International Journal of Orthopaedics Sciences

ISSN: 2395-1958
IJOS 2016; 2(4): 375-377

www.orthopaper.com
Received: 28-08-2016
Accepted: 29-09-2016

Dr. Channabasava Patil
Associate Professor, Department of Orthopedics, Oxford Medical College, Hospital and Research Center, Bangalore, Karnataka, India

Correspondence
Dr. Channabasava Patil
Associate Professor, Department Of Orthopedics, Oxford Medical College, Hospital and Research Center, Bangalore, Karnataka, India

Surgical management of distal humeral fractures in adults

Dr. Channabasava Patil

DOI: http://dx.doi.org/10.22271/ortho.2016.v2.i4f.58

Abstract
Introduction: The only reliable method for restoring the normal alignment and contour of the distal humerus is operative exposure and direct manipulation of fracture fragments. However, fixation of fracture fragments must be stable enough to allow motion while ensuring union
Methodology: On admission of the patient, a careful history was elicited from the patient and/or attendants to reveal the mechanism of injury and the severity of trauma. The patients were then assessed clinically to evaluate their general condition and the local injury
Results: In the present series there were no cases of type I fractures. There were 5 (25%) cases of type II fractures, 12 (60%) cases of type III fractures and 3 (15%) cases of type IV fractures. In this series 12 (60%) patients were fixed with double reconstruction plates of which supplementary K wires were used in 2 cases and 8 (40%) patients were fixed with Y plate
Conclusion: During open reduction internal fixation, anatomic nature of articular surface should be given prime importance

Keywords: Distal humerus, Fracture, Internal fixation

Introduction
Distal humerus fractures are uncommon injuries that account for fewer than 2% of all adult fractures. The complex shape of the elbow joint, the adjacent neurovascular architecture, and the sparse soft tissue envelope combine to make these fractures difficult to treat. Acceptable results have been reported in a majority of patients treated by open reduction and internal fixation [1]. The only reliable method for restoring the normal alignment and contour of the distal humerus is operative exposure and direct manipulation of fracture fragments. However, fixation of fracture fragments must be stable enough to allow motion while ensuring union. In the early and middle parts of twentieth century, operative treatment was combined with devascularization exposure, inadequate fixation, and cast immobilization. The result was often elbow stiffness and delayed healing. In this context, non-operative treatments, such as the so-called bag- of -bones technique (a short duration of immobilization in either a cast or a collar and cuff followed by mobilization as tolerated) were established as treatment alternatives [2].
Restoration of painless and satisfactory elbow function after a fracture of the distal humerus requires anatomic reconstruction of the articular surface, restitution of the overall geometry of the distal humerus, and stable fixation of the fractured fragments to allow early and full rehabilitation [3].
Depending upon the frequency of communition and displacement, open reduction and internal fixation with 1/3 tubular plate, reconstruction plate, `K' wire and double tension band wiring can be done individually or in combination. The result of operative fixation of fractures of the distal humerus remained unpredictable until improved techniques for the fixation of small, articular fractures as developed by the Arbeitsgemeinschaft fur osteosynthesefragen/association for the study of internal fixation (AO/ASIF) and others were applied. On the basis of the results reported in the more recent series, fixation with two plates at 90 degrees angle with one another has become the standard against which all other treatments are measured. Despite the confidence in operative fixation that believes this shift in treatment preference, these remain challenging fractures to treat effectively and best managed by surgeons with interest and experience in skeletal trauma involving upper extremity.

Even the most experienced surgeons, however may be intimidated with certain fracture characteristics, including poor bone quality, fractures involving the distal most aspects of the bone columns, and fragmentation of articular surface in sagittal and coronal planes. Some have even suggested total elbow arthroplasty as an alternative to operative fixation [4].
Although it is wise to be prepared to perform a total elbow arthroplasty in the event that a complex fracture is not amenable to internal fixation, one must keep in mind the functional limitations and eventual failure associated with total elbow arthroplasty. A surgeon treating a healthy active patient with a fracture of distal humerus should make every attempt to reconstruct and preserve the distal humerus [4]. The quality of elbow function following intercondylar fractures is related to the degree to which normal anatomic relationships are restored. Residual elbow stiffness still remains the worst complication of intercondylar fractures as it is poorly tolerated because of lack of compensatory motions in adjacent joints. The aim of the present study is to evaluate the functional outcome of surgical management of distal humerus fractures in adults.

Methodology
All 20 cases considered in this study spread over 2 years were intercondylar fractures which were managed.

Exclusion criteria
- Patients with intercondylar fracture of the distal end of the humerus
- Patients above the age of 18 years
- Patients medically fit for surgery.
- Compound fractures of the distal humerus
- Old fractures of the distal humerus
- Patients not willing for surgery
- Patients medically unfit for surgery.
- On arrival of patients at casualty or at OPD level, the various points were noted down according to the pro forma.
- On admission of the patient, a careful history was elicited from the patient and/or attendants to reveal the mechanism of injury and the severity of trauma. The patients were then assessed clinically to evaluate their general condition and the local injury.

In general condition of the patient, the vital signs were recorded. Methodical examination was done to rule out fractures at other sites. Local examination of injured elbow revealed swelling, deformity and loss of function. Any nerve injury was looked for and noted.
- Palpation revealed, abnormal mobility and crepitus. Distal vascularity was assessed by radial artery pulsations, capillary filling, pallor and paraesthesia at finger tips.
- Radiographic study was done taking AP and lateral x-ray of the involved elbow.
- The patient was taken for surgery after routine investigations and after obtaining fitness towards surgery. The investigations were as follows: Hb%, Urine for sugar, FBS, Blood urea, Serum creatinine, HIV, HBsAG and ECG.
- All patients were treated surgically with open reduction and rigid internal fixation. Patients treated surgically were done so in routine operation theatre as soon as possible. Most of the patients were operated within 8 days of admission.
- All the patients were put in lateral position with arm supported and forearm hanging. In all patients a posterior trans-olecranon approach was used to give better exposure of the articular surface.

Results
In this series, 6(30%) patients were between 21-30 years, 7 (35%) patients were between 31-40 years, 4 (20%) patients were between 41-50 years and patients between 51-60 years were 3(15%). The range of age was between 21-58 years, with mean age of 35.52 years. The maximum incidence was between 31 to 40 years i.e. 7 cases (35%).
In the present series there were 14 (70%) were males and 6 (30%) were females with M: F ratio of 7:3
In the present series there were no cases of type I fractures. There were 5 (25%) cases of type II fractures, 12 (60%) cases of type III fractures and 3 (15%) cases of type IV fractures. In this series 12 (60%) patients were fixed with double reconstruction plates of which supplementary K wires were used in 2 cases and 8 (40%) patients were fixed with Y plate
There were no cases of Intraoperative complications.

Post-operative complications
Superficial infection: One patient developed superficial infection, infection was controlled with appropriate antibiotics after culture and sensitivity report.
Ulnar neuropathy: One patient (5%) developed ulnar neuropathy which recovered spontaneously after 3 weeks.
Non-union: One patient had non-union in which Y plate was removed and internal fixation with two 3.5mm reconstruction plate with bone grafting was done.
Implant failure: Y plate breakage occurred in one patient where re-surgery was done, broken Y plate was removed and two 3.5mm reconstruction plates were applied with bone grafting In the present study there were no type I fractures, 5 cases were of type II out of which 3 had good and 2 fair results. There were 12 cases of type III fractures out of which 5 had good, 5 fair and 2 poor results. There were 3 cases of type IV fractures out of which 1 had good and 2 had poor results.

Table 1: Distribution based on age group

Age group	Frequency	Percentage
21 – 30 years	06	30.0
31 – 40 years	07	35.0
41 – 50 years	04	20.0
51 – 60 years	03	15.0
Total	20	100.0

Table 2: Distribution based on Type of fractures

Type of fracture	Frequency	Percentage
I	00	00
II	05	20.0
III	12	60.0
IV	03	15.0
Total	20	100.0

Table 3: Distribution based on Type of Fixation

Type of Fixation	Frequency	Percentage
Double reconstruction with screws	12	60.0
Y plate with screws	08	40.0
Total	20	100.0

Table 4: Distribution based on Complications

Complications	Frequency	Percentage
Superficial infection	01	05.0
Ulnar neuropathy	01	05.0
Non union	01	05.0
Implant failure	01	05.0

Table 5: Grading of results

Type of fracture	Grading		
	Good	Fair	Poor
I	00	00	00
II	03	02	00
III	05	05	02
IV	01	00	02

Discussion

In our study fractures were commoner in the 2nd and 3rd decade with average age being 40 years (21-59). Our findings are comparable to the study made by Jesse B. Jupiter 1985 [5], Gabel *et al* 1987 [6], M. Bradford Henley *et al* 1987 [7], Kun-Chuang Want *et al* [8]., In 1985 Jesse B. Jupiter *et al* found 57 years as the average age in their series. In 1987 Gabel *et al* found 45 years as the average in their series. In 1987 M. Bradford Henley *et al* found 32 years as the average age in their series. In 1994 Kun-Chuang Want *et al*, found 47 years as the average age in their series.

Our series had a male predominance with 70% and 30% female patient which were comparable to Kun-Chuang Wang *et al*, (1994) study. Jesse B. Jupiter *et al*, (1985) in his study noted about 47% male and 53% female, sex distribution. Gabel *et al* in his study noted about 38% male and 62% female incidence. M. Bradford Henley *et al* in his study noted about 52% male and 48% female incidence. Kun-Chuang Wang *et al*, in his study noted 60% male and 40% female incidence.

Male predominance is probable due to their increased involvement in outdoor activity level. In our series we accounted no cases of fractures of RR type I, 25% fractures of RR type II, 60% fractures of RR type III and 15% fractures of RR type IV. Gabel *et al* in his series noted about 23% of fractures of RR type I, 15% fractures of RR type II, 31% fractures of RR type III and 23% fractures of RR type IV. M. Bradford *et al* in his series noted about 9% of fractures of RR type I, 12% fractures of RR type II, 43% fractures of RR type III and 36% fractures of RR type IV.

In our series we had a case of superficial infection which resolved with appropriate antibiotics.

A case of ulnar neuropathy was seen which resolved spontaneously after conservative treatment.

One patient had a non union, in which Y plate was removed and internal fixation with two 3.5mm reconstruction plate with bone grafting was done. Y plate breakage occurred in one patient where re-surgery was done, broken Y plate was removed and two 3.5mm reconstruction plates were applied with bone grafting. Henly *et al* [7] reported 4% superficial infection 7% of ulnar neuropathy, 5% of implant failure, 2% of non union and 4% incidence of Heterotropic ossification.

Conclusion

Open reduction internal fixation should be done as early as possible. Delay in open reduction internal fixation with delayed soft tissue dissection leads to increased chances of elbow stiffness due to periarticular fibrosis. Operative treatment with rigid anatomical internal fixation should be the line of treatment for all grades of Riseborough Radin intercondylar fractures, more so in young adults as it gives best chance to achieve good elbow function.

References

1. O'Driscoll Shawn W, Sanchez Sotelo Joaquin, Torchia Michael E. Management of the smashed distal humerus". Orthop Clin North Am. 2002; 33(1):19-33.
2. Holdsworth BJ, Mossad MM. Fractures of the adult distal humerus: Elbow function after internal fixation. J Bone Joint Surg Br. 1990; 72B:362-368.
3. Keon - Cohen BT. Fractures and the elbow. J Bone Joint Surg. 1993; 48A:1623-1639.
4. Wilson JN. Injuries of the elbow. Chapter-22 In Watson - Jones fractures and joint injuries. Churchill Livingstone, 1992, 609-629.
5. Jupiter JB, Neff U, Holzach P. Intercondylar fractures of the humerus: An operative approach. J Bone Joint Surg Am. 1985; 67:226-238.
6. Gerard T Gabel, Gregory Hanson, James B Bennett *et al*, Intraarticular fractures of the distal humerus in the adult. Clin Orthop & Related Research. 1987; 216:99-108.
7. Henley Bradford M. Intra-articular distal humeral fractures in adults. Orthop Clin North Am. 1987; 18(1):11-23.
8. Kun-Chuang Wang, Hsin-Nung Shih, Kuo-Yao Hsu *et al*, Intercondylar fractures of the distal humerus: routine anterior subcutaneous transposition of the ulnar nerve in a posterior operative approach. J of Trauma. 1994; 36(6):770-773.