



## A PROSPECTIVE STUDY TO EVALUATE THE MANAGEMENT OF SUB-TROCHANTERIC FEMUR FRACTURES WITH LONG PROXIMAL FEMORAL NAIL

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### ABSTRACT

**Background:** Proximal femur fractures present considerable challenge in management. They are due to high velocity trauma, with or without soft tissue injury and usually with a Metaphyseal and diaphyseal involvement. The surgeon has to face many challenges like identifying the entry, reduction the fracture, and difficulty due to a narrow medullary canal and comminution. **Aims And Objective:** This study was aimed to analyze the role of reconstruction nail in patients having sub-trochanteric fracture. **Methods And Materials:** This study evaluates the fixation of sub-trochanteric fractures of femur with reconstruction nail which is a specialized antegrade intramedullary nail for femur. A prospective study conducted from March 2022 to October 2022 at department of Orthopaedics, Madhubani Medical College, Madhubani, Bihar. 30 cases of sub-trochanteric fractures of femur were treated with reconstruction nail and were followed up serially till 24 weeks radiologically and clinically. The fractures were classified according to Seinsheimer classification. All patients were assessed functionally by Harris Hip Score. **Result:** 30 patients were included in this study with sub-trochanteric fractures of femur treated with proximal femoral nail. Maximum 21(70%) of patients were below 61 yrs. of age. Mean age was 47.9 years. There were 21 male and 9 females in the study. There were 6 patients with local complications. Final result of our study, we had 26.7% excellent, 46.6% good, 20% fair and 6.7 % poor results according to Harris hip score. **Conclusion:** Reconstruction nail is a good device for sub-trochanteric fractures of femur providing rigid fixation with low complication rates.

**KEYWORDS :** Sub-trochanteric fracture of femur, Reconstruction nailing, Modified Harris hip score.

### INTRODUCTION:

Sub-trochanteric fractures of the femur remains one of the most challenging fractures faced by orthopaedic surgeons. Sub-trochanteric fractures are encountered in general population due to a simple fall or after a high-velocity injury involving both direct and indirect forces [1]. Sub-trochanteric fractures are defined as fractures occurring in the proximal femur from the inferior aspect of the lesser trochanter to a distance of about 5 cm distally [2]. It can affect any of the age groups and accounts for 10 to 34% of hip fractures [3, 4]. Sub-trochanteric femur fractures have a bimodal age distribution [5]. Among younger patients, sub-trochanteric fracture happens due to a high-energy injury and typically they have associated traumatic injuries such as a car accident or falling from a height [3, 4]. These fractures present a challenge for reduction due to the muscle attachments around the region and are one of the most difficult fractures to treat Treatment failure is common due to the complications of non-union, shortening, angular deformity and rotational malunion [6].

Adequate reduction and stable fixation are of utmost importance when treating these fractures to optimize patient outcomes [7, 8]. Early surgical intervention is advocated in majority of these patients to reduce the complications associated with long-term immobilization like deep vein thrombosis, thrombophlebitis, pulmonary embolism, urinary and lung infections and cubitus ulcers. Various extra medullary and intramedullary implants are being used for these fractures [9]. Early forms of treatment included casting, splinting and traction. Now, in most cases, the sub trochanteric fractures are best treated surgically. Over a period of time, the treatment has evolved and changed from conservative to

operative, from extra medullary devices to intramedullary devices, from open reduction and fixation to newer minimally invasive techniques [2]. Intramedullary nailing has developed as the best method of sub-trochanteric fracture fixation and can lead to reliable reproducible results [10].

Reconstruction or cephalomedullary nails are specialized, antegrade, femoral, intramedullary nails designed to provide fixation into the femoral head and neck for selected, complex, proximal-femoral fractures [11]. Reconstruction intramedullary nails are the preferred design because the cephalomedullary component increases device-to-bone contact points in the proximal fracture fragment [12]. High compressive and tensile forces of muscles separate the fracture fragments and cause instability of the fracture. Hence this fracture is difficult to manage and is associated with many complications including mal-union, delayed union, non-union and implant failure [13]. Due to these anatomical features conservative treatment is not preferred, and if there are no absolute contra indications and the patient can tolerate surgery, surgery is the treatment of choice [14].

The goal of operative treatment is restoration of normal length, anatomical alignment and angulation to restore adequate tension to the abductors. Early mobilization and weight bearing are possible with advances in implants and fixation technology. The two primary options for treatment of sub-trochanteric fractures are intramedullary fixation and extramedullary fixation [15]. Extramedullary implants including condylar blades plates and proximal femoral locking plates have been used to treat sub-trochanteric fractures, but they were associated with complications of high

rate of reduction loss, fixation failure and the need for reoperation [16]. Compared with extramedullary implants, intra-medullary implants have several biomechanical advantages with benefits, including less soft tissue dissection, dynamic locking, ease of insertion, potentially less blood loss, restoration of the mechanical axis and, most importantly, allowance for immediate weight bearing after fixation [17]. There have few studies to compare results of these two modalities. The purpose of our study was to evaluate the results, complications and functional outcomes of long PFN in the management of sub-trochanteric femur fractures.

**AIMS AND OBJECTIVE:**

This study was aimed to analyze the role of reconstruction nail in patients having sub-trochanteric fracture.

**MATERIAL AND METHODS:**

This study was conducted on total of 30 patients with Sub trochanteric femur fracture admitted to department of Orthopaedics, Madhubani Medical College, Madhubani, Bihar from November 2020 to October 2021 were selected for treatment with proximal femur nail. Permission was granted from the ethical committee of the institute before starting the research. Informed consent was obtained from all the patients.

**Inclusion criteria:**

Total 30 cases, age group > 18 yrs. and all traumatic fractures of the sub-trochanteric region were included.

**Exclusion criteria:**

Compound fractures, preexisting diseases of the affected hip, pathological fractures were excluded.

**Primary treatment**

The patients were examined thoroughly for vital signs, head injury, thoraco-abdominal injury and other associated injuries. The distal circulation was checked and the limb was examined for any neurological deficit.

**Diagnostic radiology**

Standard antero-posterior and lateral views of the affected hip were obtained for diagnosis, extent of comminution and to measure likely length of implant. Temporary immobilization was given in form of Thomas splint. All routine blood investigations and medical and preoperative aesthetic check-ups were carried out as necessary for surgery.

**Preoperative investigation and planning**

Patients with no associated injury were operated in routine operation theatre as soon as the fitness of the patient for anaesthesia was obtained.

**Anaesthesia**

All surgeries were performed under regional anaesthesia except in cases with head injury in which general anaesthesia was given.

**Patient positioning**

The patients are positioned supine on the fracture table with a radiolucent padded counter-traction post placed between the patient's leg. The uninjured leg is held in wide abduction by a boot attached to one of the leg extensions of the fracture table. The injured leg is held in slight adduction, by a boot attached to the other leg extension of the fracture table. The C-arm image intensifier is positioned between the patient's legs and the adequacy of both the antero-posterior and lateral views are verified, before surgical preparation.

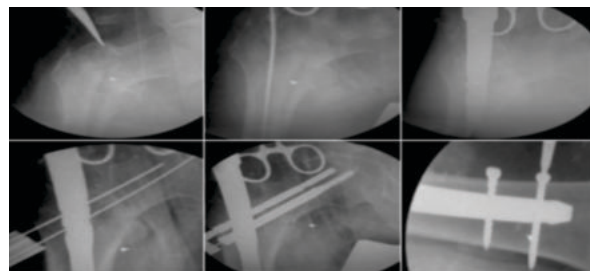
**Reduction technique**

After the anaesthetized patient is positioned on the fracture table, and the extremity is secured in the traction foot piece, traction is exerted longitudinally on the slightly abducted

injured leg until reduction is achieved. The degree of rotation required for rotation is variable, depending on the degree of comminution. In non-comminuted fractures without displacement, the limb was fixed in neutral or slight internal rotation. In comminuted fractures, 15 to 20 degrees of external rotation is required to close the defect postero-laterally. Reduction is checked in the antero-posterior and lateral views in an image intensifier.

**Draping**

The skin over the hip is scrubbed with betadine scrub, for 10 minutes and painted with betadine 10% and spirit. The lateral aspect of the hip is squared off from the iliac crest to the knee, with towels and drapes. A plastic transparent, adherent, isolation drape is directly applied to the skin at the proposed incision site.



**Fig. 1:** (a) Determination of entry point, (b) Insertion of guide wire (c) Insertion of long PFN, (d) Insertion of guide wire for compression and anti-rotation screw, (e) Insertion of compression screw and anti-rotation screw and (f) distal locking (static and dynamic mode).

**Statistical analysis:**

The data was presented using frequency, percentage and mean, followed by graphs and charts. Further statistical analysis was performed using Chi-square test for significance of proportion; the level of significance was set at 5%. All p values less than 0.05 were treated as significant.

**RESULT:**

There was a male predominance in the study with males being 21 (70%) of the study group and females were 9 (30%). 17 (56.7%) patients had fractures due to vehicular accidents and 13 (43.3%) patients had fracture due to trivial fall. 18 (60%) patients had fractures of right side and 12 (40%) patients had fractures of left side. 22 (73%) patients were operated within a period of 1-2 hours with only 2 patients requiring more than 2 hours of operative time.

Mean operative time was 75.3 mins. 2 (6.7%) patients had blood loss of less than 50 ml during the operation and 17 (56.6%) patients had a blood loss of 50-100 ml and 11 (36.7%) patients had a blood loss of 100-200 ml. Mean blood loss was 117 ml. 14 (46.6%) patients were discharged within 1-5 days post operatively 8 (26.7%) patients were discharged within 6-10 days and rest 8 (26.7%) patients were discharged in 11-20 days post op. Mean hospital stay of patients was 8.6 days. The mean time for partial weight bearing was 7.6 weeks post op. The mean time for full weight bearing was 10.93 weeks. The mean time for radiological union was 7.6 weeks post op. There were 6 patients with local complications. Final result of our study, we had 26.7% excellent, 46.6% good, 20% fair and 6.7% poor results according to Harris hip score.

**Table-1: Time of radiological union**

Time of radiological union	Number	Percentage (%)
1-6 weeks	9	30
7-12 weeks	21	70
13-18 weeks	0	0
Total	30	100

**DISCUSSION:**

Fractures of the long bones are a major social and economic problem. Of the long bone fractures Sub-trochanteric fractures of the femur have peculiar anatomic and mechanical characteristics which poses problems in their management. Closed intramedullary devices have a mechanical advantage that effectively addresses these factors. The benefit of minimal surgical exposure, more efficient load transfer through calcar femoral and decreased tensile strain on the implant because of its shorter lever arm makes proximal Femoral Nail a good choice of implant for sub-trochanteric fractures of the femur. Various studies have considered proximal femoral nail as an acceptable minimally invasive implant for Sub-trochanteric fracture. In this study an attempt was made to survey, evaluate, document and quantify our success in the management of such individuals by using proximal femoral nail implants and evaluate the result with the results of three other studies by Boldin et al in 2003, El-Mowa et al in 2013 and Abraham et al in 2016 [18-20].

21 of the patients in our study were males. In all other studies also, there is a male preponderance. Most common cause of injury in all studies is vehicular accident followed by fall. Mean operative time of procedure in our study was 75.3 minutes which was well comparable to other study which is 68 mins in study by Boldin et al and 100 min in El-Mowa et al. [18,19]. Duration of hospitalization is between 6 and 10 days of postoperative period. In our study its 8.6 days. In our study, the mean time for partial weight bearing was 7.6 weeks. In a study of 55 cases by Boldin et al, mean time for partial weight bearing was 6 weeks. In a study of 20 cases by El-Mowa et al, mean time for partial weight bearing was 5.8 weeks [19].

In all studies full weight bearing walking was started between 1.5 and 2 months. In our study it is mean 10.93 weeks. Complications were superficial and deep infection, screw breakout. In our study, 6 cases of PFN group were associated with complications. In a study of 20 cases by El-Mowa et al, five complications were observed during the follow-up of four months [19]. 3 patients had implant backout. 1 patient had deep infection for which debridement was done and 1 patient had superficial infection which was managed by antibiotics. In our study, 8 cases (26.7%) had excellent results, 14 cases (46.6%) had good results, 6 cases (20%) had fair results and 2 case (6.7%) had poor result. In a study of 55 cases by Boldin et al, Postoperative radiographs showed near anatomic fracture reduction in 34 patients [18]. The fracture healed in all 55 patients. The longest consolidation time was 5, months. In a study of 20 cases by El-Mowa et al, 5 patients had excellent results, 8 scored good results, 4 scored moderate and 3 scored poor results. In a study of 30 patients by Abraham et al had very good result, 9 had good results and 4 patients had moderate results and 3 had poor results [20].

**CONCLUSION:**

Management of sub-trochanteric fractures of femur remains to be a challenge due to the deforming forces and the high rates of nonunion and other complications. Long intramedullary devices have emerged as the treatment of choice for these fractures with importance placed on anatomical reduction. Reconstruction nail is a good device for sub-trochanteric fractures of femur providing rigid fixation with low complication rates.

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