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# Functional Outcome of Proximal Humerus Fractures Treated with Closed Reduction and Percutaneous Pinning

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## Abstract

**Background**: Fractures of proximal humerus are very common. Many options are available for its management including non-operative management. Reconstruction of the articular surfaces including restoration of the anatomy and a stable fixation with minimal soft tissue damage is the main principle of this procedure. Percutaneous pinning is the less invasive, less time consuming and reliable procedure and avoids complications such as avascular necrosis, infections and heavy weight bearing implants. **Aims and Objectives:** 1. To study the clinical profile of adult patients with proximal humeral fractures. 2. To study the functional outcome of closed reduction and percutaneous pinning of proximal humeral fractures. 3. To study the factors affecting functional outcome of proximal humeral fractures. **Materials and Methods:** This is a prospective study among 32 patients on whom percutaneous pinning was done after closed reduction for the fractures of proximal humerus. This study was conducted from August 2014 to December 2016. **Results**: According to Neer's functional assessment score the functional outcome was excellent in 18 (56.3%) patients, satisfactory in 6 (18.8%) patients, unsatisfactory in 7 (21.9%) patients and failure in 1 (3.1%) patient. **Conclusion**: Percutaneous pinning is simple, less invasive, reliable and effective procedure. It reduces risk of heavy implant bearing, infection and avascular necrosis.

**Keywords:** Neer's Functional Assessment Score, Percutaneous Pinning, Proximal Humerus Fractures

## 1. Introduction

Proximal humeral fractures are common and debilitating injuries, particularly among the elderly. Many treatment modalities are available for such injuries and each has its advantages and disadvantages[1]. The shoulder joint has the greatest range of motion as compared to any other joint in the body; it's because of the shallow glenoid fossa which is only 25% of the humeral head. Main stabilizers of the shoulder joint are not bones but soft tissue envelope composed of muscles, ligaments and capsule. Humerus is almost 35-45° retroverted proximally relative to epicondylar axis[2]. Fall on an outstretched hand is the commonest mode of injury in old osteoporotic bones and high energy trauma like motor vehicle accident is the commonest mode of injury in younger individuals[2]. About 2-3% of upper extremity fractures occur in proximal humerus. A three fourth of these fractures occur after 60 years of age and are commonly seen in women. Majority (85%) of the proximal humeral fractures are minimally displaced while the remaining (15%) are of the severe category about which much of the debate is centered[3].

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Poor functional outcome is commonly seen in untreated 3 and 4 part fractures of proximal humerus while its open reduction and fixation increases the risk of avascular necrosis and infections for which percutaneous pinning is preferable[4]. Different types of surgical techniques for proximal humerus fractures are percutaneous pinning, plate and screw fixation, fixation with intramedullary rods or pins, tension band wiring with or without plates or rods, standard plate modification into blade plate constructs, and hemiarthroplasty[5]. In order to minimize the complications like pin site infection, loosening, neurovascular damage, techniques such as fixed pin site insertion and threaded pins in osteoporotic patients are used. So percutaneous pinning is a safe and novel method of management of unstable proximal humeral fractures if certain principles are borne in mind before using it[6]. Many literatures and treatment modalities are available on this topic. The treatment modalities for the same. The treatment modality changes according to the age, bone quality, surgeons expertise and patients expectations. The surgery should be done as soon as the patient's general condition permits because the delay in treatment may increase the difficulty in reduction and fixation of the fracture, resulting in unwanted complications[7]. Reduction in dissection and stripping of soft tissue is seen in percutaneous pinning technique[8].

## 2. Present Study

"Functional outcome of proximal humerus fractures treated with closed reduction and percutaneous pinning" was done to explore the advantages of percutaneous pinning after closed reduction in the proximal humeral fractures.

## 3. Aims and Objectives

1. To study the clinical profile of adult patients with proximal humeral fractures.
2. To study the functional outcome of closed reduction and percutaneous pinning of proximal humeral fractures.
3. To study factors affecting the functional outcome of proximal humeral fractures.

## 4. Materials and Methods

Prospective study of 32 patients with fracture of proximal humerus treated with close reduction and percutaneous pinning was done in the department of orthopedics at Dr Vasantrao Pawar Medical College Hospital and Research Centre from August 2014 to December 2016.

**Inclusion criteria**: 1. Neer's type 2, 3 or 4 part fractures with < 45 degree of angulation of articular surface or <1 cm of displacement between major fragments. 2. Displaced or undisplaced fractures without comminution.3. Where fracture can be reduced close.4. Maintenance of glenohumeral congruity. 5. Two, three and four part valgus impacted fracture without lateral displacement.

**Exclusion criteria:** 1. Medically unfit patients.2. Pathological fractures. (Excluding osteoporotic fractures. 3. Pediatric fractures. 4. Proximal humeral fractures with shaft extension. 5. One part fracture. 6.Seropositive.

## 5. Surgical Methodology

Pre-operative investigations (figure 1) was done on the patients before injecting anesthetist as advised by the anesthetist. The patient was placed in a beach chair position. Closed reduction was performed under C-arm

**Figure 1.** Pre surgical X-ray.

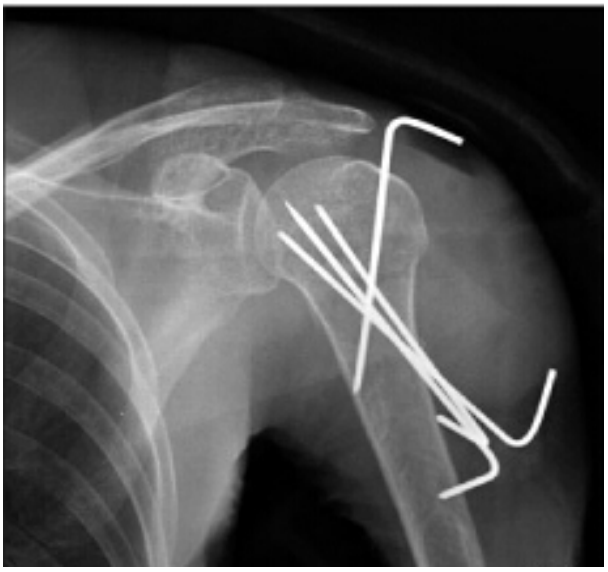

**Figure 2.** Post surgical X-ray.

**Figure 3.** Post-Union X-ray.

guidance. Reduction was confirmed under C-arm guidance and maintained by the assistant. Surgeon inserted the percutaneous pins just below the insertion of deltoid and preceded towards humeral head, another pin was inserted from the greater tubercle to the humeral shaft. Partially threaded or simple k wires were used for fixation. Three to five wires can be used for fixation and the fixation was confirmed under the c-arm guidance. Wires were bent and cut outside the skin (figure 2). Shoulder immobilizer was given for a period of 6 weeks or till the fracture becomes sticky after which the pins are removed and gradual rehabilitation is started (figure 3).

## 6. Results

According to Neer's functional assessment score (table 1) excellent results were seen in 18(56.3%) patients, satisfactory results in 6(18.8%) patients, unsatisfactory results in 7(21.9%) patients, failure in 1(3.1%) patient.

**Table 1.** Results According to Neer's Scoring System

| Functional Outcome | N | % |
|---|---|---|
| Excellent | 18 | 56.3% |
| Satisfactory | 6 | 18.8% |
| Unsatisfactory | 7 | 21.9% |
| Failure | 1 | 3.1% |
| Total | 32 | 100.0% |

## 7. Discussion

The functional outcome was excellent in 18 (56.3%) patients, satisfactory in 6 (18.8%) patients, unsatisfactory in 7 (21.9%) patients, failure in 1 (3.1%) patient. Dr. Gupta in 2010 also reported similar results with excellent outcome[7].

## 8. Conclusion

Closed reduction and percutaneous pinning of proximal humerus fractures is simple, less invasive, reliable and effective procedure. It reduces the risk of heavy implant bearing, infections and avascular necrosis which are common in open fracture reduction and internal fixation with heavy implants.

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