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A Clinical Study on Surgical Management of Proximal Humeral Fractures by Locking Plates

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Abstract

Introduction: Over the last 3 decades, various modalities of fixations have evolved for the proximal humerus fractures. Of this proximal humerus locking plate is the implant of choice now for treatment of displaced proximal humerus fractures since they provide rigid anatomical fixation and more angular stability. Hence, It permitsearly mobilization and good functional limb. *Methodology:* This was a prospective study of 21 cases of proximal humerus fractures in adults treated by surgical fixation with proximal humerus locking plate. Twenty one patients were randomly selected from among the admission to the accident ward in Department of Orthopaedics and recruited into the study prospectively. *Results:* The average time for fracture healing is 10.15 weeks (Ranging from 8 weeks to 15 weeks). Fracture type, comminution and presence of infection shad a significant role in fracture union. 5 patients, who had stiffness, underwent physiotherapy and attained functionally acceptable range of movements. *Conclusion:* Anatomical restoration of the tuberosity had direct relationship with the range of movements. Cases with good anatomical restoration had excellent results.

Keywords: Humerus Fracture; Locking Plate; Anatomical Restoration.

Introduction

Proximal humerus fractures are common and debilitating injuries and incidence of them are increasing especially in elderly. They accounts for about 5% of all injuries to appendicular skeleton. They are the third most common fractures in elderly population after hip and distal radius fractures. Increase in incidence is due to more geriatric population with osteoporosis in aged population and increasing incidence of higher velocity injuries, Increasing incidence of road traffic accidents, natural disasters and industrial accidents, together with assault lead to multiple fractures and higher incidence of morbidity in young patients.

In the past century, non operative treatment of proximal humerus fractures has been documented as an acceptable approach [1]. About 80-85% of proximal humeral fractures can be treated nonoperatively, resulting in good functional outcomes. For the 15% to 20% of displaced proximal humerus fractures that may be need surgical fixation for better results. The incidence of complications from operative treatment varies between 11% and 50% [2].

Over the last 3 decades, various modalities of fixations have evolved for the proximal humerus fractures (transosseus suturing, percutaneous pinning, tension band wiring, platting, rush nailing, shoulder arthroplasty). Of these proximal humerus locking plate is the implant of choice now for treatment of displaced proximal humerus fractures since they provide rigid anatomical fixation and more angular stability. Hence, It permitsearly mobilization and good functional limb.

Methodology

This was a prospective study of 21 cases of proximal humerus fractures in adults treated by surgical fixation with proximal humerus locking plate. Twenty one patients were randomly selected from among the admission to the accident ward in Department of Orthopaedics and recruited in to the study prospectively based on the following criteria.

Inclusion Criteria

1. Age above 20yrs.
2. Consent from the patients.

Exclusion Criteria

1. Co-morbidailments.
2. Compound fractures.
3. Two part fractures involves avulsion of greater and lesser tuberosity.
4. Head splitting fractures (more than 40% of articular surface).
5. Three and four part fractures with dislocation.

Results

Table 1: Time interval between injury and surgeries

Time Interval	No. of cases	Percentage
<2 days	5	23.8
3-5 days	11	52.38
>5 days	5	23.8

Table 2: Complications

Complications	No.ofPatients
Stiffness	5
Superficial infections	2
Deep infection	1
Pullout of head screw	1
Osteonecrosis of humeral head	1
Impingement Syndrome	1
Varusmal union	1
Delayed/ Non union	0

In our Study we Meet the Following Complications:

It is the most common complication to occur in our study. It is due to the internal adhesive scaring between the tissue planes. All of them underwent vigorous shoulder mobilization exercises and showed better results.

In our study 2 patients had superficial infection. They were treated with appropriate antibiotics. Both these 2 patients intraoperatively had injury to cephalicve in and developed significant edema distal to the arm present post operatively. It compromises with the wound healing. Infections settled within 2 weeks for both the patients.

For the patient having deep infection we did a wound wash and debridement in the 4th POD and applied secondary closure. This patient had a lowers core with limited movements.

One female patient with four part fracture developed osteonecrosis of head with poor functional outcome. Though the extensive soft tissue stripping will cause the problem, the advantage of the locking compression plate is good anatomical restoration of the tuberosity to the remaining shaft of humerus. Later replacement surgery will be easy and have good functional outcome.

It is a technical problem in which pull out of all the heads crews in the immediate postoperative period. Then we did revision surgery for that patient. We delayed the mobilization up to 8-10 week for that patient.

Due to the placement of the plate very close to the greater tuberosity, we had this problem. Initially we treated this patient with local heat therapy and steroid injections. Patients had recurrence and remission. So wedid early implant exit after radiological bonyunion.

The inclination angle between the humeral head and shaft was reduced to 100 degree in onec ase. Due to the comminution in the medial cortex leads to this problem. Range of abduction was reduced in that

patient. But functional outcome was better.

The Analysis was done using the **Constant Murley scoring system** and the following results were obtained.

The average time for fracture healing is 10. 15 weeks (Ranging from 8 weeks to 15 weeks). Fracture

Table 3: Outcome

Grading	No. of Cases	Percentage
Excellent	5	25%
Good	7	35%
Moderate	6	30%
Poor	2	10%

Table 4: Results According to Neer's type

Neer's type	No. of cases	Score
2 Part (Surgical neck)	4	77.5
3 Part	11	75.72
4 Part	5	60.2

type, comminution and presence of infections had a significant role in fracture union.

5 patients, who had stiffness, underwent physiotherapy and attained functionally acceptable range of movements. Anatomical restoration of the tuberosity had direct relationship with the range of movements. Cases with good anatomical restoration had excellent results.

Discussion

In recenty ears, rigidi nternal fixation has been increasingly used in the operative cases of proximal humerus fractures. Inspite of early postoperative mobilisation these implant would reduce the risk of secondary reduction loss, particularly inosteoporotic bone.

Proximal humerus locking plate is the most commonly used implantat present for these fractures. It permits indirect reduction of the articular fragments using image in tensifier, thus lowering the possibility of AVN particularly in four part fractures. Outcome with other type of implants were not as good as when fixed with proximal humerus locking plate and that too especially in elderly with osteoporosis [3].

Table 5: The Average Clinical Results Obtained in our Study

Mean constant Murleyscore	71.14
Infection Rate	15%
AVN Rate	5%
Technical Problems	10%
Stiffness	25%

These results are comparable with the various prospective studies conducted in other parts of the world and the same are shown below [4,5,6].

Table 6: Comparative study of outcomes of various studies

Study	Bulent etal 2008	Fazal MA 2009	Martinez AA 2009	Handschin 2009	Moonot P 2009	Our study
Constant Murley Score	75.5	70	80	81	66.5	**71.14**

Two patients were with poor outcome scores, one due to the AVN of the head,and another one due to the immediate pullout of heads crews. Though infection rate (15%) appeared to be higher, the functional outcomes of these patients were with moderate scores.

Technical problems in this study, namely crew pullout and high position of the plate which leads to impingement syndrome are not uncommon. These problems can be corrected in future procedures. Though the rate of stiffness is also very high (25%), the study period is too short to commit these results. After the couple of years the range of movement in

these patients may improve due to physiotherapy and functional outcome score may goup.

Exact anatomical repositioning of the tuberosities and rigid internal fixation was associated with a significantly better functional result. The results attained n our patients high light the importance of the restoration of the correct anatomical relationship between individual fragments. Temporary K-wire fixation of the fragments and non absorbable suturing techniques are very important in anatomical restoration tetuberosities [2].

Using multiple locking screws of adequate length in multiple directions improves the fixation. Intraoperative fluoroscopy is important to ensure that no screws penetrate the head and impinge on the glenoid. Arthroplasty should e considered for patients with pre existing arthritis, shoulder stiffness, severe comminution and head splitting fractures, rather than fixation.

Due to the increased incidence of road traffic accidents (High velocity injury), occurrence of proximal humerus fractures in young patients is increasing. Even though, the follow up time in our study was relatively short and it was not a randomized controlled study, the results are comparable with other published studies.

The functional results after rigid fixation of three and four part fractures using a plate or screws were showing to be better than conservative treatment or semi rigid fixation. Shoulder function continued to improve as the strength and function of the muscles increased.

Conclusion

Accurate anatomical restoration of the articular surface and tuberosities appear to be more important for the better functional outcome.

Anadequate surgical technique will minimize complications and an aggressive rehabilitation regime (active physiotherapy) will ensure the best possible result.

The surgeon's familiarity with the technique and the implant chosen always play an important role.

References

1. Bigliani LU, Flatow EL, Pollock RG. Fractures of the proximal humerus. In: Rockwood CA, Green DP,Bucholz RW,Heckman JD,eds. Fractures inadults. Philadelphia,etc: Lippincott-Raven, 1996.p.1055-107.
2. RL Sahu:Philo sLocking plates in proximal humerus fractures –literature review.. The InternetJournal of Health. 2010; 11(1).
3. Neer CS. I.Displaced proximal humeral fractures.II. Treatment of three- part and four-part displacement. J Bone Joint urg Am 1970; 52:1090-1103
4. Brostrom F. Early mobilization of fractures of the upper end of the humerus. Arch Surg1943; 46: 614-615.
5. Kannus P, Palvanen M, Niemi S, et al: Osteoporotic fractures of the proximal humerus in elderly Finnish persons: Sharp increase in 1970–1998 and alarming projections for the new millennium. Acta Orthop Scand 2000; 71:465-47.
6. Muller ME, Allgower M, Willeneger H. Manual of internal fixation. New York: Springer-Verlag, 1970.