CASE SERIES -A PROSPECTIVE STUDY OF FUNCTIONAL OUTCOME OF SUBTROCHANTERIC FEMORAL FRACTURES TREATED WITH PROXIMAL FEMORAL LOCKING COMPRESSION PLATE

Orthopaedics

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ABSTRACT

Background and objective:

Subtrochanteric fracture of femur and its complications account for significant morbidity and mortality especially in elderly. Proximal femoral locking compression plate helps in early Range of movements of the patient.

Materials and Methods

This study was done in SREE BALAJI MEDICAL COLLEGE AND HOSPITAL, CHROME PET from August 2018 to May 2020. During this period 25 cases of adult patients with subtrochanteric fractures were treated with proximal femoral locking compression plate (PFLC). The classification used here was according to Seinsheimers and functional outcome was assessed using Traumatic hip rating score.

Results:

In our study of 25 patients 65% of them (16 patients) showed excellent results, 30% (8 patients) showed good results, 5% (1 patient) showed poor result due to Infection.

Conclusion:

Proximal femoral LCP is a good method for Subtrochanteric femur fractures in the elderly patients especially for severely comminuted fracture and with osteoporosis. Proximal femoral LCP gives the advantage of flexibility to surgeon to achieve angular stability or axial compression with plate to bone apposition.

KEYWORDS

Subtrochanteric fracture, proximal femoral locking compression plate (PFLC)

INTRODUCTION

Subtrochanteric femur fractures are one of the most common traumatic injuries seen in both young populations and in elders. In young population, the injury is due to high energy trauma, whereas in the elderly it is due to osteoporosis, resulting from a insignificant fall. These fractures have a significant impact on the health care system. Proximal femur fractures comprises of intertrochanteric and subtrochanteric region.

In case of subtrochanteric fractures the prevalence of limb shortening, and implant cut outs is high. This led to the emergence of newer methods like IM devices and proximal femoral locking compression plate.

PF-LCP represents a Good option for the treatment of unstable subtrochanteric fractures. PF-LCP offers the surgeon with the flexibility to achieve plate to bone apposition as well as axial compression and angular stability.

Subtrochanteric fractures are femoral fractures where the fractures occur below the lesser trochanter to 5 cm distally in the shaft of femur.¹ Subtrochanteric fractures are noted for their higher incidence of unsatisfactory results after operative treatment. These fractures occur typically at the junction between trabecular bone and cortical bone where the mechanical stress across the junction is highest in the femur which is responsible for their frequent comminution.² These fractures account for 10% to 34% of all hip fractures.³

Subtrochanteric fractures are complicated by delayed union or non-union.

The present choice of treatment of subtrochanteric fractures are open reduction and internal fixation.

In view of these considerations, the present study of surgical management of subtrochanteric femur fractures is managed by using proximal femoral locking compression plate.

AIMS AND OBJECTIVES

- To study the advantages of proximal femoral –locking compression plate.
- To study the functional outcomes of sub trochanteric femoral fractures treated with proximal femoral –locking compression plate.
- To compare these results with those in literature treated by other

surgical modalities.

- To determine the demography (sex and age distribution) of patients with subtrochanteric femoral fractures

MATERIALS AND METHODS

This study was conducted in SREE BALAJI MEDICAL COLLEGE AND HOSPITAL, CHROME PET from August 2018 to May 2020. During this period 25 cases of adult patients with subtrochanteric fractures were treated with proximal femoral locking compression plate (PFLC). The fractures were classified according to Seinsheimers classification.

Inclusion Criteria:

- Age group of the study: 40 -80 years
- Patients with subtrochanteric femur fracture
- All closed and type I open fractures
- fractures with comminution
- fractures with osteoporosis.
- Patients willing and fit for surgery

Exclusion Criteria:

- Age group less than 40 and more than 80 years
- Those associated with femoral neck fractures are excluded.
- Type 2 & 3 open fractures shall be excluded.
- Inability to walk independently prior to injury due to either stroke or CVA were excluded.
- Patients failing anaesthetic fitness.
- Pathological fractures due to metastasis or other diseases like metabolic or Paget's.

25 cases were followed at regular intervals. This study was conducted with due emphasis for clinical observation and analysis of results after surgical management of Subtrochanteric femur fractures with proximal Femoral LCP.

PROCEDURE

Anatomic reduction has to be obtained, patient was placed in the supine position on the fracture table under spinal anaesthesia and reduction done by

- Traction
- Abduction or adduction
- Internal rotation or external rotation until anatomical reduction obtained.

APPROACH

Through lateral approach a 15 cm vertical incision was taken from the tip of trochanter in distal direction along the shaft of femur. Fascia lata is cut and vastus lateralis is exposed.

The ultimate plate position and screw position depends upon fracture reduction and placement of guide wires into the femoral head and neck

Postoperative Care:

Patient's vitals were monitored. Foot end elevation was given overnight Drain was monitored. Antibiotics were given as per the hospital protocol. Analgesics were given as per the patient compliance. Blood transfusion was given depending upon preoperative general condition and intraoperative blood loss. Patients were encouraged to sit in the bed next day and were taught quadriceps strengthening exercises and knee mobilization. In patients with stable fixation toe touch weight bearing with walker or axillary crutches was encouraged as per pain tolerance of the patient. Sutures were removed on day 11 or 12. Patients were discharged from the hospital at 2 weeks partial weight bearing with help of walking aids.

Follow Up:

All patients were followed up at 2 weeks, 6 weeks, 12 weeks, 6, 9 and 12 months. At every visit patient was evaluated for both hip and knee function, walking ability, shortening and fixation defects. X ray of the involved hip with femur was done to assess fracture union and implant bone interaction. The functional outcome of the patient is assessed by Traumatic Hip Rating Score whose components are as follows

Traumatic Hip Rating Score (sander's et al)

NO. OF POINTS	CRITERIA
I. PAIN	
0	Constant: unbearable; uses strong medication frequently
2	Constant but bearable uses strong medication occasionally
4	Little or none at rest; with activities : uses salicylates frequency
6	When starting, then better, or after a certain, activity, uses salicylates
8	Occasionally and slight
10	None
II. WALKING (GAIT)	
0	Bedridden
2	Uses wheel chair; transfer activities with walker uses one support; house-bound
Markedly restricted	4 Uses one support, less than one block uses bilateral support, short distance
Moderately restricted	6 Uses no support, less than one block uses one support, up to 5 blocks uses bilateral support, up to 5 blocks
Mildly restricted	8 Uses no support, limp uses no support, no limp
Unrestricted	10 Uses no support, no appreciable and confined
III. FUNCTION	
A. RETIRED PRE-INJURY	
0	Completely dependent and confined
2	Partially dependent
4	Independent can do limited house work, limited shopping
6	Can do most house work, shops freely, can do desk type of works
8	Very little restriction, can work on feet
10	Normal activities
B. EMPLOYED PREINJURY	
0	Unemployed/ retired secondary to injury
2	Part time/ light duty
4	Changed jobs secondary to injury
6	Altered job description somewhat
8	Return to work with some disability
10	Return to full work
IV. MOTION- MUSCLE POWER	
0	Ankylosis with deformity
2	Ankylosis with good functional position
4	Muscle power poor to fair and of flexion < 600 restricted lateral and rotatory movement
6	Muscle power fair to good and arc of flexion as much 900 restricted lateral/

		rotatory motions
	8	Muscle power good to normal, arc of flexion more than 900; fair lateral and rotatory movements
	10	Muscle power; motion normal or almost normal
V. DAILY ACTIVITIES		
A. Indian footwear	0	Unable
	3	With difficulty
	5	With ease
	0	Unable
	2	One at time
	4	With railing
	5	Normal
VI. SHORTENING		
	2	>3CM TO <4CM
	4	>2CM TO <3CM
	6	>1CM TO <2CM
	8	<1CM
	10	No LLD
VII. RADIOGRAPHIC EVALUATION		
	0	NON UNION/ Plate failure? Arthritis
	2	Delayed union
	4	Varus > 100, shortening > 2.5cms
	6	Varus > 50 but < 100, Shortening > 1cms but < 2.5cm
	8	Varus < 50 shortening < 1cm
	10	Anatomical reduction

TOTAL SCORE	RESULT
65-80	EXCELLENT
45-64	GOOD
35-44	POOR
<35	FAILURE

RESULTS

The following observations were made from data collected during study.

25 patients with subtrochanteric fractures were enrolled to the study. 14 were male and 11 were female with mean age being 60 years. Demographic characteristics are shown below in Table-1 and 2

Table-1: Age Distribution

Age group (years)	No. of cases	Percentage
41-50	3	11
51-60	10	39
61-70	11	41
71-80	2	9

Table-2: Sex Distribution

SEX	No. of cases	Percentage
Male	14	60
Female	11	40

In this study there was no significant difference in results due to age and sex.

Overall, in 25 patients surgical complications were observed in 4% were infected and 8% showed delayed union and is shown in Table 3.

Table-3 Distribution Of Postoperative

WOUND COMPLICATION	No. of cases	Percentage
Infection	1	4
Healed normally	22	88
Delayed and healed	2	8

In our study of 25 patients 65% of them (16 patients) showed excellent results, 30% (8 patients) showed good results, 5 percent (1 patient) showed poor result due to delayed healing. Shown in Table 4.

Table-4 Functional Results Of Subtrochanteric Fractures

Results	No. of cases	Percentage
Excellent	16	65
Good	8	30
Poor	1	5

Failure	0	0

SEINSHEIMER CLASSIFICATION

TYPE	No. of cases	Percentage
I	1	5
II a	2	10
II b	4	15
III a	4	15
III b	6	25
IV	4	15
V	4	15

Case Photos**Case 1** **Pre Operative** **Immediate Post Op** **6 Month Follow Up****DISCUSSION**

Early operative treatment of sub-trochanteric fractures reduces both mortality and morbidity (Laskin, Gruber and Zimmerman, 1979) giving best chance of early independency and reducing the risks of prolonged bed rest. In the management of sub-trochanteric fractures of femur, it is at most importance to re-establish bone to bone contact of the postero medial cortex.

Sliding nail plate systems have given good results for both stable and unstable sub-trochanteric fractures (Ecker, Joyce, and Kohl, 1975) with reported complication rates of 3% to 15%. Complications such as superior cutting out are related to the position of the lag screw (Doherty & Lyden, 1979, Manoli 1986). Penetration of the lag screw is due to its failure to slide and the rare lateral pulling out of the slide plate is caused by the varus movement acting on the screws 4.

The Proximal femoral LCP is a pre-contoured specially designed for the right and left femur to accommodate average femoral neck anteversion. The convergent angle design of 95 degree, 120 degree, 135 degree and the locking interface of the proximal 7.33mm (first and second), 5.0mm (third) cannulated locking screws should alleviate and improve proximal femoral fixation, especially in osteopenic bone. The remaining in the plate shaft are combi holes which allow the placement of either a cortical (4.5mm) or locking head screw (5.0mm).

In our study, there were difficulties in placing all the 3 proximal screws into the head through neck in 3 cases and also placement of the plate along the shaft in 2 cases. This is attributed to the pre-contouring of the plate and different neck angle and ante-version in individual patient and also due to low to moderate built of the patients in our region.

The greater trochanter fragment and the lateral trochanteric wall play an important role in stability after implant fixation of sub-trochanteric fractures.

In our study, 40 percent of the cases showed bony union at 3 months follow up and 56 percent of cases showed bony union at 6 months follow up. 1 case showed infection which was managed by removal of implant and by conservative methods. Zha GC, Chen ZL et al reports union rate of 95% and 98% at 3 months, 6 months follow up respectively.

CONCLUSION

- Sub trochanteric femur fracture is common in young due to high velocity trauma and in the elderly due to osteoporosis. As the fracture is more common in the elderly, early reduction and internal fixation increases patient comfort, facilitates nursing care, helps in early mobilization of the patient and decreases the duration of hospitalization. As the incidence of comminution is high, these fractures may require a stable reduction and internal fixation.
- The procedure may be adopted in patient with comminuted fractures, where conventional dynamic hip screw fixation is difficult and not advised and there is need for adequate post-op immobilization to prevent implant failure complications
- Proximal femoral LCP provides the surgeon with flexibility to achieve angular stability or axial compression with plate to bone apposition. Good to Excellent results were seen in 95% of cases (Functional outcome)
- Mean duration of hospital stay was 10 days
- Mean time for full weight bearing was 16 weeks and 90% of cases showed bony union at 6 months follow up
- In light of these observations, we conclude that the Proximal femoral LCP, despite few unfavourable results and complications, is a satisfactory method of treatment in subtrochanteric fractures with severe comminution and osteoporosis.

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