



ORIGINAL RESEARCH PAPER

Orthopaedics

EVALUATION OF CLOSED REDUCTION & EXTERNAL FIXATION IN DISPLACED PROXIMAL HUMERUS FRACTURE IN ELDERLY PATIENT WITH CO-MORBID CONDITION

KEY WORDS: Peri-menopausal, Osteosynthesis, External Fixation

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ABSTRACT

INTRODUCTION: Proximal humeral fractures are occurring at or proximal to the surgical neck of the humerus most commonly in peri-menopausal female accounting for 4–5% of all fractures .
AIMS: To evaluate the clinico- radiological results of osteosynthesis by close reduction and external fixation in the management of displaced proximal humerus fractures in adults.
MATERIALS AND METHODS : 30 patients coming at OPD & emergency of Department of Orthopaedics with displaced fracture Proximal Humerus in age group of 50 – 75 years treated with Closed reduction & External Fixation.
RESULTS: Average age of our study population was around 54.3 yrs with female predominance (63.33%). Mean surgery time was 37 minutes, & mean fracture union time was 8.7 weeks .
CONCLUSION: Closed reduction & External Fixation can also be considered as an effective treatment option for osteosynthesis of judiciously selected proximal humerus fractures .

INTRODUCTION

Proximal humeral fractures are occurring at or proximal to the surgical neck of the humerus. In the adult population, proximal humeral fractures have a unimodal distribution. The incidence of proximal humerus fractures fluctuates with ages.

Females have the highest risk of suffering a proximal humerus fracture.(1) As with other osteoporosis-related fractures, additional risk factors for proximal humeral fractures include low bone mass and an increased risk of falls. Furthermore patients with poor vision, use of hearing aid, diabetes mellitus, cardio-vascular disease, cerebro-vascular accident, depression, alcohol consumption, use of anticonvulsive medication have been identified as being at increased risk of sustaining a proximal humeral fracture.

Proximal humeral fractures account for 4–5% of all fractures & 26-27% of Humerus fractures (2); most of them involving elderly and osteoporotic people (3). The 2:1 female to male ratio is likely related to issues of bone density as well (4). 51% of such fractures are displaced. Fractures with minimal displacement, regardless of the number of fracture lines, can be treated with closed reduction and early mobilization.

Approximately half of all proximal humeral fractures occur at home with the majority occurring as a consequence of falls on level ground. In individuals 60 years or older, over 90% of proximal humeral fractures result from a fall from a standing height (7). In younger individuals there is a higher incidence of proximal humeral fractures occurring outside the home, as a result of higher-energy trauma, such as a fall from a height, motor vehicle accidents (MVA), sports, or assaults.

The proximal humerus fracture can occur as a consequence of three main loading modes: compressive loading of the glenoid onto the humeral head, bending forces at the surgical neck, and tension forces of the rotator cuff at the greater and lesser tuberosities. When the glenoid impacts on the humeral head during a fall in individuals with normal bone, the proximal humeral epiphysis appears to be able to resist local compressive loads. The energy is then transferred further distally, where the weaker metaphyseal bone may yield, resulting in a surgical neck fracture. In individuals with osteoporotic bone, weaker epiphyseal bone may yield simultaneously with the surgical neck, thereby leading to more complex multi-fragmentary fractures. Tension forces may also play a role in multi-fragmentary fractures, where tuberosity fractures are caused in combination with compression of the humeral head. These tension forces play a

further role in displacement because of the unopposed pull of the rotator cuff muscles on the tuberosities, once they have become unstable. Apart from bone quality fracture configuration is influenced by the amount of kinetic energy conveyed to the shoulder, and by the position of the upper limb during injury. High-energy fractures in normal bone result in marked comminution of the surgical neck area with extension into the proximal humeral shaft with the integrity of the proximal humeral epiphysis usually being preserved. When falling onto the outstretched hand with the shoulder in flexion, abduction, and internal rotation the glenoid forces the humeral head into valgus, hinging around the infero-medial aspect of the stronger calcar bone. In the event that the patient falls directly onto the shoulder the deforming force on the humeral head will create a varus deformity which, due to the natural retroversion of the humeral head will most probably cause a posterior rotational deformity of the head segment.

The treatment options of these type of fractures may be Non-operative Or operative by Intramedullary nailing , Open reduction and plate fixation , Closed reduction & External fixation by percutaneous pinning and Primary arthroplasty.

Open reduction & internal Fixation with Locking plate provide anatomical reduction & most stable fixation , but there are also increased risk of infection, osteonecrosis , Soft tissue impingement , Adhesion, Frozen Shoulder , Rotator cuff lesion, Secondary loss of Reduction, Secondary Impaction , Primary & Secondary Screw perforation , Loosening, Screw backing out.(8,9)

External Fixation by percutaneous pinning are a popular method now a days for treatment of proximal humerus fractures. These procedure has advantages of Minimal invasion and Maximum salvage of tissues , minimal lymphovenous stasis , light weight and easy to handle , minimal OT duration & hence less duration anesthesia exposure , easy technique , early joints mobilization.

AIMS

To evaluate the clinico- radiological results of osteosynthesis by close reduction and external fixation in the management of displaced proximal humerus fractures in adults with comorbid condition .

MATERIALS AND METHODS

I. STUDY AREA:

Orthopaedics department of I.P.G.M.E.R, Kolkata.

II. STUDY POPULATION:

The patients coming to orthopaedics -OPD and Emergency with fracture of proximal humerus .

III. STUDY PERIOD:

From March 2018 to September 2019 (18 months duration)

IV. SAMPLE SIZE: 30 patients

INCLUSION CRITERIA:

1. Adult Age group (50-75 years)
2. Type of fracture: surgical neck fracture ;2/3/4 part fracture or fracture dislocation where dislocation can be reduced by close methods
3. Closed displaced proximal humerus fracture
4. Fracture of duration <3 weeks
5. Those willing to participate in the study through

EXCLUSION CRITERIA:

1. Head split fracture & fracture dislocation.
2. Polytrauma injury of ipsilateral limb .
3. Unsalvageable distal limb due to neuro-vascular injury or any other reason.
4. Sufficient Loss of bone from distal fragment rendering reduction impossible.
5. Pathological fracture
6. Old and neglected fractures (>3weeks)
7. Patient unwilling to undergo surgery

VI. STUDY DESIGN:

This is an institution based, prospective longitudinal study.

VII. PARAMETERS TO BE STUDIED:

- Radiological fracture union
- CONSTANT-MURLEY SCORING SYSTEM for shoulder:
 - 1) pain(15 points)
 - 2) Activities of daily living (20 points)
 - 3) Strength (25 points)
 - 4) Range of motion (40 points)

The higher the score the higher the quality of the function.

External Stabilization System with the associated instrumentation set including:

- Threaded K-wires, 2 to 2.5 mm thick
- Link joints of stainless steel blocks with 2 offset holes to which K-wires and connecting rods are clamped
- Connecting rods, 3 to 4 mm in diameter and of suitable lengths
- Allen keys
- K-wire bender & cutter
- Hand drill & T handle



Instruments required for Closed reduction & external fixation

OPERATIVE TECHNIQUE

Under general or regional anesthesia the patient is positioned on a special beach chair or on a regular operating room table with a long bean-bag contoured medial to the scapula to ensure that the entire shoulder girdle is freely exposed for fluoroscopic imaging. The patient's muscles must be completely relaxed , so that the surgeon can manipulate the fracture fragments to obtain reduction. In many patients, the humeral shaft is either angulated with the apex anterior or

completely displaced anteriorly as a result of the pull of the pectoralis major tendon . Reduction is performed by applying longitudinal traction with the arm in minimal abduction and some flexion to relax tension on the pectoralis major, and posterior pressure on the humeral shaft then reduce both displacement and angulation between the shaft and the humeral head fragments . For three-part fractures, the subcapital fracture is reduced with adduction, internal rotation, and axial traction on the arm. A pointed hook retractor is inserted into the subacromial space to manipulate the greater tuberosity fragment anteriorly and inferiorly into anatomic position. For four-part valgus impacted fractures or true four part fractures, a periosteal elevator is used to elevate and laterally translate the articular fragment.

PERCUTANEOUS FIXATION WITH PINS:

- Three pins at humeral head will be at 30° to each other in the same horizontal plane.
- The 1st one just lateral to bicipital groove.
- The 2nd one in true lateral plane
- The 3rd one posterior to the central one.
- The shoulder should be externally rotated during placement of the greater tuberosity pins so as to move the axillary nerve and the posterior circumflex artery farther away from the humeral neck.

POSTOPERATIVE CARE

1. The limb has been placed in a triangular sling.
2. Alternate day pin tract dressing was done using Normal saline & ciprofloxacin or gentamycin eye drop.
3. Patients were encouraged to begin active use & mobilization ,mainly pendulum movement from postoperative day one to three depending upon postoperative pain.
4. After 2weeks all movement exercises were encouraged progressing to unrestricted full range of motion except abduction initially supine position ,gradually to sitting and standing position.
5. The patients were examined thoroughly clinically and radiologically at two weeks interval till removal of pins at 6-8 weeks .
6. Shoulder abduction & other motions are encouraged after removal of k wires.

FOLLOW UP

At 4 weeks, 6 six weeks, 8 weeks, and then 4 weekly interval, looking for clinical and radiological union , Constant-Morley Score, complication. Constant-Morley Scoring System consists of four variables that are used to assess the function of the shoulder. The subjective variables are pain and activities of daily living (ADL) (sleep, work, recreation/sport), which give a total of 35 points (pain: 15, ADL: 20). The objective variables are range of motion and strength, which give a total of 65 points (range of motion: 40, strength: 25). Altogether there are 100 points. Constant Score divides the outcome of patients into four categories, i.e. excellent having a score >85, good having a score between 71 and 85, fair having a score between 61 and 70, and poor outcome with a score of 60 or less.

RESULTS

Average age of our study population was around 54.3 yrs with female predominance (63.33%). Most of the fractures were on right side(60%), probably due to the fact that maximum people use their right dominant limb .

Most of the fractures in our study caused by fall on ground (66.7%). Maximum patients had co morbidities (93.3%), & 40% of them had multiple co morbidities.

Among all 46.6% patients had 3 part fractures , while 36.7% was 2 part & 16.7% was 4 part fractures.

Mean fracture duration before operation for closed reduction

was 5.9 days with minimum 4 days & maximum 10 days.

Mean surgery time was 37 minutes(Range35-60 min).

The mean fracture union time was 8.7 weeks .

There were 6 excellent (20%),20 good (66.7%) & 4 fair (13.3%) constant murley score grading in Closed reduction & external fixation group.

DISCUSSION

Study shows there is significantly faster fracture union in case of closed reduction(mean time 8.7 weeks) probably due to non disruption of fracture hematoma in case of closed reduction & external fixation. The Constant Murley Score at 3 & 6 weeks after surgery are significantly high.

CONCLUSION

Our study shows that operative time & fracture union time is significantly less in Closed reduction & external fixation .Complications are also less in case of Closed reduction & external fixation. Constant -Murley score is significantly superior in Closed reduction & external fixation

Therefore we can say that Closed reduction & External Fixa tion can also be considered as an effective treatment option for osteosynthesis of judiciously selected proximal humerus fractures in low cost.

LIMITATION OF OUR STUDY

This study was not without limitations. Sample size was small and evaluation of only short term outcomes was done. As this was not a multi-centric and multi-observer study, biasness may be there for the chosen surgical methods.

ACKNOLEDGEMENT :

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DECLARATION

FUNDING :None

CONFLICTS OF INTEREST :None

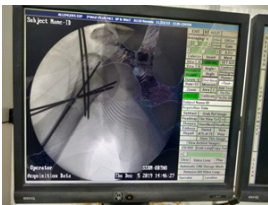
ETHICAL APPROVAL :

Institutional Ethical committee approval taken.

PHOTOGRAPH



3 Part # Proximal Humerus



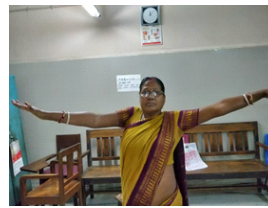
Immediate Post- op



4 weeks Post Op - Radiology



4 weeks Post Op- External Rotation



4 weeks Post Op - Active Abduction



6 weeks Post Op- Active Abduction

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