

A PROSPECTIVE STUDY OF FUNCTIONAL OUTCOME OF SUBTROCHANTERIC FRACTURE OF FEMUR FIXATION WITH LONG PROXIMAL FEMORAL NAIL

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ABSTRACT

INTRODUCTION: Sub-trochanteric fractures accounts for approximately 10-30% of all Hip fractures. These fractures are difficult to manage and are frequently associated with complications, owing to high stresses in this region. Proximal Femoral Nail has immense potential advantages and suspected lower complication rates, hence long Proximal Femoral Nail in our system needed to be augmented and further studied . We evaluated the functional outcome of long proximal femoral nailing in management of sub-trochanteric fractures.

MATERIAL AND METHODS: 30 patients of sub-trochanteric fractures of femur more than 18 years of age and less than 80 years of age were treated with long proximal femoral nail and were assessed functionally by Harris Hip Score.

RESULTS: 30 patients of sub-trochanteric fractures with mean age 32.5 years treated with long proximal femoral nailing were included in the study. 19 were male and 11 were female patients. Complications were seen in 4 patients such as 2 cases were of superficial surgical site infection, 1 case of slight varus deformity and shortening and 1 case of delayed union all with good functional outcomes.

CONCLUSION: Subtrochanteric fractures fixed using long proximal femoral nail have a stable construct which allows us to mobilize these patients early with less hospital stay and early weight bearing. Long proximal femoral nailing provides reliable and excellent to good results in the management of difficult sub-trochanteric fractures, with minimal complications, but the surgery is technically demanding and requires learning curve.

KEYWORDS: Sub-trochanteric fracture of femur , Proximal femoral nailing, Harris-hip score.

INTRODUCTION

Subtrochanteric femur fractures are defined as fractures occurring within 5 cm of the distal end of the lesser trochanter⁽¹⁾. They account for approximately 10-30% of all Hip fractures. As non operative treatment has become predominantly historical treatment of subtrochanteric fractures of the femur. Subtrochanteric fractures

of the femur present a challenge for treatment because of the deforming forces on the proximal and distal segments which are difficult to control as the proximal segment is inherently short, decreased vascularity of the region, unfavourable fracture morphology (comminution), strong deforming muscle forces, difficulty in attaining and maintaining reduction during surgery and complications of varus malunion, implant failure, infection and non union, subtrochanteric fractures of the femur pose a great challenge to the orthopaedic surgeon^(2,3). Proximal Femoral Nail has immense potential advantages and suspected lower complication rates, hence long Proximal Femoral Nail in our system needed to be augmented and further studied⁽⁴⁾. The aim of the study was to evaluate the functional outcome of Subtrochanteric femur fracture fixation with long proximal femoral nail.

METHODS AND MATERIALS

It was a prospective observational study done in department of orthopaedics, Narayana Medical College and Hospital, Nellore, Andhra Pradesh .The study was conducted on patients who underwent surgery between July 2020 to January 2022.\

Inclusion Criteria :

1. The fracture line located within 5 cm below the lesser trochanter;
2. Patients with age more than 18 years and less than 80 years
3. Patients with closed fractures
4. Interval from injury to operation <3 weeks
5. Patients agreed for informed consent and follow up.

Exclusion Criteria :

1. Patients with age less than 18 years and more than 80 years
2. Open fractures
3. Old fractures > 3 weeks
4. Pathologic fractures
5. Patients medically unfit for surgery

Study protocol was approved by the institutional ethics committee; informed written consent was taken from the study participants. A total of 30 patients who were diagnosed with subtrochanteric fracture of femur as per Seinsheimer classification and underwent surgery.

SURGICAL TECHNIQUE

Patients were initially, hemo-dynamically stabilized and then X rays of the involved limb were taken. Patient was placed in supine position on fracture table with C- arm Support.Closed reduction of the fracture was achieved by traction and internal rotation primarily with mild adduction or abduction as required. After achieving closed reduction, a 4 cm incision was given above the tip of the greater trochanter, deepened to clear muscle attachment and entry point was made with an awl over a protector sleeve on the tip of the greater trochanter and checked in both AP and lateral views. A flexible guide wire was passed and sequential reaming was done over the wire to know the diameter of the canal and the diameter of the nail to be used. The decided nail was mounted over the jig and was inserted into the femur till the desired depth, such that the position of the holes for the proximal screws directed over the head of the femur. Following this, both the proximal locking screws were passed via the jig and drill sleeve over the guide wire. The distal locking was done free hand with the help of image intensifier⁽³⁾.

Figure.1: Insertion of proximal femoral nail



Figure.2: Passing the screws into the head



Postoperatively, antibiotics and analgesics were continued and suture removal was done after 11 days. Patients were encouraged to sit in the bed 24 hours after surgery. Quadriceps exercises and knee mobilization were started on the 2nd post-operative day. Patients were started on weight bearing depending on their pain tolerance.

Follow up was done regularly at 4 weeks interval for minimum of 6 months. Functional outcome of the patients was assessed by Harris Hip Score and radiological assessment was done to see union and implant placement.

STATISTICAL ANALYSIS

Statistical analyses were done by using SPSS software version 21.0. Chi-square test was used to assess the association between different categorical variables; $P < 0.05$ was considered statistically significant.

RESULTS

Total 30 patients were included in this study, patients were distributed across all age groups, 3 patients above the age of seventy five years (Table 1); 19 male patients and 11 female patients (Figure 2). 17 cases of right side and 13 cases of left side. According to Seinsheimer classification, 6 cases were of type II A, 10 cases of type II B, 8 cases of type III A and 6 cases had type III B. Associated diabetes mellitus was seen in 4 patients, hypertension in 2 patients and coronary artery disease in 1 patient. The average duration of hospital stay was 13.50 days, ranged 12 to 15 days. We encountered complications in 4 patients such as 2 cases of superficial surgical site infection, 1 case of slight varus deformity, shortening and 1 case of delayed union all with good functional outcomes. Four patients were using crutches to mobilize up to five months, two patients were using zimmer frame to mobilize upto five months postoperatively (Table 2). statistically there was significant difference ($P < 0.05$). Based on Harris Hip score obtained 4 patients outcome was excellent, 19 patients were good and 6 patients had fair outcome and 1 patient had poor outcome (Table 3).

Table. 1 Age distribution of the study participants n (%)

Age (in Years)	Participants
18 - 35	3 (10)
36 - 55	7 (23)
56-75	17 (57)
> 75	3 (10)
Total	30 (100)

Figure.3 Gender distribution among the study participants

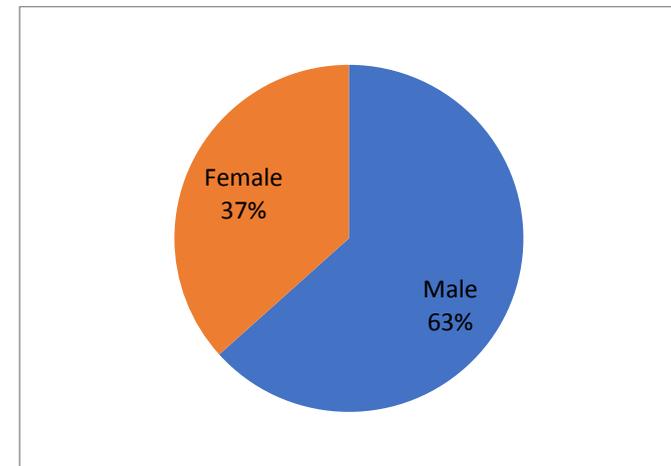


Table 2. Postoperative independence of ambulation n(%)

Ambulation	12 weeks	20 weeks	24 weeks
Walk independently	5 (17)	24 (80)	30 (100)
Crutch walking	16 (53)	4 (13)	-
Zimmer frame	9 (30)	2 (7)	-

Table.3 Harris hip score results among the study participants n(%)

Results	Participants
Excellent	4 (13)
Good	19 (63)
Fair	6 (20)
Poor	1 (3)
Total	30 (100)

Harris hip score is 97 at follow up-Excellent



DISCUSSION

Seinsheimer et al made a retrospective study of 56 cases and reported that in 47 cases receiving surgery, 9 had failure of internal fixation, 3 non-union (failure rate: 26%); 9 cases receiving conservative treatment were all healed, but 5 cases (56%) had varus deformity of the hip⁽⁵⁾. Roberts et al evaluated the biomechanical study of fracture site motion in second generation Intramedullary nailing of subtrochanteric fracture. He concluded that when subtrochanteric fractures are unstable and early weight bearing is desirable, the choice of implant is critical and should be restricted to long intramedullary implants that allow minimal fracture site motion^(6,7). From the perspective of biomechanics, intramedullary fixation has its unique advantage of short force arm, which can better distribute the stress, while extramedullary fixation can load the stress⁽⁸⁾. Some scholars made a comparison study of intramedullary fixation and extramedullary fixation and proved a better consequence using intramedullary fixation^(9,10). Due to the deformation of the flexion, abduction, external rotation in the proximal femur, the reduction of subtrochanteric fracture of the femur is challenging. There are two types of reduction, one is in lateral position from distal to proximal, and the other is the reduction by the force of traction in traction table^(11,12). Reduction may fail in some of these fractures. The unsuccessful reduction may cause nonunion of the fracture, sometimes leading to failure of the internal fixation methods⁽¹³⁾. Pelet et al. evaluated the results of fixation of subtrochanteric fractures by blade plate versus gamma nail. He concluded, gamma nail is preferred for subtrochanteric fracture management as it allows early weight bearing. Twenty six patients were treated with Gamma nail and blade plate⁽¹⁴⁾. Velasco et al retrospectively studied 82 cases and reported that 50% of 32 patients undergoing conservative treatment showed unfavorable results, which includes varus, shortening of limbs and rotational deformity, while the incidence of poor outcome in surgery group was only 21%⁽¹⁵⁾. In our study all the patients were treated with long Proximal femoral nailing which enabled us to mobilize and make the patient weight bear early. Open reduction in irreducible fractures is described in many papers. 80% of our cases reduction was possible with closed method and only 20% cases we needed to open to achieve length, rotation and satisfactory angulation. In the management of subtrochanteric fracture for achieving successful outcome, good pre operative planning and execution is necessary.

CONCLUSION

Proximal femoral nail is a good implant for subtrochanteric fracture of the femur. These fractures fixed using long proximal femoral nail have a stable construct which allows us to mobilize these patients early with less hospital stay and early weight bearing. The longer the nail, more the working length across the fracture site and less the chances of varus malunion. Long proximal femoral nailing provides reliable and excellent to good results in the management of difficult sub-trochanteric fractures, with minimal complications, but the surgery is technically demanding and requires learning curve.

ACKNOWLEDGEMENT : Self Funding .

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