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INTERNAL FIXATION OF TYPE C FRACTURE OF DISTAL HUMERUS

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ABSTRACT

Background: Type C fracture of distal humerus is a relatively uncommon fracture. Internal fixation is difficult but anatomical reduction is needed to prevent poor functional outcome and degenerative changes. **Methods:** Twenty two cases with type C fracture of distal humerus including 6 having grade I compound fracture were treated with open reduction and internal fixation. Dual 3.5mm reconstruction plates in two planes were used in 17 patients and single plate was used in 5 patients. Patients were followed up for a mean period of 45 months (24 to 60 months). **Results:** All the fractures united at a mean duration of 13 weeks (8 to 20 weeks). Mean loss of extension (flexion deformity) was 28^0 (5^0 to 60^0). Mean range of movement achieved was 106^0. Complications were few, except restriction of movement. **Conclusion:** Internal fixation is a good method of treatment for this type of fracture to get restoration of the articular surface anatomy, stable fixation and early mobilization.

KEYWORDS: Internal fixation; Distal humerus fracture.

INTRODUCTION

Intra-articular bicondylar fractures of distal humerus (Type C, AO classification) are difficult to manage. Malunion, stiffness and osteoarthrosis are common. Many methods like close reduction, hanging arm cast, traction, limited internal fixation, open reduction with rigid fixation and elbow replacement have been described. In the last few decades, the popularity of internal fixation of this fracture is growing fast.[1-3] Being intra-articular fracture the importance of anatomical reduction is vital. Surgical treatment gives a chance for accurate

anatomical reduction of the joint surface. Most of the recent reports emphasize that accurate restoration of the articular surface anatomy, stable fixation and early mobilization gives the best result.[4-6] We are reporting the result of internal fixation of this fracture in young adults

MATERIALS AND METHODS

Twenty two cases (15 males and 7 females) of type C (AO classification) fracture of distal humerus were treated from 1996 to 2000 in the age group of 20 to 45 years. Six fractures were Grade I compound fracture. The patients, in whom surgery was delayed were excluded. Patient was kept in lateral position, arm resting on a bolster which was kept in front of the chest. Tourniquet was used, but released as soon as the exposure was completed. Transolecranon approach was used in all the cases. A transverse osteotomy was used but the subchondral bone was fractured by levering the osteotome instead of cutting it. The ragged edge created in this manner helped in accurate reduction at the time of olecranon fixation. Fracture haematoma was cleaned. Assessment of the fracture anatomy was done. It may be different from what was seen on X-ray. No fragment was discarded except the very small one. Reduction was done and fixed temporarily with 1.5mm K-wires. Reduction forceps with points was useful to hold the condyles. Anatomical reduction was the aim. Reconstruction of the trochlea is the most important part. Stenosis of the olecranon fossa was avoided at all cost. Valgus and varus position were checked. Normal anterior tilt of the condyle or humero - capitulum angle was checked. Defect in the inter condylar area, if any, was filled with cancellous bone graft. Inter condylar fracture was fixed with a 4 mm cancellous screw as lag screw. But compression was avoided in presence of comminution. If medial or lateral column was broken as a butterfly fragment or a wedge, it was fixed to the proximal fragment with lag screw to make the fracture anatomy simpler before applying plate. Two 3.5 reconstruction plates in two perpendicular planes were used in 17 cases. One 3.5 mm reconstruction plate was kept on the posterior surface of the lateral column and one on the medial side of the medial column. Main problem was to achieve a good purchase of the distal screw in low fractures. In such cases, the lag screw which was fixing the intercondylar component of the fracture was passed through the distal most hole of the plate (Fig. 2).

Fig 1. Pre-operative X-ray of a 30 years old male with type C fracture. reconstruction

Fig 2. Post-operative X-ray. Two 3.5 plates were used. The lag screw fixing the intercondylar fracture was through the last

This increased the fixation to the distal fragment. Single plate was used in 5 patients. If the plate was encroaching the ulnar groove, the nerve was transposed anteriorly and noted carefully for future reference. Olecranon was fixed with tension band wiring. A below elbow slab was applied at 70º to 80º flexion. Exercise was started as soon as pain subsided, usually in one week. Only active exercise was given. No passive mobilization was done. Muscle strengthening exercises was given after the union of the fracture. Result was assessed with criteria of Riseborough and Radin (1969) and criteria of Jupiter et al and Mayo elbow performance score (Table I, II).

Table I. Criteria of Riseborough and Radin. (1969).

	Flexion contracture	flexion	Subjective symptom
good	<30	>115	minor
fair	30-60	>115	Minor
poor	>60	<115	major

Table II: Criteria of Jupiter etal (1985) Range of movement (degrees).

	Loss of extension	flexion	pain	disability
excellent	<15	>130	none	none
good	<30	>120	slight	minimal
fair	<40	>90	With activity	moderate
poor	<40	>90	varible	severe

RESULT

Mean age of the patient was 34 years (20 to 45 years). Patients were followed up for a mean duration of 45 month (24 to 60 months). All the fracture united in a mean duration of 13 weeks (8 to 20 weeks). Mean loss of extension (flexion deformity) was 28^0 (5^0 to 60^0), mean

range of movement obtained was 106^0 (45 to 130^0). Functional result with three systems of assessment is shown in table III. Mean Mayo elbow performance score was 84. None had clinically obvious varus or valgus deformity. Two patients had collapse of fixation, two patients had superficial infection, none had myositis ossificans, nerve injury or olecranon nonunion. Three cases underwent arthrolysis at the time of implant removal, with some improvement in function. Two cases with collapse of fixation were immobilised in cast and united with a relatively poor function.

Table III: Functional results with three assessment criteria (expressed in number of patients and its percentage in bracket.).

	Riseborough and radin criteria	Jupiter et al criteria	Mayo elbow performance score
Excellent	-	0	6(27.2)
Good	15(68.2)	15(68.2)	12(54.5)
Fair	5(22.7)	3(13.6)	4(18.2)
Poor	2(9.1)	4(18.2)	0

DISCUSSION

Type C fractures of distal humerus are difficult to manage inspite of the advancement in fixation technique. Though the range of movement is better in surgically treated patients, stiffness is the most important complication. It is due to intra- articular adhesion, periarticular fibrosis, myositis ossificans and malunion. Accurate restoration of articular surface prevents osteoarthrosis. Reported[8] mean range of movement in conservatively treated patients is 47^0. Mean range of movement obtained in this series (106^0), is less than 115^0 and 108^0 reported.[4,9] Result appears better with Mayo elbow performance score as 18 patients (81.8%) were rated as excellent or good. The reason is that this score provide only 20 points to motion and 80 points to pain, instability and function. These patients rarely complained of pain and instability.

Fig 3. Pre-operative X-ray with a wedge fragment from the medial column.

Fig 4. X-ray after the union of the fracture. Medial wedge fragment was fixed with interfragmentary screw from lateral side and single plate for lateral column was used. Perfect bony anatomy was restored.

Transolecranon approach is must for these fractures. We did not find any difficulty in reduction and fixation of olecranon and none of the cases developed nonunion of olecranon. Anatomical reduction of articular surface was achieved in all cases without comminution at articular surface, but in cases with comminution some amount of step at the articular surface was common. Fixation of the distal fragment in low fracture is a problem as there is hardly any space to accommodate two screws for each plate. Preoperatively placement of the screws should be meticulously planned. Passing the lag screw which fixes the intercondylar fracture through the plate is one way to increase the fixation (fig.2). If the purchase of the screw is poor, double tension band wiring is one option.[9] If there is wedge fragment from the medial or lateral column it should be fixed to the shaft of humerus with lag screw first to make the fracture anatomy simple.

This fracture in young patients should be treated with internal fixation through a transolecranon approach. Single method of fixation could not be applied to every case. Meticulous planning should be done for every case. Functional results are better than radiological results.

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