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# A Prospective study of Surgical Management of Intertrochanteric Fractures of Femur treated with Trochanteric Femoral Nail

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## Abstract

**Background:** Intertrochanteric fractures are the most frequent fractures of the proximal femur and occur predominantly in geriatric patients and are among the most devastating injuries in the elderly. Since the general life expectancy of the population has increased significantly during past few decades leads to increase in incidence of these fractures and subsequently development of newer designs of implants for fixation of these fractures. Trochanteric femoral nail is a newly introduced nail for internal fixation, compared to single lag screw , the TFN with two screws yielding superior life to cut out and uncontrolled collapse at fracture site. In this prospective study operative time, blood loss, functional outcome and complications are studied.
**Materials and Methods:** 50 patients diagnosed with Intertrochanteric femur fracture were treated in our hospital. Classification used is Boyd and griffin, Excluding type 4 .Surgery performed after getting the medical fitness. Patient on traction table in supine position through lateral approach. Clinical outcome assessed with Harris hip score at the end of 6 months .
**Results:** This prospective study shows that Harris Hip score at 6 months was 85% in type I, 61%in type II, and 68% in type III frac-tures.
**Conclusions:** TFN gave good results clinically and functionally with early return to pre fracture activities to the patients.
**Keywords:** TFN, Intertrochanteric fracture, Harris hip score.

## Introduction

Intertrochanteric fractures are considered 1 of 3 types of hip fractures. The anatomic site of this type of hip fracture is the proximal ,upper part of the femur or thigh bone. The proximal femur consists of the femoral head, femoral neck and the trochanteric region. An intertrochnateric fracture occurs between the greater trochanter, where the gluteus medics and minimum muscles (hip extensors and abductors) attach, and the lesser trochanter, where the iliopsoas muscle (hip flexor) attaches. Intertrochanteric femoral fractures are common in elderly patient1 and are the most frequently operated fractures and has the highest morbidity and mortality rates[2]. The frequency of these fractures has increased primarily due to the increasing life span and more sedentary life style brought on by urbanization. Trochanteric fractures occur in young population due to high velocity trauma whereas in the elderly population it is most often due to trivial trauma. Patient of all age groups are affected but the group in the 5th -7th decades of life has been involved most. Gulberg et al has predicted that the total number of hip fractures will reach 2.6 million by 2025 and 4.5 million by 2050[3]. Due to osteoporosis and poor bone quality, achieving stable fixation in elderly patients is quite difficult[4]. Stable fixation and early mobilization is the principal of treatment of such fractures[5,6]. Various implants are available for treatment of intertrochanteric femur fractures. Sliding hip screw with more blood loss, soft tissue dissection may deteriorate the pre existing morbidities[7]. Excessive medialization of the distal fragment (unstable fracture), cutting out of the screw and collapse upon weight bearing are also major drawbacks[8,9]. Intramedullary devices such as Trochanteric femoral nail, are more stable under loading with a shorter lever arm, so the distance between the hip joint and the nail is reduced compared with that for a plate, thus diminishing the deforming forces across the implant theoretically reduces the chances of varus collapse. Also reduced surgical site incision, less blood loss, less soft tissue trauma significantly decreases morbidities associated with such fracture[10]. Biomechanical advantage of intramedullary devices is a load

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sharing device and is important in unstable intertrochanteric fractures[11]. The aim of the study is to evaluate the results of the trochantric femoral nail in intertrochanteric femur fractures and evaluation of different fracture types by clinical, radiological and functional outcome ( harris hip score). Short and long term complications like infection and implant failure in intertrochnateric fracture by trochanteric femoral nail.

## Materials and methods

Materials and Methods

Fifty patients from october 2015 to october 2017 diagnosed with intertrochanteric femur fractures admitted in our hospital attached to M.R.M.C Medical college were included in the study. Classification used is Boyd & griffin. The TFN is a solid nail made up of AISI 316L stainless steel with universal 6 degrees of mediolateral valgus angulation with 180 mm in length and 9,10,11 or 12mm in diameter, inserted without reaming of the medullary canal. Nail-screw angle are of 130o and 135o. Proximal nail accommodates two screws, one lag screw of 8mm in size with various lengths ranging from 50mm to 120mm and a second cervical screw which is of 6.4mm in size with various lengths ranging from 50mm to 110mm, that provides rotational sstability. Distal nail has two parallel holes for distal locking with 4.5mm bolts. Proximal distal hole is for static locking while the distal one is for dynamic locking.

**Inclusion criteria:** i) Intertrochanteric femoral fracture diagnosed radiologically and classified accordingly (Table 1), ii) patients with proximal femoral epiphyseal closure( 18-80yrs) .
**Exclusion criteria:** i) Non ambulatory prior to fracture , ii) Subtrochanteric fractures(type 4), iii) other fractures interfering with ambulation, iv) Pathological fractures.

## Surgical Technique

Under spinal anaesthesia in supine position, hip adducted slightly and torso shifted towards the opposite side to allow unobstructed access to the femoral medullary canal. Fracture reduction achieved by traction and internal rotation and checked under c-arm. Lateral incision taken 5 cm proximal to greater trochanter and 3-5cm in length, greater trochanter identified and lateral to tip of greater trochanter in AP view and centre of trochanter in lateral view is marked for insertion point, but in severely communited fractures nail inserted through fracture site. Entry made with bone awl and guide wire passed into the femoral canal, after confirming that guide wire is in shaft on lateral fluoroscopic view, entry site reamed to accommodate the nail through entry reamer, which has an enlarged proximal diameter of 17mm. In elderly patients with wide intramedullary canal reaming is not required. A nail of appropriate angle and diameter is attached to the jig and introduced into the canal with manual force only. Once the nail has been inserted fully into the canal, the limb can be brought out of adduction to correct any residual varus deformity at the fracture site, guide sleeves attached and guide wires passed into femoral head, goal for placement is centre-centre position on lateral view and postero inferior in anteroposterior view. Reaming for lag screw and de rotation screw are carried out, at this point, before inserting lag screw traction is released to allow compression at fracture site. Essentially all stable fractures and many unstable fracture patterns move as a unit after the insertion of nail, so distal interlocking is required to avoid rotational instability and shortening of the limb.

**Post operative protocol:** Inj. Ceftriaxone 1gm iv 12 hourly was continued for first 3 days and then it was shifted to oral till. Suction drainage removed after 24hours in case of open reduction. I.V analgesics were given for 1 day followed by oral analgesics when necessary. Quadriceps physiotherapy: strengthening exercises, Static quadriceps exercises and calf pumping are started as soon as the patient is out of anaesthesia, followed by knee and ankle mobilisation on post op day 1. Dressing done on 2nd and 5th post operative day and discharged on sixth day if no discharge from wound site and Sutures were removed on 12th postoperative day. Patients are advised to walk non weight bearing as soon as

**Figure 1**A: Pre operative X-rays

**Figure** 1B: Post Operative X-ray Day 1

**Figure** 1C: At 1 month

**Figure 1D**: At 6 month

**Figure 1E**: Full range of motion at 9 months

tolerable depending upon the fracture pattern. Partial weight bearing was started once further collapse is not expected radiologically in case of stable fractures and where comminution is minimal. Full weight bearing walking allowed after assessing callus formation at fracture site(radiologically) and any abnormal fracture site mobility(clinically).

**Follow up:** Post-operative x-rays(Fig 5) taken at 1st month(Fig 6), 3rd month, 6th month(Fig 7)and 9months from the date of sur-gery. A each follow up patient patient was assessed clinically as per harris hip score and Functional outcome at 9 months(fig.8) was assessed.

## Results

In our study average age of patients is 59.82yrs as the young individuals less than 50yrs old are 12 involved in road traffic accidents. Most of patients were males. Right side in 28 cases and left in 22 cases. Time duration between admission and surgery was usually 48hrs but in 12 patients surgery delayed due to medical problems(diabetes and hypertension) and financial constraints of patients. Mean duration of surgery was 50.3mins with a standard deviation for 11.9minutes. The average blood loss in our study was 50ml. Majority of the cases closed reduction was achieved where fracture haematoma was preserved except 2 cases of reverse oblique intertrochanteric fracture where open reduction internal fixation done. No case of superficial or deep infection in our study. The more common co-morbidity being hypertension & diabetes. Closed head injury was the most common associated injury in younger individuals involved in road traffic accidents. These cases are managed conservatively. 3 patients had distal radius fracture and are treated conservatively with closed reduction and below elbow cast. During follow up 5 patients expired due to previous co morbidities not related to fracture. Most of the patients were able to do partial weight bearing by 1-3weeks and by the end of 3months total 43 patients could do partial weight bearing and 2 patients didn't follow the post protocol and did full weight bearing immediately after surgery. Table 2 showing post operative complications in which two patients (4.44%) had cut out of proximal screws on 1st month follow up due to early full weight bearing (non compliance) and three patients(6.6%) had Z effect due to collapse of fracture site, rest all others are doing well. The risk of cut out is directly dependent on the quality of fracture reduction and on implant position. Average time of fracture union in all our patients was about 13 weeks(av. 12-14wks). After 9months of follow up in 43 patients union was achieved with neck shaft angle maintained expect 2 patients where fracture healed in varus malalignment. Harris Hip score at the end of 6 months was 85% in type I, 61%in type II and 68% in type III fractures.(Fig 1A-E shows radiograph of a typical case in our series)

Table 1: Shows classification of Fractures according to Boyd and Griffin.

| TYPE OF FRACTURE | LM, OF PATIENTS | # OF PATIENTS |
|---|---|---|
| Rwnc I | 6 | / 4 |
| Rwnc II | 06 | 34 |
| RWNC III | / 2 | 06 |

Table 2: Showing Post Operative complications

| Complications | No. of patients | Percentage |
|---|---|---|
| Cut out of neck screw | 02 | 4.44% |
| Z effect | 03 | 6.66% |
| Breakage of nail | 0 | 0% |

## Discussion

Fractures of intertrochanteric region have been recognised as a major challenge by the orthopaedic community, not solely for achieving fracture union, but for restoration of optimal function in the shortest possible time that to with min-imal complications. The time of management accordingly has been drifted to achieving early mobilization, rapid reha-bilitation and quick return of individuals premorbid homeland work environment as a functionally and psychologically independent unit. Operative treatment in the form of internal fixation permits early rehabilitation and offers the best chance of functional recovery, hence has become the treatment of choice for virtually all fractures in the trochanteric region. Active surgical approach decreases the mortality to less than 15% by avoiding development of complications like hypostatic pneumonia, catheter sepsis, cardio respiratory failure, Decubitus ulcers, but also early rehabilitation and mobilization is possible which generate self confidence in patient. Many studies[12,13,14] shown good outcome with less complications after treatment with the TFN. TFN has given good results with unstable intertrochnateric fractures. Complication encountered intra operatively [15,16] due to wrong tech-nique of putting screws in femoral head. The blood loss was less compared to extra medullary fixation. Proper screw placement is very crucial for fracture stability[17.18]. Overall,

impaction of the fracture is beneficial to its consolidation. The general complications and mortality rates are less as compared to other studies [19]. Since the beginning efforts are made to reduce the intra operative and post operative complication by changing nail configurations. Optimal reduction of the fracture prior to nail insertion and correctly placed screws remains of crucial importance20 and should be obtained at all times. Correctly placed fixation device will have reduced chances of implant failures. Therefore, outcome of treatment with trochanteric femoral nail will be on surgeons skill in correctly placing the implant.

## Conclusion

The use of TFN for extracapsular fractures of the proximal femur has several distinct advantages, namely; lesser operative time with less operative blood loss, early return to daily activities, reduced complications like infection, implant failure, and limb length discrepancy.

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