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Outcome after internal fixation of intraarticular distal humerus (AO type B & C) fractures: Preliminary results with anatomical distal humerus LCP system

Jwalant Patel[a], Girish Motwani[a,b,c,*], Himanshu Shah[a], Rajeev Daveshwar[a]

[a] Department of Orthopaedics, Medical College, Baroda, India
[b] Department of Paediatric Orthopaedics, B.J. Wadia Hospital for Childrens, Mumbai, India
[c] Fellow in Orthopaedics, University of Alabama, Birmimgham, USA

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ABSTRACT

Purpose: The treatment of intraarticular fractures of the distal humerus is challenging and involves the risk of complications and bad functional results. Anatomical and stable internal fixation with early postoperative mobilization is expected to improve the functional outcomes. The objective of this study was to evaluate the functional and radiological results, along with the complications associated, of open reduction and internal fixation using precontoured anatomical locking LCP plate system for intraarticular distal humerus fractures in adult patients.

Methods: This prospective study consist of 31 patients with a mean age of 41.2 years (range 19–62) were treated with open reduction and angular stable internal fixation. All underwent posterior transolecranon surgical approach. Mean follow-up to the final interview was 10 months (from 6 to 20 months). All operated patients were available at the time of last followup. AO classification showed 26 C-fractures (9*13C 1, 12*13C2,5* 13C3) and 5 B-fracture (1* 13B1,1* 13B2,3* 13B3). There were 25 closed fractures and 6 open grade 1 fractures. The clinical followup using Mayo elbow performance score (MEPS) and radiographic follow up with elbow anterior–posterior and lateral view X-rays were performed postoperatively.

Results: The mean MEPS was 87.9 points out of 100 (range 55–100) with 61% Excellent, 29% good and 10% fair and poor scores. Mean elbow flexion of 115.8° (range 85°–150°). The mean deficit in extension was 19° (range 5°–35°). All olecranon osteotomy were united .Nonunion of distal humerus fracture occurred in 2 cases. Other complications were hardware prominence in 3 cases, superficial infection in 4 cases and Ulnar nerve neuropraxia in 1 case which was recovered uneventfully. Revision surgery was not required in any complication.

Conclusion: Open reduction and internal fixation with precontoured distal humerus anatomical locking plate system is a good method of treatment for complex Supra- intercondylar fracture of distal humerus with good functional outcome and low rates of complications. Even though early results are promising, longer term investigations and larger patient groups are necessary to confirm the presented data.

1. Introduction

Majority of the distal humerus fractures (96%) have a complex pattern involving both the columns and the articular surface (AO type B and C injuries).[1]

High percentage of unsatisfactory functional results following conservative treatment has been reported in the literature.[2] On the other hand,open reduction and internal fixation (ORIF) of distal humeral fractures with plates and screws has been associated with complications such as implant loosening associated with secondary loss of reduction, malposition and malunion of the frag-

* Corresponding author at: Fellow in Orthopaedics, University of Alabama, Birmimgham, USA.
E-mail addresses: jwalant72@gmail.com (J. Patel), gitz.dr@gmail.com (G. Motwani), himanshuortho82@gmail.com (H. Shah), dr_rndaveshwar@yahoo.com (R. Daveshwar).

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ments.[3,5,10] Comminution of the fragments, osteopenia, delicate articular anatomy of the distal humerus, deficient bone stock available in the olecranon fossa for implant placement, further complicate the situation.The latest generation precontoured anatomical low compression locking distal humerus plate system allows angular stable and rigid fixation of intraarticular distal humerus fractures. These specially designed plating system for distal humerus provide better biomechanical properties and enhanced anchorage in these complex, unstable & more challenging injuries. Due to these advantages, early mobilization and aggressive functional rehabilitation is possible and functional outcome might be improved.

The objective of this study was to analyze the functional and radiological results, along with the complications associated,of open reduction and osteosynthesis with internal plating for intraarticular distal humerus fractures in adult patients.

2. Methodology

This prospective study was based on a series of 31 consecutive patients who were operated on from june 2014 to june 2015 for distal intercondylar humerus fracture using the 3.5 mm precontoured distal humerus medial and lateral anatomical locking plating (90:90 orthogonal) system through a posterior transolecranon approach. The criteria for inclusion were: patients aged more than 18 years,with close and open grade 1 (according to Gustilo-anderson classification) intraarticular distal humerus fractures and fracture dislocations classified intercondylar type B and C according to the AO classification system. Exclusion criteria were: patient below age of 18 years, open grade 2 & 3 fracture, supracondylar extraarticular fractures (AO type A), previous operative treatment because of the fracture (external fixation excluded), history of primary or metastatic tumors with pathologic fracture and those who were unfit for major surgery. Seven of the patients were women and twenty four were men. The average age of the patients was 41.2 years (range 19–62). Mean follow-up up to the final interview was 10 months (from 6 to 20 months).All operated patients were available at the time of last followup.

Preoperative data collection was done by detailed history taking and systematic clinical examination of injured elbow. Preoperative radiographs in two planes (antero-posterior (AP), and lateral views) were obtained to analyze the fracture. Fractures were classified according to the preoperative X-rays and the intraoperative findings. AO classification showed 26 C-fractures (9*13C 1, 12*13C2,5* 13C3) and 5 B-fracture (1* 13B1,1* 13B2,3* 13B3).

There were 25 closed fractures and 6 open grade 1 fractures. 5 patients had tense soft tissue swelling and ecchymosis and they were treated after resolution of soft tissue swelling usually within 7–9 days.Detailed Informed consent of the patient or relatives was taken prior to the surgery.

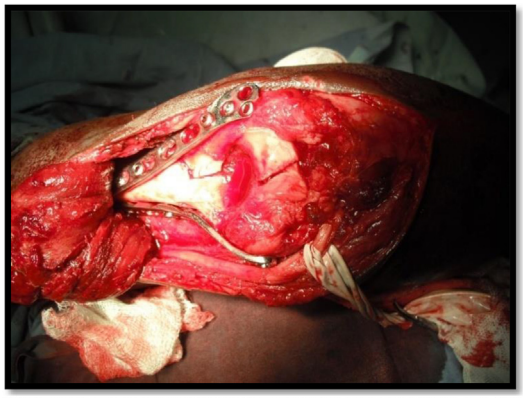
All underwent posterior transolecranon surgical approach. 3.5 mm precontoured distal humerus anatomical LCP system belongs to the latest generation of locking compression plates. The screws in the distal humerus are locked into the plate and cannot back out or totter, which is a particular advantage in the distal region close to the joint with low amount of cancellous bone. The plates are preshaped in different sizes to fit on the ulnar and dorsoradial column.

2.1. Postoperative period

Patients were instructed to keep the limb elevated and move their fingers and elbow joint. Early controlled passive mobilization of the elbow was started 48 h postoperatively after removal of the drainage. After discharge, patients completed a physical therapy program with passive and active mobilization of the joint in full range of motion. Suture/staples were removed within the 9th to 16th postoperative day and check X-ray in anteroposterior and lateral views were obtained.

2.2. Follow-up

After suture removal, patients were advised to report for follow up after 4 weeks and 8 weeks, 12 weeks, 16 and 24 weeks thereafter every 3 months. At each follow up a detailed clinical and radiological examination was done and patients were assessed subjectively for the symptoms like pain, swelling and restriction of joint motion,ability to perform daily routine activities. Using 2 elbow projections (anteroposterior and lateral), we assessed radiographic consolidation and state of the osteosynthesis material (migration, breakage). Functional assessment was effected by measuring the range of mobility with a manual goniometer, evaluating elbow stability, and using the scales of the Mayo Elbow Performance Score (MEPS) which include an assessment of the arc of joint mobility, stability and functionality of the elbow and the presence or absence of pain). Patients were instructed to carry out physiotherapy in the form of active flexion-extension and pronation-supination without loading at 3–4 weeks postoperatively.



BICOLUMN FIXATION WITH DISTAL HUMERUS LCP SYSTEM.

3. Results

3.1. Functional evaluation

At final follow up, the mean MEPS was 87.9 points out of 100 (range 55–100) with a mean elbow flexion of 115.8° (range 85°–150°). The mean deficit in extension was 19° (range 5°–35°). There were no final limitations in pronation and supination in any cases. All elbows were stable at followup with no difference in radial or ulnar stress opening in comparison to the contralateral side, a negative pivot shift test and a negative moving valgus stress test.

The mean functional result of the MEPS was 22.74 points of 25. Majority of patient (22 out of 31) were able to do all 5 functions included in mayo elbow performance score (daily hygiene work by themselves, comb their hair by themselves, feed by their own, put on their shirts by their own and put on their shoes by their own). The majority of patients (20/31) reported no pain at all, eleven patients reported mild pain over 24 h and usual activities of daily living and working.Based upon Mayo Elbow Performance Score, there were 19 patients (61%) with a mean excellent result (90–100), 9 patients (29%) with good (75–89), 1 patient with a fair result (60–74) and 2 patients with poor result. (below 60).