



PROXIMAL HUMERUS FRACTURES TREATED BY ANATOMICAL PLATES WITH LOCKING SCREWS: A SHORT TERM STUDY OF 20 CASES

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ABSTRACT

Aim: The aim of this study was to evaluate the clinical results of locking anatomical plates in proximal humerus fractures and to analyze the potential complications.

Material and Methods: We studied 20 patients treated with anatomical locking plates for a displaced proximal humerus fractures. Functional outcome was determined using Constant and Murley score.

Results: The average overall Constant score was 68.70. At six months of follow up, we had 1 poor, 2 fair, 7 good and 10 excellent results. Average time to radiological union was 12.80 weeks. There were no implant related complications in our study. Two part fractures had better outcome as compared to three part fractures.

Conclusion: Our results show that good fracture stability is achieved with anatomical locking plates. Achieving anatomical reduction prior to fixation is pertinent to achieve an acceptable reduction that gives good functional outcome.

KEYWORDS : Proximal humerus fractures, anatomical locked plates, PHILLOS, shoulder

INTRODUCTION

Proximal humeral fractures account for approximately five percent of all fractures presenting to the orthopaedic surgeon.⁽¹⁾ It is estimated that only twenty percent of these patients require surgical intervention.⁽²⁾ The indications for fixing such a fracture depend on the fracture pattern, quality of bone and age & activity level of the patient. Surgical treatment is usually preferred for displaced fractures. Various methods have been introduced including the use of per-cutaneous Kirschner's wires, plates, intra-medullary nails and arthroplasty.⁽¹⁾ The goal is to achieve near anatomical reduction and stabilization so as to achieve early mobilization. However, literature shows complication rate following surgical treatment to be nearly fifty percent or even higher.⁽¹⁾ Several complications have been reported such as cut-out or back-out of screws & plates, non-union, avascular necrosis, nail migration, rotator cuff impairments and impingement syndrome.^(1,2) In order to decrease the incidence of complications, particularly fixation failure and loss of stability and to enable early post operative mobilization, plating techniques using anatomical locking plates have been developed. The aim of this study was to evaluate the clinical results of locking anatomical plates in displaced proximal humerus fractures and to analyze the potential complications if any, during the early period of follow-up.

METHODOLOGY

The study was conducted at a tertiary care hospital between June 2015 and May 2016. Twenty patients (16M, 4F) with displaced proximal humerus fractures were included in the study. Fractures were classified using Neer's classification.⁽³⁾

Inclusion criteria: All adult patients (age >18 years) with two/three part fractures of proximal humerus.

Exclusion criteria: i) Intra-articular comminution, ii) pathological fractures, iii) open fractures and iv) associated injuries in the same limb affecting final functional outcome.

Computerized Tomography was performed (n=8) in patients in whom fractures were difficult to assess on plain radiographs. However, Magnetic Resonance scan was not performed in any of the patients.

All patients were operated after adequate surgical fitness was obtained. Standard delto-pectoral approach was used. Near anatomical reduction was attempted in all the patients, however in few patients where this could not be achieved, attention was given to properly fixing the tuberosities in as near anatomical position as possible. In addition to routine post operative care, physiotherapy was instituted in all patients from third post-operative day.

Patients were followed up monthly for a minimum period of 6 months on out-patient basis. All findings related to symptoms, functional limitations, surgical wound condition, complications and union status on plain x-rays were recorded at each follow up. The final functional assessment was done at six months using Constant and Murley Score.

OBSERVATIONS

Twenty patients (16M, 4F) in the age group 18-70 years (mean age 46.75 years) were included in the study. Fourteen patients sustained fracture in the dominant extremity. The main mode of injury was high velocity trauma due to road traffic accidents.

The average time to union was 12.80 weeks (range 10-22 weeks). Surgical site infection was encountered in two patients at first follow up which healed with appropriate sensitive antibiotic regime. Postoperative x-ray assessment showed anatomical reduction in 12 patients (Figure 1.), non-anatomical but acceptable reduction in 3 patients (Figure 2.) and varus fixation in 5 patients. There was no loss of reduction/implant related complication in any of these patients at final follow up.



Figure 1. Anatomical reduction



Figure 2. Non-anatomical reduction.

Shoulder pain persisted for more than four weeks post operatively in eight patients, but at final follow up only 3 patients had mild pain during routine activities involving the affected shoulder. Shoulder movements were assessed in relation to pure individual planes i.e. forward flexion, abduction, internal rotation and external rotation. Loss of range of motion was calculated as percentage loss of the summation of individual range of movements. This loss calculated for over all patients decreased from nearly 70 percent at the end of 2 months to about 33% at the end of 6 months. However, when comparing two and three part fractures, we found that this loss was more in three part fractures as compared to two parts at both instances. In comparison, the unaffected shoulders in our study showed a mean loss of 12.5 degrees.

Abduction strength is measured as the average of the three readings of weight attached to a spring balance that is strapped to the hand with forearm in pronation and shoulder in 90 degrees of abduction. This test should be pain free for 5 seconds. At final follow up, the average abduction strength was 5.4 kilograms (range: 3 to 8 kgs). Functional outcome assessment according to Constant and Murley Scoring system showed 1 poor, 2 fair, 7 good and 10 excellent results.

DISCUSSION

Modern advances in orthopaedic surgery have expanded the indications of surgical treatment of proximal humerus fractures; simultaneously the complications have also been minimized. Conservative treatment except for the most undisplaced fractures is almost outdated. Kristiansen and Christensen have reported a high incidence of fixation failure following use of T-buttress plates in fixation of proximal humeral fractures.^(2,4) The anatomical plate with locking screws used in this study combines the principles of fixation with a conventional plate with those of locking screws. The benefits of this implant are that it gives enhanced purchase in osteopenic bone, there is no loss of reduction or varus/valgus angulations, the screws locking into the plate provide angular and axial stability of the construct and it is a low-profile plate.⁽²⁾

During this study, we felt that the main challenge in surgical management of proximal humerus fractures is achieving anatomical reduction. The anatomical locking plate limits further manipulation of reduction, once initial reduction is achieved across the fracture. Identifying and holding of tuberosities with non absorbable suture material prior to placement of plate is pertinent to achieve an acceptable reduction that gives good functional outcome. Few patients in whom fractures were fixed in varus showed persistent low outcome score till final follow up.

None of the fractures in our study showed a deviation in the expected progress to union. Although shoulder range of movements were

compromised when assessed in total for the study, individual case assessment showed that shoulder pain and loss of movements were proportionately lower in fractures properly reduced and fixed. Sub-acromial impingement was not a major problem in our study because of prior knowledge of this problem from the available literature. Our results corresponding with other studies in literature can probably be attributed to the minimum dissection required for fracture fixation with this system.

There have been different methods to evaluate outcome of fractures of proximal humerus.^(6,7) Although all outcome assessment systems have their own advantages, the Constant and Murley Scoring system is simple and easy to use which also includes measurement of abduction strength which is important for good functional outcome in these fractures. As per this scoring system, we had 1 poor, 2 fair, 7 good and 10 excellent results. Lesser scores were constantly seen with fractures that were fixed in varus and in non anatomical fixation of tuberosities. In a series of 20 consecutive patients, Koukakis et al.^(2,5) showed favorable early results with surgical treatment of proximal humeral fractures using the anatomical locking plate. After a mean follow up of 16 months, the mean Constant score was 76.1. The results did not differ with respect to age.

Although our study showed favorable results using anatomically locked plates for proximal humerus, any inference from it should be viewed considering its limitations like the small sample size, the short duration of study, inclusion of limited variety of fractures and not referencing our outcomes with confounding factors like age, quality of bone, and status of rotator cuff etc.

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