e-ISSN: 0976-822X, p-ISSN:2961-6042

Available online on http://www.ijcpr.com/

International Journal of Current Pharmaceutical Review and Research 2024; 16(5); 361-365

Original Research Article

An Observational Study Assessing Outcome of Locking Humerus Plating for Early Mobilization of Fractures of Proximal Humerus

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Received: 06-03-2024 / Revised: 11-04-2024 / Accepted: 14-05-2024
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Conflict of interest: Nil

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 Orthopaedic, ESICMCH, Bihta, Bihar, India. Study duration was of 2 years. In present study, 80 cases satisfying study criteria were studied

Results: Majority were males (70%), > 60 years age (52.5%), mode of injury due to RTA (72.5%), injury on right side (60%) and had co-morbidities such as hypertension (32.5%), diabetes mellitus (20%), coronary artery disease (15%). Majority were 2 part fracture (47.5%) as compared to part 3 (30%) and part 4 (22.5%). 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 25%, 60% and 15% patients. Complications noted were Plate impingement (7.5%), Varus malunion (6.25%) and Stiffness (6.25%).

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

Management of proximal humerus bones fractures is cumbersome as they are linked with higher morbidity. Proximal humerus bones fractures is the third most common type of fragility fracture with increasing incidence globally. [1] They are responsible for 6% of all the adult fractures. [2,3] It is difficult to treat proximal humerus bones fractures when it is unstable, displaced, and comminuted. Conservative management for proximal humerus fractures are not beneficial as it might lead to incomplete union or malunion, and avascular necrosis (AVN) which causes disability in patients. [4] Locking plates is the preferred type of intervention owing to its biomechanical properties for the displaced proximal humerus fractures. [5,6] 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. [8-11]

Proponents of locking plate fixation often cite better fixation, early mobilization, head preservation, restoration of range of motion and satisfactory function as some of the major advantages of locking plate construct. Proponents of prosthetic replacement often quote predictability in terms of pain relief as the major advantage but prosthetic replacement often fails to provide necessary function, stability and range of motion in young active patients and hence not a suitable option in this group of patients. 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. [13-15] There is ongoing controversy regarding the ideal methods of treating displaced proximal humerus fractures. Many published series in the literature are retrospective reviews of limited numbers of cases, with combined approaches and techniques used by different surgeons. They are still unsolved fractures in many ways. [16-18]

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 Orthopaedic, ESICMCH, Bihta, Bihar, India. Study duration was of 2 years. In present study, 80 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	56	70
Females	24	30
Age in years		
20-40	12	15
40-60	26	32.5
>60	42	52.5
Mode of injury		
RTA	58	72.5
Fall, others, etc.	22	27.5
Limb involved		
Right Side	48	60
Left Side	32	40
Co-morbidity		
Hypertension	26	32.5
Diabetes Mellitus	16	20
Coronary artery disease	12	15
Classification		
2 Part Fracture	38	47.5
3 Part Fracture	24	30
4 Part Fracture	18	22.5

Majority were males (70%), > 60 years age (52.5%), mode of injury due to RTA (72.5%), injury on right side (60%) and had co-morbidities such as hypertension (32.5%), diabetes mellitus (20%), coronary artery disease (15%). Majority were 2 part fracture (47.5%) as compared to part 3 (30%) and part 4 (22.5%).

Table 2: Neer's scoring system

Neer's scoring system	N	%
Excellent	20	25
Satisfactory	48	60
Unsatisfactory	12	15

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 25%, 60% and 15% patients.

Table 3: Complications

Complications	N	%
Plate impingement	6	7.5
Varus malunion	5	6.25
Stiffness	5	6.25

Complications noted were Plate impingement (7.5%), Varus malunion (6.25%) and Stiffness (6.25%).

Discussion

Proximal humeral fractures account for almost 4-5% of all fractures. [19,20] These fractures have a dual age distribution occuring either in young people following high energy trauma or in those older than 50 years with low velocity injuries like simple fall. [21] 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. [22] Conservative treatment is usually associated with nonunion, malunion and avascular necrosis resulting in a painful dysfunction. [23]

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. [24] Majority were males (70%), > 60 years age (52.5%), mode of injury due to RTA (72.5%), injury on right side (60%) and had co-morbidities such as hypertension (32.5%), diabetes mellitus (20%), coronary artery disease (15%). Majority were 2 part fracture (47.5%) as compared to part 3 (30%) and part 4 (22.5%). Arumugam S et al [25] 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. [26] 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. [27]

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 25%, 60% and 15% patients. Aggarwal et al [28] 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 [29] revealed their patients with 28 in excellent, 64% in good, 8 in moderate and nil in poor. Bjorkenheim et al [30] demonstrated their patients of 5.5% in excellent, 44.4% in good, 43% in moderate and 6.9% in poor. Mahesh et al [31] 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. Complications noted were Plate impingement (7.5%), Varus malunion (6.25%) and Stiffness (6.25%). 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. [32-34]

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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