Functional outcome of elbow reconstruction after using precontoured Locking Compression Plate

Imran Mang, Intikhab Taufiq, Muhammad Kazim Rahim Najjad, Muhammad Noman Iqbal, Summaiya, Noor ul Ain, Aamir Ali Shah

Abstract

Objective: To evaluate the functional outcome of elbow reconstruction after using precontoured LCPs.

Material & Method: This retrospective study was conducted between July 2010 and April 2013 on 25 consecutive patients who presented in our department. Osteosynthesis was attempted via transolecranon approach using Chevron osteotomy. Back splints were used for postoperative immobilization for two weeks. Elbow rehabilitation was started at week three followed by functional assessment at three month by using Mayo Elbow Scoring System.

Results:

Twenty-five patients were included in this study out of 25, 13 were male and 12 females with male to female ratio of 2.14:1. Age ranged from 22 to 75 years and the mean age was 35 years. Most injuries occurred after motorcycle accidents, total 20 RTAs and 5 falls were notified as mechanism of injury. Fifteen patients (60%) were right hand dominant. Union was achieved normally in 21 patients at 12 weeks and remaining 4 patients achieved delayed union at 20 weeks. All the fractures were stable on healing. Maximum extension achieved was 10º. Maximum flexion achieved was 120º, with mean motion arc of 110º. No patient showed loosening of implant or pulling out of screws during follow-up visits, 02 cases required removal of impinging olecranon osteotomy screw and 1 required removal of prominent intercondylar screw. One patient had ulnar nerve neuropraxia, which recovered spontaneously during next 4 months time. Stiffness was seen in one case.

The Mayo elbow score turned out to be: Excellent in 12 (48%), Good in 8 (32%), Fair in 3 (12%) and Poor in 2 cases (8%).

Conclusions: Complex Intra or extra articular distal humerus fractures are a specialized operative procedure for its management. We found good functional outcome of elbow by using anatomical precontoured locking compression plate.

Key Words: Elbow Reconstruction, Pre Contoured Locking Plates, Intra-articular, Mayo elbow score system.

Introduction

Principle for intra-articular fracture fixation is anatomical reduction and absolute fixation with stabilizing extra-osseous implantation. The functional outcome has been greatly influenced by the early graduated rehabilitative exercise.

There are many methods and approaches for fixation of fracture; it is mainly based on the fracture pattern and surgeon expertise.

Fracture union, functional outcome, range of motion and satisfaction after open reduction and internal fixation with LCPs was evaluated[2].

Objective:

To evaluate the functional outcome of elbow reconstruction after using precontoured LCPs.

Corresponding author:
Kazim_najjad@hotmail.com, Cell: 03002271106

Material & Methods

Twenty-five patients treated for elbow intra-articular and periarticular fractures involving the distal humerus from July 2010 – April 2013. Exclusion criteria of this study are patients operated with percutaneous K Wires, conventional plating, treated not primarily at LNH Karachi and those who were managed conservatively.

Posterior approach used and trans-olecranon chevron shaped osteotomy in 17 patients and triceps reflection in 8 patients. The fracture reduction was started after complete exposure at the articular surface and then attached with the diaphysis when there was any metaphyseal comminution. The reduced bone fragments were held in place with reduction clamps and were provisionally fixed using Kirschner wires. The K-wires were then checked under vision and fluoroscopically so that they should not interfere with plate application. Ulnar nerve identified and

mobilized from the arcade of struthers proximally to the first motor branch to the flexor carpi ulnaris distally to allow anterior translation of the nerve without tension[4] in order to prevent iatrogenic damage. Depending on how proximally fixation is needed on the lateral coloumn radial nerve may also be identified and mobilized. All patients underwent screw and plate fixation using pre-contoured LCP's and intercondylar lag screws if needed.

Olecranon osteotomy closed via a 6.5mm cancellous screw with washer alone or with tension band wiring where needed. All wounds were closed with redevac drain placement. Long arm plaster splint was applied in all cases for 2 week to fasten the soft tissue healing.

Mayo Elbow Score System

Section 1: Pain Intensity and SCORE

None 45
Mild 30
Moderate 15
Severe 0

The patient's demographic data, mechanism of injury, the postoperative pain, range of motion, stability, functional activity of elbow at follow up were assessed using the mayo elbow score. Data pertaining to complications were also recorded.

Subsequently follow-up with 4 weeks intervals until fracture was united i.e. at 4 weeks, 8 weeks, 12 weeks and then at 6 months.

Section 2 – Motion and score

Arc of motion greater than 100 degrees 20
Arc of motion between 50 and 100 degrees 15
Arc of motion less than 50 degrees 05

Section 3 – Stability and score

Stable 10
Moderate instability 05
Grossly Unstable 0

Section 4 - Function and score

Can comb hair 05
Can eat 05
Can perform hygiene 05
Can don shirt 05
Can don shoe 05

Interpreting the Mayo Elbow Performance Score							
Score>90	Excellent	Score 75-89	Good	Score 60-74	Fair	Score < 60	Poor

Results

Out of twenty-five patients 13 were male and 12 females with mean age of 35 years (range from 22 to 75 years). Most of the injuries occurred after motorcycle accidents, total 20 RTAs and 5 falls were notified as mechanism of injury, 15 (60%) injured their right hands.

Majority of the patients were admitted in ward while only 2 patients were admitted in High Dependency Unit and then transferred to ward as they were stabilized. The time lapse from injury to fixation ranged from 12 hours to 4 days. Union was achieved normally in 21 patients at 12 weeks and remaining 4 patients achieved delayed union at 20 weeks. All the fractures were stable on healing. Maximum extension achieved was 10º. Maximum flexion achieved was 120º, with mean motion arc of 110º. No patient showed loosening of implant or pulling out of screws during follow-up visits. Two cases required removal of impinging olecranon osteotomy screw and 1 required removal of prominent intercondylar screw. 1 patient had ulnar nerve neuropraxia, which recovered spontaneously during next 4 months time. The Mayo elbow score turned out to be

Excellent in 12 (48%), Good in 8 (32%), Fair in 3 (12%), Poor in 2 patients (8%).

Discussion

Distal humerus fractures in adults are not common but these remains one of the most challenging fractures for reduction and fixation. Despite being uncommon the distal humerus fractures pose the greatest challenge in terms of surgical fixation and absolute anatomical reduction. Surgical expertise is of paramount importance. Good functional outcomes are expected with intelligent surgical approach and early rehabilitation.[5]

Conservative management in the past was favored that render the patient functionless for a

longer period of time with extended immobilization and unsatisfactory functional outcomes.[10, 12, 13] Articular surface restoration and reconstruction of elbow joint is mandatory to restore maximum joint function[10.] Stabilization of fracture fragments with plate osteosynthesis based on restoration of joint congruity,[2]

The elderly women with osteoporosis frequently present with history of fall suffering from these types of fractures[7, 11] In our study where 4 elderly patients had history of fall on ground during walking and young and middle aged patients had motor vehicle accidents.

In dealing with intra-articular fractures, all the patients underwent an olecranon osteotomy with anatomical restoration of joint congruity; all showed increased ROM with good to excellent functional results[20.]

In our study, excellent functional outcome was seen in 12 (48%), good in 8 (32%), fair in 3 (12%) and poor in 2 patients (8%). Out of all, 13 patients (52%) had no pain, 13 patients (52%) had motion arc >100º, All (100%) had stable elbow on fracture healing, 15 patients (60%) showed normal daily activities and 7 patients (28%) had mild to moderate impairment in activities.

Union was achieved normally in 21 patients at 12 weeks and remaining 4 patients achieved delayed union at 20 weeks. Delayed union was mainly seen in elderly patients with osteopenic bone and hence fragility fracture. Maximum extension achieved was 10º. Maximum flexion achieved was 120º, with mean motion arc of 110º. The motion arc and other results seen in our patients are comparable with other studies[17, 18.]

No patient showed loosening of implant or pulling out of screws at the time of evaluation during follow up visits. 2 patients out of total 17, required removal of impinging olecranon osteotomy screw[19] and 1 required removal of prominent intercondylar screw after healing of fractures. 1 patient had ulnar nerve neuropraxia, which recovered spontaneously during next 4 months time. Stiffness was seen in 1 patient (4%). None of the patient developed heterotopic ossification.

Multi-fragmentary fracture configuration or comminution is seen more in high velocity road traffic accidents in young population. The plates are pre shaped to fit on the ulnar and radial sides[(2)]. Postoperatively a more conservative approach in the form of passive and then assisted active motion was allowed as advocated by Schatzker, this in fact lessens the load on the implants[5, 6].

Conclusion

Complex Intra or extra articular distal humerus fractures are a specialized operative procedure for its management. We found good functional outcome of elbow by using anatomical precontoured locking compression plate.

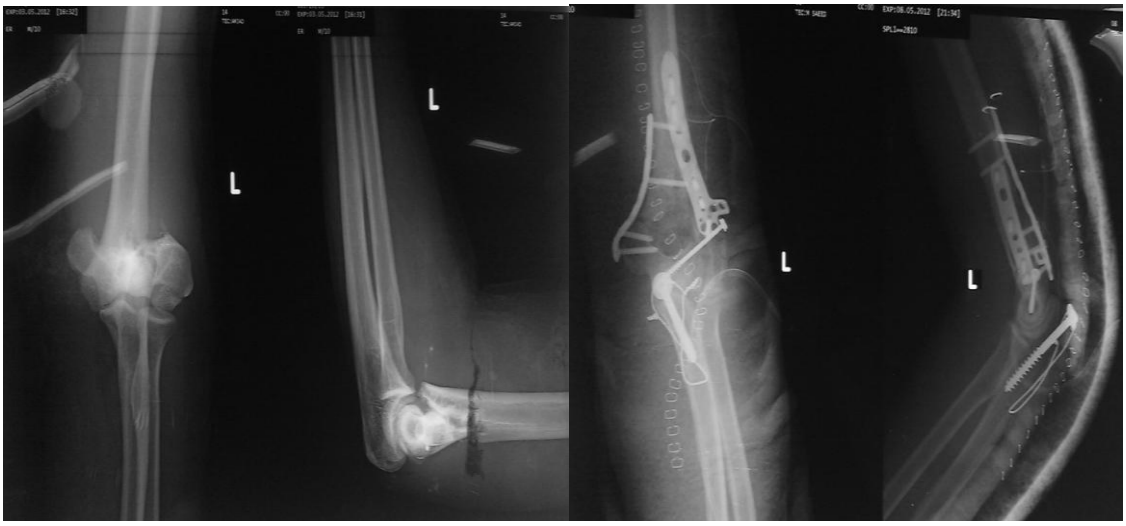

Fig 1.1 Preoperative and immediate postoperative radiographs showing distal humerus intra-articular fracture and Reconstruction with pre-contoured LCPs. Chevron osteotomy is seen to be closed via cancellous screw with tension bend wiring.

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