RESULTS OF INTERNAL FIXATION OF DISTAL HUMERAL ARTICULAR FRACTURES IN OLD AGE, STUDY OF 10 CASES

Islam H. Hegazy MD and Abdel-Salam A. Ahmed MD
Orthopedic department, Faculty of medicine, Benha University, Egypt.

Abstract

Background: In elderly patients the tolerance of elbow joint to immobilization is very poor and stiffness develops easily, so conservative treatment is not suitable method for intraarticular fractures of the distal humerus. Although open reduction and internal fixation is the treatment of choice for these fractures in adults, in elderly patients disagreement remains on how to treat these fractures. Also the reports on the functional results after internal fixation of these fractures in elderly patients are rare.

Objectives: The purpose of this study is to evaluate the results of open reduction and stable internal fixation for treatment of intra-articular fractures of distal humerus in elderly patients above 60 years old.

Patients and Methods: 10 patients with 10 intra-articular fractures of distal humerus. The average age was 63 years (ranged 60-73 years). There were sex females (60%) and four male (40%). The right side was affected in seven patients (70%) and left side in three patients (30%). The fractures were classified according to the AO/ASIF classification. There was one fracture (10%) type B1, four fractures (40%) type C1, three fractures (30%) type C2 and two fractures (20%) type C3. All the patients were treated by open reduction and internal fixation through a posterior approach. The average follow up period was 18 months (ranged 12-32 months) During it the patients were examined both clinically and radiographically for union of the fractures, Post-traumatic arthritis, range of motion the elbow and forearm, muscle strength, degree of pain, return to previous activities. The final results were evaluated according to the Mayo Elbow scoring points system.

Results: average time to union were 3.5 months (ranged 2-4.5months). Four patients (40%) had Post-traumatic arthritis of the elbow
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(three patients with mild degree and one patient with severe degree). The motion at the elbow was mainly affected, the median arc of flexion/extension was 1000 (ranged 600-1300). The forearm motion was not affected and it was near normal in all of the cases. The final clinical results were excellent in three patients (30%), good in five patients (50%), fair in one patient (10%), and poor in one patient (10%).

**Conclusion:** Open reduction and internal fixation of distal humeral intra-articular fractures in elderly patients can achieve excellent and good results in majority of the patients. Advancing age is not a contraindication for open reduction and internal fixation of these fractures.

**Introduction**

Distal humeral articular fractures is a challenging problem although it represents a small percentage of upper extremity fractures (Fereles et al 1997). Nonoperative treatment of such fractures need prolonged immobilization, which have lot of complications like fibrosis and stiffness of elbow movement which result in loss of elbow function. (Jupiter et al., 1969) and (Sanders and sackett 1990). Recently, open reduction and internal fixation has become the treatment of choice for distal humeral articular fractures in adults (Ring & Jupiter 2000) (Ring et al., 2003) and. Although surgical treatment of these fractures are difficult, especially when there is intraarticular comminution, that make the reconstruction more demanding. In geriatric patients diminished bone quality (osteoporosis), metaphyseal and articular comminution, make stable joint reconstruction more problematic (Korner et al., 2005). Debate remains on how to manage these fractures in elderly patients. There are many options for treatment of the distal humeral articular fractures in elderly patients range from conservative treatment (Kinzi and Fleischmann 1991) to primary total elbow replacement (Gambirasio et al., 2001) and (Muller et al., 2003). However, the paucity of studies done to assess the results of surgical management of distal humeral fractures in older patients necessitates more studies.

The aim of this study is to evaluate the results of surgical management of intra-articular frac-
The arc of flexion/motion was not final clinical results in elderly patients above the age of 60 years old by open reduction and internal fixation.

**Patients and Methods**

The study included 10 patients with 10 intra-articular fractures of the distal humerus that were treated by open reduction and internal fixation in King Fahad central hospital, Madinah Mounawarah, KSA, during the period from 2005 to 2008. The average age of the patients was 63 years (ranged 60-73 years). There were six females (60%) and four males (40%). The right side was affected in seven patients (70%) and the left side in three patients (30%). All fractures were closed. The fractures were classified according to the AO/ASIF classification (Fig. 1). There was one fractures (10%) type B1, four fractures (40%) type C1, three fractures (30%) type C2 and two fractures (20%) type C3 as showing in table I. The causes of injury were as a result of fall in eight patients (80%) and traffic accident in two patients (20%).

**Surgical Techniques:**

All the patient were operated within 1 week of injury. prophylactic antibiotics (1 gram first generation cephalosporine was given 1 hour before induction of anesthesia and continued for 2 days postoperative). Regional anesthesia was used in three patients (30%) and general anesthesia in seven patients (70%). Under pneumatic tourniquet and prone position a 15 cm midline posterior skin incision was used in all patients starting 10 cm above the olecranon till 5 cm distal to it. The skin and subcutaneous tissues were retracted. The ulnar nerve was identified proximally at the medial border of the triceps and released proximally and distally to medial epicondyle. then gently retracted from its bed with a rubber drain. Olecranon osteotomy was done in 6 patients and tongue shape triceps tendon flap was used in the remaining 4 patients. reduction of both condyles and fixation to each other with 4mm cancellous screws to achieve reduction of the articular surface. The two condyles then were reduced and fixed to the humeral metaphysis. In six patients double plates fixation was used (one-third tubular plate for fixation of medial column and 3.5mm
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reconstruction plate or small dynamic compression plate for fixation of lateral column) and in the other four patients, the fixation was with single plate for fixation of the comminuted column and screws fixation for the other non comminuted column. After complete fixation the tourniquet was released and good hemostasis was done. Closure of the wound over a drain which removed 48 hours later, posterior plaster splint were applied to immobilize the elbow in 90° flexion and neutral forearm rotation. The average operative time was 95 minutes (ranged 70-100 minutes).

Postoperative care and follow up:
Removable splint was applied and assisted active exercises under supervision of therapist were initiated. The average hospital stay was 6 days (ranged 4-13 days). The sutures and splint were removed at two weeks postoperatively, and then the arm was kept in arm sling with active exercises till union of the fractures. The average follow up was 18 months (ranged 12-32 months). The follow up was done every month till union of the fractures, and then every four months till the final follow up. During this period the patients were assessed clinically for active range of flexion and extension at the elbow, rotation of the forearm, elbow stability, muscle strength, degree of pain and return to normal functional activities. Anterioposterior and lateral radiographs were taken every visit to assess bony union, articular congruity and post-traumatic degenerative changes. The final functional results were evaluated according to the Mayo elbow point system, Morrey et al., (1993) which depended on assessment of the degrees of pain, range of movements at the elbow and forearm, functional activities, instability and muscle strength. The results were graded as, excellent (95-100 points), good (80-94 points), fair (50-79 points) and poor <50 points.

Results
The fractures were united at an average 3.5 months (ranged 2-4.5 months). Postoperatively the articular joint surface was congruent in 8 patients (80%), but 2 patients with type C3 fracture (20%) had

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Hen evening follow the physically for and extension of the muscle and related activities and lateral every visit articular matic decreases. The final evaluated elbow point (1993) assessment of range of and forearm instability. The range was excellent (80-94% of normal) and limited at an angled 2-4.5 step off less than 2mm of the articular joint surface. Post-traumatic osteoarthritis of the elbow joint was found in 4 patients (40%) with mild degree in three patients (type C2 fractures) and severe degree in one patient with type C3 fracture.

The range of elbow flexion/extension movement was from 60°-130° (median 100°). The motion at the elbow was affected mainly by the types of the fractures, congruity of the articular surface after reduction and later by the development of post-traumatic osteoarthritis. There was no significant relation between the side, age, or technique of the approach whether olecranon osteotomy done or tounge shape triceps flap elevation. Type C3 and C2 fractures had less range of motion than the cases with type C1 and B1 fractures. The forearm motion pronation/supination was little affected and it was near the normal side in all the cases.

Seven patients returned to previous activities and three patients modified their activities. Six patients (60%) had no pain with activities. two patients (20%) had slight occasional pain and two patients (20%) had mild to moderate pain. Instability (either under valgus/varus stress or anterior/posterior stress) was not reported in all the patients. The strength of pronation and supination was near the normal side in all the patients, but the strength of flexion and extension was reduced in five patients (50%) due to the presence of pain at the elbow joint with motion.

Some complications were reported in this study. Superficial wound infection was occurred in three patients (30%), that were treated with systemic antibiotics and dressing. Tingling and paresthesia related to the ulnar nerve was reported in two patients (20%). These symptoms were resolved completely during the follow up. No complications from healing of olecranon osteotomy in the 6 patients whom olecranon osteotomy was used in the approach. Post-traumatic osteoarthritis of the elbow joint was found in five cases (50%), three cases with mild degree.