

Outcomes of Modalities of Treatment of Intra Articular Fracture of Distal Humerus in Adults



Medical Science

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ABSTRACT

Supracondylar intraarticular fractures of the distal humerus, because of their rarity and often associated significant displacement, comminution and osteopenia, present as a challenge. We have reviewed functional results obtained in a prospective study of 40 cases treated by closed or open reduction and internal fixation. Outcome was assessed by Mayo's elbow performance score. Excellent and good results are obtained in 90% of patients. Paraticeps approach used more commonly which involves minimal soft tissue damage and minimal damage to osseous vascularity though cassabaum approach gives good exposure in articular comminution. Rigid internal fixation is best accomplished by bipillar plate fixation and for optimal biomechanical stability both plates should be placed at right angle to each other. Post operative physiotherapy is most vital part.

Introduction:

"No injury of the elbow is more difficult to treat than intercondylar fracture of humerus."

Sir Watson Jones

In the last 20 years, advances in the science of fracture care have had a dramatic effect on the care of a difficult class of fractures. The injured elbow joint presents more difficulty than almost any other because it really is three joints that move synchronously. Distal humerus fractures are uncommon injuries that account for fewer than 2%⁹ of all adult fractures, the complex shape of the elbow joint, the adjacent neurovascular structures and the sparse soft tissue envelope combine to make these fractures difficult to treat. The functions of elbow joint are essential for performing day to day activities, which require the hands to reach the midline of the body such as dressing, eating and combing hairs. This exact and demanding precision is frequently disturbed by inter condylar fracture which always results in loss of a few degree motion of the elbow regardless of any modalities of treatment. Bicondylar intraarticular fractures of the distal humerus, because of their rarity and often associated significant displacement, comminution and osteopenia, present the orthopaedician with a difficult injury to treat successfully. Treatment, both surgical and non surgical has been associated with a high rate of complications and poor outcomes, when compared with other injuries.

The principle of anatomic restoration of articular surface, stable fixation and early motion are the optimal treatment goals. Recent treatment supports these goals and early postoperative active mobilization. By adhering to this protocol the literature supports this as the most reliable view for a good result. The availability of new implants, like precountoured anatomical plate for both pillars, however, has increased the reliability of operative stabilization, while placing additional demands upon the surgeon's expertise.

Objective: In this paper, we have reviewed the functional results obtained in a series of supracondylar intraarticular fracture of the distal end of humerus treated by closed or open reduction and internal fixation

Material and Methods: A prospective study of 40 cases of supracondylar intercondylar fracture of lower end of humerus was studied. All were operated in orthopedic department, civil hospital, Ahmedabad from July 2009 to January 2012. A complete clinical examination was carried out. All patients were operated by closed method or by open method using paraticeps¹ or cassabaum's² approach. Evaluation of results was done by Mayo's elbow performance score⁶.

The maximum incidence was recorded in 5th decade of life. Average age is 44 years and range is 22-75 years with 28 male and 12 females. Incidence was higher in male patients. 21 fractures involved left elbow and 19 the right. 60% have fracture due to road traffic accidents (RTA) and high energy impact. Majority of patients presented in the hospital within 24 hrs. 36 fractures were closed and 4 are open. Among open fractures 2 were Gustillo Anderson³ grade- 2, 1 grade-1 and 1 grade-3 injuries. 70% was falling in type-2(30%) and type-3(40%) grading of Riseborough and Radin (R-R) system⁸. Statistical analysis were done using students-t test.

Operative techniques⁷: We routinely done ORIF in 85% except when skin condition would not permit or open fractures (15%). We routinely used tourniquet in all patients and deflated after one hour. We routinely used a dorsal incision in the lateral position with the patient lying on the side opposite the involved extremity the shoulder in 90° abduction elbow 90° flexion on well padded support. The Ulnar nerve routinely was identified and tagged. Anterior transposition of the Ulnar was not needed in any patients. Internal fixation typically was achieved in 2 steps: (1) anatomic reconstruction of the humeral joint surface by a transverse Kirschner wire followed by a 4-mm cancellous bone lag screw if there is no articular comminution or 3.5mm cortical screw if there is articular comminution to prevent width of trochlea (2) reattachment of the joint block to the metaphysis using a dorsally applied 3.5-mm reconstruction plate or dynamic compression plate on the radial column and a 1/3 tubular plate on the crest of the ulnar column at a right angle to the radial plate. We also used precountoured anatomical locking plate that is available separately for right and left side for medial pillar placed medially and for lateral pillar placed posteriorly. Intercondylar screw can be inserted through lateral locking plate. The olecranon usually was fixed with tension band wiring. Closure was done routinely with suction drain. Posterior splint is applied.

Results:

APPROACH USED FOR OPERATION

In our study in 55% patient we have done ORIF through paraticeps approach and in 30% of patient ORIF done through cassabaum approach in our series.

IMPLANT USED FOR INTERNAL FIXATION

In our study we have fixed 85% of fractures with bipillar plating (15% fix with pre countour anatomical plate) and 15% of fractures fixed with wire /cancellous screws.

POST OPERATIVE MOBILIZATION

Started at 1 week in 47.5%, at 3 weeks in 37.5% and at 6 weeks in 15%.

COMPLICATIONS

7.5% of patients have complications following surgery, among them 5% developed infection of wound and healed by daily dressing and antibiotics. No patients have non union and mal-union and 2.5% patient had implant failure.

RANGE OF ELBOW MOTION AT LAST FOLLOW UP

Range of motion (flexion-extension) are excellent (>100°) in 40%, fair (60° to 100°) in 37.5% and poor (<60°) in 22.5%. Pronation and supination movements is excellent (>60°) in 25% patients and fair (60°-30°) in 57.5% and poor (<30°) in 17.5%.

OBJECTIVE EVALUATION OF RESULTS

According to criteria given by MAYO'S ELBOW SCORE

In our study results are excellent in 52.5% of patients, good in 37.5% of patients, fair in 2.5% of patients and poor in 7.5% of patients.

Discussion:

With better understanding of surgical anatomy, and biomechanics of elbow joints, the development of new implants and improved surgical techniques have improved the results of operative treatment of intercondylar fractures. Even with modern available operative facilities the management of intercondylar fractures has been an enigma for an orthopedic surgeon because the achievement of perfect articular congruity is difficult. The problem is further compounded by complex anatomy of the distal end of humerus, which produces more fracture comminution and to less acceptance of implant. This leads to an inevitable restriction of elbow movements at varying degrees.

The aim of the discussion is to analyze the results of operative management of intercondylar fracture humerus and difficulties associated with it. We had compared results and present series of cases with Jupiter⁴ and John⁵ series.

Average age in all series is 5th and 6th decade. This suggests that intercondylar fractures are more common in middle and old age patients. This is because of osteoporosis of bone, weakened metaphyseal bone and poor bone stock and this is easily caused by minor trauma like fall on elbow. In present series incidence increased in younger age group due to increased RTA. In past series fall was more common mode of injury while in present series RTA is more common mode of injury. In past and present series more common fracture type is 3. Incidence of Ulnar nerve palsy, myositis ossificans, infection, nonunion, implant failure are more common in past series than present because of improved expertise and familiarity with approach, less soft tissue dissection, early active mobilisation, rigid internal fixation with locking plate and 90°-90° plating⁷. Fair and poor results are more common when injury to operative interval is more than 24 hour because of subsequent soft tissue fibrosis leads to increased risk of joint stiffness and infection

RESULTS (Table-1)

TABLE-1 RESULTS

Series	Total	Excellent	Good	Fair	Poor
Jupiter	34	18	8	6	2
John	49	21	21	7	0
Present series	40	21	15	1	3

Excellent and good result are more common in R-R type 1 and 2 while fair and poor result are more common in R-R type 3 and 4 because of articular comminution leading to poor fixation and more immobilization.

APPROACH V/S RESULT (Table-2)

TABLE-2

APPROACH V/S RESULT

Approach	Cases	Excellent	Good	Fair	Poor	T Score
Closed	6	2	4	1	3	<0.05
Paratriceps	22	13	7	-	-	>0.05
Cassabaum	12	6	4	-	-	>0.05

In our series there is good functional outcome in paratriceps compared to cassabaum but it is not statistically significant though in our experience paratriceps approach involves minimal soft tissue damage and minimal damage to osseous vascularity and Cassabaum approach gives good exposure in articular comminution R-R type 4. In our series fair and poor results are in k-wire/ccs because of open fractures and prolonged immobilization. All patients in whom precountour anatomical locking plate was used had excellent results and no complication. All patients operated by cassabaum's approach and k-wire/ccs have complaint of painful hardware. 95% patients in our series have restricted terminal extension of elbow regardless of modality of treatment.

Conclusion: 40 cases of supracondylar intercondylar fractures of distal humerus in adults were included. Fractures are more common in middle and old age group patients and old age is not a contraindication for operative treatment. Riseborough and Radin type 3 & 4 are more common than type 1 & 2. Paratriceps approach used more commonly which involves minimal soft tissue damage and minimal damage to osseous vascularity. Rigid internal fixation is best accomplished by bipillar plate fixation and for optimal biomechanical stability both plates should be placed at right angle to each other. Post operative physiotherapy is most vital part in management of supracondylar intercondylar fractures and preferably physiotherapy should be started within 7 days of operation for optimal range of motion. Despite any form of treatment most of the patients have restricted terminal extension of elbow. The Ulnar nerve paresis can be prevented by proper size & placements of implants & gentleness during surgery & inserting the screw from medially for intercondylar fractures. Most patients who are treated Transolecranon and k wire/ screw fixation have complaints of painful hardware. Availability of new implants like precountoured locking anatomical plate was associated with excellent results, decreased operative time and no complication further study may be required.

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