

External Fixator along with Multiple K Wires for Proximal Humerus Fractures

Yash Shah¹, Santosh Borkar², Shivraj Konde³, Shantanu Patil⁴, Vijith Hegde⁴

¹M.S Orthopaedics, Assistant Professor, Department of Orthopaedics, MIMER Medical College, Pune, Maharashtra, India, ²Professor, Department of Orthopaedics, MIMER Medical College, Pune, Maharashtra, India, ³M.S Orthopaedics, Associate Professor, Department of Orthopaedics, MIMER Medical College, Pune, Maharashtra, India, ⁴Junior Resident, Department of Orthopaedics, MIMER Medical College, Pune, Maharashtra, India.

Abstract

Introduction: Proximal humerus fracture is mostly treated by plating which has many disadvantages. In the literature, it is described that external fixation with K wires has many advantages over other techniques of fixation. Hence, we did this study to see the outcome of this technique.

Materials and Methods: A prospective and cohort study was carried out at MIMER Medical College, Talegaon (D) on 20 patients to see outcomes of external fixation along with multiple k wires for proximal humerus fractures. Postoperatively, X-rays and constant score was assessed at 3, 6, and 9 months.

Results: There were 12 males and eight females with mean age of 52 years. Average duration of surgery was 32 min with fluoroscopy time of 13.5. Constant score was 73.5 at 9 months. Mean fracture union time was 13.2 ± 3.1 weeks. Pin tract infection occurred in four patients.

Conclusion: This technique gives good anatomical reduction with minimal soft-tissue injury and good stability with minimal complication.

Key words: External fixator, Humerus, K wires, Fractures, Complications

INTRODUCTION

Fractures of the proximal humerus occur commonly due to fall on outstretched hand, fall at home in elderly osteoporotic patients or road traffic accidents in the young patients.^[1] It is generally agreed on that this fracture if displaced requires operative management. This fracture has an incidence of 4–5% of all.^[1] This fracture is mostly treated by internal fixation by plating. There are many disadvantages of open reduction and internal fixation (ORIF) with plating such as more operative time and blood loss, soft-tissue stripping during surgery leading to post-operative stiffness, chance of avascular necrosis of head of humerus, need for second surgery for implant removal, and post-operative infection in few patients.^[2] Furthermore, scar of surgery is

large after ORIF. However, plating allows immediate post-operative early range of motion if construct is stable and chances of malunion are less if good reduction is obtained intraoperatively, particularly in young patients.^[2] Nailing for proximal humerus fracture is not good alternative due to technical issues and poor results.^[2] Hence, the only other operative treatment is external fixation with or without K wire but it is not so popular yet. In the literature, it is described that external fixation with K wires has many advantages such as low morbidity stable enough for early range of motion, less operative time, less blood loss, and easy implant removal in office.^[3,4] However, some studies have noticed that there is risk of delayed union, non-union, or malunion in few cases as stability provided may not be enough in multi-fragmentary fractures.^[3,4] There are not enough studies in the literature which support external fixation with k wires for proximal humerus fracture in non-osteoporotic patients, though it is an accepted modality of treatment for older patient with osteoporosis who are at higher risk for prolonged general anesthesia.^[3,4] Hence, we decided to carry out a study to see outcomes of external fixation along with multiple k wires for proximal humerus fractures.

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Corresponding Author: Dr. Santosh Borkar, Maeer's MIMER Medical College and Hospital, Talegaon Station, Tal. Maval, District, Pune - 410 507, Maharashtra, India.

MATERIALS AND METHODS

A prospective, follow-up, and cohort study was carried out at MIMER Medical College, Talegaon (D) from March 2019 to February 2020. Twenty patients who presented to casualty or orthopedic OPD and who were aged 18 years to 65 years were included in study. Consent for participation in study was taken from patients and institutional ethics committee approval was taken. Patients who had associated other fractures, pathological fractures, compound fractures, Neer's 4 part fractures (where arthroplasty preferred), and osteoporotic fractures on X-ray were excluded from study. Preoperatively, all patients underwent X-ray screening of the affected shoulder in anteroposterior and axillary view for classification of fractures according to Neer's classification.^[5]

Operative Technique Followed

Patients were positioned supine on a regular OT table with affected arm left free off the drapes. Image intensifier was placed toward patients head end. Patient was given short general anesthesia usually with ketamine or propofol. A supraclavicular block was given with bupivacaine and lignocaine as per choice of anesthetist. Usually, closed reduction was achieved under C-arm guidance and 3–4 k wires (2–2.5 mm) were placed to secure fixation of fracture. 3 mm Schanz screw was placed through greater tuberosity and advanced into humeral head. Additional 2 schanz screws were placed at some distance from the first pin proximal and distal to it to secure good fixation in humeral head and neck. At least 2–4 mm schanz screws were passed into humerus shaft. External fixator was completed with connecting rod and clamps to give adequate stability to fixation. In those patients in whom closed reduction could not be obtained, open reduction was done through mini incision over fracture site following deltopectoral approach if necessary.

Patients were given I.V antibiotics for 48 h and oral antibiotics on discharge. After 2–3 days, patients were allowed to do shoulder pendulum exercises (Codman's), shoulder forward flexion upto 90°, external rotation up to 40°, and internal rotation up to tolerance for initial few weeks.

Patients were called for follow-up at 6 weeks, 3 months, 6 months, and 9 months. Depending on the union further physiotherapy was given at each stage to regain good range of motion at shoulder joint. Postoperatively, X-rays and constant score was assessed at 3 months, 6 months, and 9 months. Constant score was assessed based on pain, activities of daily living, range of movement, and power.^[6]

Data were entered into Microsoft Excel (windows 10) and then analysis was done using the Statistical Package for the Social Sciences.

RESULTS

There were 12 males and eight females. Mean age of patients was 52 years.

Duration of surgery was 32 min.

Average fluoroscopy time was 13.5 min.

Average Constant score was 73.5 at 9 months.

Mean fracture union time was 13.2 ± 3.1 weeks.

Pin tract infection was noted in four patients (easily managed with oral antibiotics and pin removal)

One patient developed non-union of fracture.

Closed reduction was achieved in 14 patients but six patients required mini-open surgery for fracture reduction.

There was no mortality.

There were three patients with Neer's Type 1, eight patients of Neer's Type 2, and nine were of Neer's Type 3 of classification.

DISCUSSION

Proximal humerus fractures are commonly encountered in adults and are commonly treated by operative procedure if displaced. There are various operative procedures for its treatment including plating, external fixation, percutaneous pinning, nailing, etc.^[7] However, plating has many advantages such as better biomechanical stability and early mobilization but requires extensive surgical dissection with possible damage to the soft tissues, aseptic necrosis of humeral head, blood loss, infection, and hardware failure in few patients.^[7] In a study by Gracitelli *et al.* which compared results of locking intramedullary nails with locking plates in proximal humerus fractures, complication rates were significant in nailing groups.^[8]

Percutaneous pinning with multiple k wires in different planes can provide fracture reduction in many patients but without good biomechanical stability with loss of reduction or malunion or non-union quite often.^[9] External fixation preserves fracture hematoma, avoids soft-tissue stripping, and may allow early mobilization in few patients but loss of reduction, malunion, and non-union chances is significantly high because of excessive rigidity or instability.^[10] Hence, we did study by combining both methods of fixation and k wires. We believe that it may prevent complications associated with plating but allow early mobilization to

prevent stiffness. Indication for treatment with external fixator does not lie only in exposed fracture as there may be significant soft-tissue damage even in closed fracture.^[10]

In our study, duration of surgery was 32 min which was comparable to other studies by Zhang *et al.* in which duration of study was 29 ± 12 min.^[11] Average fluoroscopy time was 13.5 min in our study which was comparable to study by Zhang *et al.* in which it was 12 ± 3.5 min.^[11]

In our study, union time was 13.2 ± 3.1 weeks which was comparable to studies in which external fixator was used by Benetos *et al.* (11 weeks), Ghosh *et al.* (10 weeks), and Zhang *et al.* (13 ± 3.6 weeks).^[11-13]

In our study, we got average constant score of 73.5 at 9 months which means our results were in good category overall. This was comparable to studies by Zhang *et al.* (excellent to good results in 81% patients), Benetos *et al.* (excellent constant score), Ghosh *et al.* (excellent to satisfactory results in 72.7% patients), Bloona *et al.* (average constant score of 72.5), etc.^[11-14]

In our study, average complication rate was 25% which was comparable to other studies by Bloona *et al.* (27%), Ghosh *et al.* (45%), etc. but as noted by them most of the complications were due to pin tract infection or loosening which could be easily managed with oral antibiotics and pin removal, etc.^[13,14]

In our study, only one patient developed non-union and required ORIF and plating.

Our results were comparable to study by Patil *et al.* in which fixation of proximal humerus fracture was done with Philos plate in whom constant score was between 70 and 80.^[15]

Hence, we got comparable results to other techniques and studies without major complications using external fixator and k wires for proximal humerus fractures.

CONCLUSION

External fixation with multiple k wires gives good anatomical reduction with minimal soft-tissue injury and

good stability with minimal serious complication. Overall functional outcome of technique of fixation of proximal humerus fracture with external fixator and k wires is good.

Limitation of Study

Our sample size was small and our study had no control group and hence further randomized and controlled trial for comparison is necessary.

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