**INTRODUCTION** Intercondylar humerus fractures are supposedly uncommon injuries, but recent times have witnessed rise in the incidence rates. Whenever they occur the outcome is always uncertain. There is a wide range of management options mentioned in the literature; from non-surgical management to extensive surgery.<sup>1</sup> In the conservative management, there are high chances of developing pseudoarthrosis leading to poor outcome. Operative management has become need of the hour except in those unfit for surgical procedure or with undisplaced fracture.

The intercondylar fracture is one of the most difficult fractures to operate upon. The fracture fragments are very small and appears to be pieces of a jigsaw puzzle. If precise reduction of even a single fragment is not achieved, further reduction of other fragments is compromised leading to malalignment and poor outcome. The elbow joint is a very unforgiving joint and even small malalignments results in severe range of movement restrictions and painful elbow. In fact, the difficulty level is such that the literature unanimously describes it as one of the most challenging and complicated fractures to operate upon.

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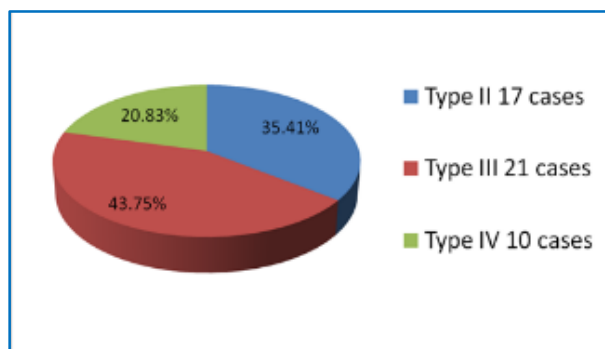
**MATERIALS & METHODS:** We observed data of Ninety eight patients who had suffered fracture intercondylar humerus from December 2003 to 2014. We excluded sixteen patients who either refused for operation or were unfit for surgical procedure after preanesthetic checkup. Those with undisplaced fracture were also excluded from study. Fourteen patients who did not complete at least 3 months follow up were excluded from the study. Eventually the study comprised of 48 operated patients who completed a follow up of at least three months. The patient's age varied from 17 to 65 years. Thirty five patients were male and thirteen were female. Most of these patients were operated within one week of the injury barring few who reported as late upto six weeks.

We followed Riseborough and Radin Classification,<sup>2</sup> in our study which describes undisplaced fracture in Type I category. Those with displaced and with separation of condyles from the shaft without rotation of the condyles were in Type II while rotational displacement of condyles were categorized as Type III. Severe comminution of the articular surface with wide separation of condyles were falling in Type IV.



**Fig. 1: A Pie Chart Showing Distribution of Male and Females in Study**

Type I cases of undisplaced fracture were excluded from our study, but all the other three types were included in the study. Around 35.41% patients (17 cases) were in Type II while 43.75% cases (21) were categorized in Type III of Riseborough and Radin classification only 20.83% (10 cases) were in Type IV of the classification. The result of our study is displayed in Table number.



**Fig. 2: A Pie Chart Showing Distribution of the Patient Categorization of Patients as Per Riseborough and Radin Classification**

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All the patient were operated upon by the same surgeon, the corresponding author. In all cases the lateral position was used with the arm folded upon a pillow, a tourniquet and. Olecranon osteotomy approach was used. The osteotomy was either transverse or chevron randomly. Anterior transposition of the nerve had to be done in eight cases where the nerve was found contused or the hardware was impinging or was suspected to impinge the nerve. In most of the cases, a recon plate 3.5 mm was applied over the posterior humeral surface of both pillars. Other implants depending upon the type of fractures were also used. The osteotomies were fixed by single CC screw with washer wherever narrow snugly fitting ulnar medullary cavity was present and in others a tension band wiring was used.

Post operatively, an above elbow posterior plaster splint was given in all patients and shoulder exercises were begun as early as third day of surgery. The elbow mobilization (active range of movement exercises and pronation – supination exercises) was started intermittently as early as 2-3 weeks in patients wherein an anatomical reduction and rigid fixation was obtained and the bone quality was good. In all these patients the splint was discarded at 4-6 weeks after assessing union clinically and radiologically. Rigorous physiotherapy program was initiated. In patients with poor bone quality the elbow mobilization was deferred till 6-8 weeks and intermittent posterior splintage was continued till 10 to 12 weeks of surgery.

The results were evaluated by the Aitken and Rorabeck<sup>3</sup> criteria which takes into consideration the range of movement, pain and activity level. The results were evaluated at the end of 3 months from the day of surgery.

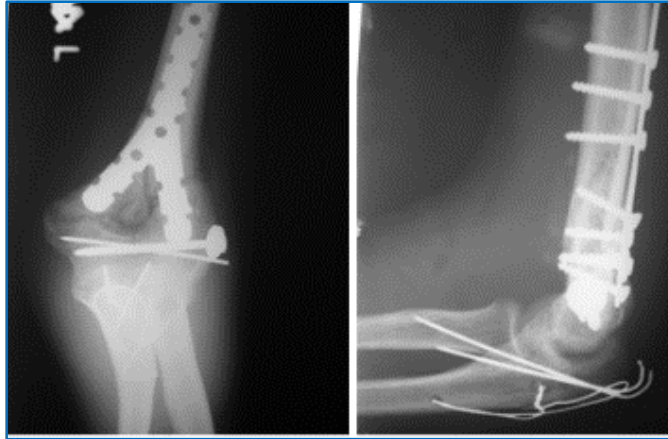
We followed Aitken and Rorabeck criteria for evaluating patient's outcome, depending upon arc of flexion, activity and pain. Those graded as excellent were having arc of flexion more than 110° with no limitation of activity and no pain while in Good category range of motion was between 75° to 110° with activities of daily living with minimal pain. The results were fair if it is between 60° to 74° with activities of daily living with mild pain requiring occasional analgesics. The poor category was with range less than 60° and arm used as prop with constant pain.

**OBSERVATIONS & RESULTS:** Analysis on the basis of activities of daily living revealed that outcome was excellent in 31.2%cases was good in 41.6%cases. The outcome was fair in 14.5% and only 12.5% cases exhibited poor performance in activities of daily living postoperatively.



**Fig. 3: Pre-Operative X ray picture of the Patient (17 years Male) with a Comminuted Intracondylar Fracture with Intercondylar Extension**

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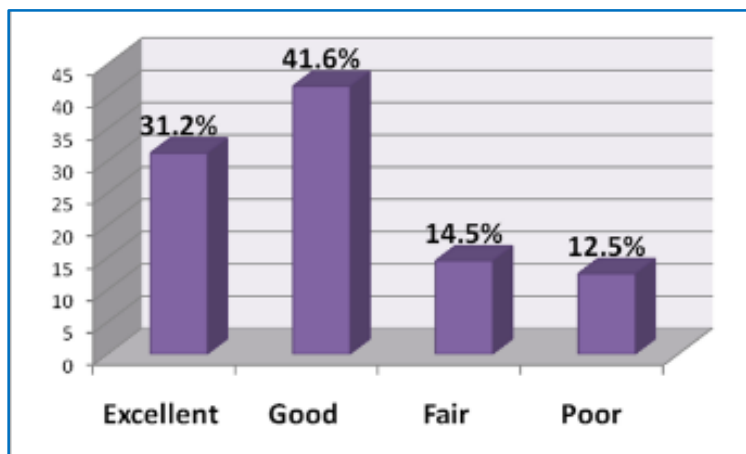
**Fig. 4: Post-Operative X rays wherein an Anatomical Reduction was achieved and a Y plate was put in and the Osteotomy Secured with Tension Band Wiring**

The operative approach was extensile and provided full view of the field and caused no problems in hardware placement. There was no osteotomy non-union and all osteotomies healed well. The range of movement obtained with the osteotomies fixed with Cannulated Cancellous screws was same as that obtained with the Tension Band Wiring.

There were two cases of infection both of which showed poor results and painful elbow. One of them landed up in non-union and had to be taken for implant removal and debridement. The other united after 16-20 weeks and then implant was removed. However, both of them showed poor results with painful restricted movements.

A case of ulnar nerve injury which managed conservatively and recovered spontaneously and completely after six months and another of injury with radial nerve recovered only partially. A patient aged 62 years had fixation failure at 3 months and had to be re-operated using locking plates. All these patients had poor Aitken scores.

We did not encounter heterotrophic ossification.



**Fig. 5: Chart Showing Analysis of the Outcome on the Basis of Activities of Daily Living in Four Category**

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**DISCUSSION:** The patients operated early showed better results when compared with those operated late. The patients were operated as late as 3 weeks showed less range of post-operative movement and poor outcome than those who were operated earlier.

Rigid fixation and anatomical reduction is the key to good result. The results obtained were much inferior in the elderly with osteoporotic bone where in one case landed up with loss of fixation and in others the physiotherapy had to be delayed for the same reason leading to poor outcome.

The transolecranon approach is a good extensile approach with few difficulties and provided an excellent view of the intra-articular fragments and optimum space for implantation. When compared it was easier to fix the chevron osteotomy than to fix the transverse osteotomy. However, the end results were not affected by the type of osteotomy. We recommend, a single CC screw with washer fixation of osteotomy whenever narrow ulnar medullary cavity is present.

Pajarinen et al in 2002 used olecranon osteotomy approach<sup>4</sup> and it was also recommended by David Ring et al in 2004 in their study on 45 consecutive patients<sup>5</sup> with distal humeral fractures.

It is relatively easier to put plates on the posterior surface of the distal humerus on both the columns without any compromise in the results than to put it on the medial or lateral sides. A battery operated power drill, a pointed reduction forceps and plate side bender are very useful tools for the procedure. The drill ensures easy maneuverability of wrist due to its light weight and being sessile. Henley et al also reported good or excellent results in 33 intercondylar fractures treated with ORIF.<sup>6</sup>

In other studies Gabel et al and Helfet et al also obtained good or excellent results in 90% and 75% of cases respectively with ORIF when done by experienced surgeon.<sup>7</sup>

We observed that a delay in the surgery for 3 weeks or more yields inferior results. We recommend that surgery should be performed as early as possible after the reduction of swelling. Physiotherapy should be started as early as 2-3 weeks intermittently and rigorous physiotherapy should be started after 4-6 weeks after removal of all splintage for best results. A delay in starting physiotherapy would lead to restriction of range of movements. Rigorous physiotherapy may be delayed in elderly osteoporotic patients till X rays show signs of union.

It can be concluded from the present study that early mobilization whenever possible and the use of olecranon osteotomy approach yields the best result.

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