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Original Research Article

Assessing Role of Locking Humerus Plating for Early Mobilization of Fractures of Proximal Humerus in Adult: An Observational Study

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Abstract:

Aim: The aim of the present study was to role of locking humerus plating for early mobilization of fractures of proximal humerus in adult at tertiary care center.

Methods: The Present study was single-center, prospective, observational and descriptive study, conducted in Department of Orthopaedics. Study duration was of 2 years. In present study, 50 cases satisfying study criteria were studied

Results: Majority were males (68%), > 60 years age (54%), mode of injury due to RTA (72%), injury on right side (58%) and had co-morbidities such as hypertension (32%), diabetes mellitus (20%), coronary artery disease (14%). Majority were 2 part fracture (48%) as compared to part 3 (28%) and part 4 (24%). The Neer's scoring system of the severity of pain, function, range of movement, anatomy, was done to determine the end results. In present study excellent, satisfactory and unsatisfactory results were noted in 26%, 58% and 16% patients. Complications noted were Plate impingement (8%), Varus malunion (6%) and Stiffness (6%).

Conclusion: Locking compression plate for management of fractures of proximal humerus is beneficial mainly due to stable fixation, angular stability and early functional aftercare is possible. It helps patients for early mobilization, to regain good shoulder function and resume normal activities much earlier.

Keywords: Locking compression plate, fractures of proximal humerus, stable fixation, early mobilization.

Introduction

Fractures of the proximal humerus are common and debilitating injuries and have bimodal age distribution. In old patients it is often due to low energy injury. [1,2] However, in young patients proximal humerus fracture is often due to high energy trauma and is associated with severe comminution. [3] Complications following proximal humerus fracture and management can be broadly classified as ones due to the fracture itself and ones due to the management options. Complications like stiffness, avascular necrosis and secondary osteoarthritis are often related to the severity of the fracture.

Majority of undisplaced proximal humeral fractures can be treated with a sling immobilization and physical therapy. [4] However, approximately 20% of displaced proximal humeral fractures require surgery. [5] Conservative treatment is usually associated with nonunion, malunion and avascular necrosis resulting in a painful dysfunction. [6,7] The surgical modalities used are transosseous suture fixation, closed reduction and percutaneous fixation, open reduction and internal fixation with conventional plates, locking plate fixation and hemiarthroplasty which have shown to have mixed results. [5,8]

Proximal humerus fracture management is constantly evolving, because of improved understanding of fracture characteristics and also various modifications and innovations in surgical techniques. [9] Wide variety of treatments like percutaneous fixation, closed reduction, internal fixation, k-wire fixation, hemiarthroplasty, and recently use of locking compression plate have been advocated. Advantage of the locking compression plate is better anchorage of screws in osteoporotic bone. Because of the good fixation, enhanced stability will allow for early mobilization of the injured shoulder. More current data, concerning the use of locking plates in the treatment of fractures of the proximal humerus, have been very encouraging. [10-12] Locking

plates is the preferred type of intervention owing to its biomechanical properties for the displaced proximal humerus fractures. [13,14] It can be applied even in the fixation of osteoporotic bone.7 Moreover, newer advancement had been made in the fixation techniques to increase the chance of anatomic restoration but with the limitation of patients immobilization time which is responsible for stiffness. [15,16]

The aim of the present study was to role of locking humerus plating for early mobilization of fractures of proximal humerus in adult at tertiary care center.

Materials and Methods

The Present study was single-center, prospective, observational and descriptive study, conducted in Department of Orthopaedics, Darbhanga Medical College and Hospital, Darbhanga, Bihar, India. Study duration was of 2 years. In present study, 50 cases satisfying study criteria were studied

Inclusion criteria: Patients of either gender, >18 years age, with displaced proximal humerus fractures according to NEER two, three- and four-part fracture, posted for surgery with locking humerus plating.

Exclusion Criteria: With associated dislocation of the shoulder, Undergoing revision surgery for failure of other implants, Failure of conservative treatment. Pathologic fractures from primary or metastatic tumors, Open fractures and Poly trauma, Four-part fracture in elderly, with neurovascular deficits.

On admission, patients were informed about the study, and written consent was taken for participation and follow up. Patients underwent detailed history taking and physical examination. X ray (Antero-Posterior and Lateral views.) of injured arm was done and diagnosis was confirmed. After confirmation of the proximal humerus fracture, patient were taken into the study, if they fit into the above criteria. Fractures were classified using Neer's classification. Patients underwent open reduction internal fixation with philos locking plating under GA. Post- operative physiotherapy, was started on day 3 and gradually increased along with early mobilisation. Post-op sutures were removed on the 10th postop day and patient was discharged with the U-slab applied and arm supported in an arm pouch. Follow-up was advised at 3 weeks, 6th week, 3rd month, 6th month and 1year. At each visit, clinical examination (wound/scar, tenderness, movements of joints, NV status and radiological evaluation (evidence of union and status of the implant) was done and post-operative complications if any, noted.

Data was collected and compiled using Microsoft Excel, Statistical analysis was done using descriptive statistics.

Results

Table 1: General characteristics

Characteristics	N	%
Gender		
Males	34	68
Females	16	32
Age in years		
20-40	8	16
40-60	15	30
>60	27	54
Mode of injury		
RTA	36	72
Fall, others, etc.	14	28
Limb involved		
Right Side	29	58
Left Side	21	42
Co-morbidity		
Hypertension	16	32
Diabetes Mellitus	10	20
Coronary artery disease	7	14
Classification		
2 Part Fracture	24	48
3 Part Fracture	14	28
4 Part Fracture	12	24

Majority were males (68%), > 60 years age (54%), mode of injury due to RTA (72%), injury on right side (58%) and had co-morbidities such as hypertension (32%), diabetes mellitus (20%), coronary artery disease (14%). Majority were 2 part fracture (48%) as compared to part 3 (28%) and part 4 (24%).

Table 2: Neer's scoring system

Neer's scoring system	N	%
Excellent	13	26
Satisfactory	29	58
Unsatisfactory	8	16

The Neer's scoring system of the severity of pain, function, range of movement, anatomy, was done to determine the end results. In present study excellent, satisfactory and unsatisfactory results were noted in 26%, 58% and 16% patients.

Table 3: Complications

Complications	N	%
Plate impingement	4	8
Varus malunion	3	6
Stiffness	3	6

Complications noted were Plate impingement (8%), Varus malunion (6%) and Stiffness (6%).

Discussion

Proximal humeral fractures account for almost 4-5% of all fractures. [17,18] These fractures have a dual age distribution occurring either in young people following high energy trauma or in those older than 50 years with low velocity injuries like simple fall. [19] It has been always enigma of management because of numerous muscles attachment and the paucity of space for fixing the implant in fracture of the proximal humerus. The treatment is more controversial for articular fractures which carry a high risk of the humeral head necrosis. [20] Conservative treatment is usually associated with nonunion, malunion and avascular necrosis resulting in a painful dysfunction. [21]

However, locking plates provided better stability than conventional plates which were used in the past. The use of locking plates has currently become the standard protocol for open reduction and internal fixation of proximal humerus fractures especially in the elderly patients with poor bone quality. In the locking plate system, all the forces are transmitted from the bone via the locking head screws to the blade and vice versa. Fixed angle plates enable a gain in the torsional stiffness and stability which promotes a superior outcome and less chance of complications like cut-out of the screws and plates, non-union, avascular necrosis, and fractures distal to the plate. [22] Majority were males (68%), > 60 years age (54%), mode of injury due to RTA (72%), injury on right side (58%) and had co-morbidities such as hypertension (32%), diabetes mellitus (20%), coronary artery disease (14%). Majority were 2 part fracture (48%) as compared to part 3 (28%) and part 4 (24%). Arumugam S et al [23] noted that the majority of the patients were males, elderly aged, with RTA being the commonest mode of injury, involving 2 part, 3 part and 4 part fractures of the proximal humerus.

The Neer's scoring system of the severity of pain, function, range of movement, anatomy, was done to determine the end results. Neer recommended open reduction and internal fixation for displaced two and three parts fractures. Most of the poor results following open reduction and internal fixation of three-part fracture are due to imperfect technique. [24] However, with the aim of getting anatomically accurate reductions, rapid healing and early restoration of function, which is a demand of today's life, open reduction, and internal fixation, is the preferred modality of treatment. The goals of surgery are to obtain anatomic fracture reduction and stable primary fixation to ensure rapid fracture healing and immediate post-operative functional therapy without prolonged immobilization. [25]

In present study excellent, satisfactory and unsatisfactory results were noted in 26%, 58% and 16% patients. Aggarwal et al [26] showed their study CMS result of patients with 17.02% in excellent, 38.3% in good, 34.4% in moderate and 10.6% in poor. Siwach et al [27] revealed their patients with 28 in excellent, 64% in good, 8 in moderate and nil in poor. Bjorkenheim et al [28] demonstrated their patients of 5.5% in excellent, 44.4% in good, 43% in moderate and 6.9% in poor. Mahesh et al [29] illustrated their patients Constant Murley score result population of 15% in excellent, 55% in good, 15% in moderate and 10% in poor.34 Complications noted were Plate impingement (8%), Varus malunion (6%) and Stiffness (6%). Other studies have shown high complication rates ranging from 16 - 36%, which include articular screw penetration, subacromial impingement, varus malalignment, nonunion, implant failure, and osteonecrosis of the humeral head which adversely affects the final outcome. Further, most of these complications were attributed to poor surgical technique, improper implant positioning, and failure of accurate intraoperative assessment of reduction and screw length. Additionally, meticulous surgical dissection to preserve vascularity of humeral head is necessary to prevent potential complications such as AVN. [30-32]

Conclusion

Locking compression plate for management of fractures of proximal humerus is beneficial mainly due to stable fixation, angular stability and early functional aftercare is possible. It helps patients for early mobilization, to regain good shoulder function and resume normal activities much earlier.

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