ORIGINAL RESEARCH

A Prospective Study in the Management of Peritrochanteric Fractures Femur by PFNA2

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ABSTRACT

Background and Objectives

Intertrochanteric fracture is one of the most common fractures of the especially in the elderly with osteoporotic bones usually due to low energy trauma like simple falls. Internal fixation is appropriate for most intertrochanteric fractures. Optimal fixation is based on the stability of the fracture. PFNA2 is biomechanically considered one of the most effective methods of treatment with promising results.

Methods: This is a prospective study of 30 cases of fresh trochanteric and subtrochanteric fractures admitted to DMMC Wayanad between June 2019 to June 2022. Cases were taken according to inclusion and exclusion criteria i.e., patients with Peritrochanteric fracture above the age of 18yrs. Medically unsuitable and patients not willing for surgery were excluded from the study.

Results: In our series of 30 cases there were 18 males and 12 females, maximum age of 94 yrs and minimum age of 22 yrs, most of the patients were between 41 to 60 yrs. Mean age of 55.18 yrs. 45% of cases were admitted due to slip and fall and with predominance of right side. Out of 30 cases, 22 were trochanteric and 8 were subtrochanteric. In Trochanteric class 50% were Boyd and Griffin type 2 33.33% were of type 3, in Subtrochanteric class 37.5% were Seinsheimer's type 3a and 25% were 3b. Mean duration of hospital stay is 20.67 days and mean time of full weight bearing is 16.5 wks. Good to excellent results were seen in 91.66% cases of trochanteric fractures and 87.5% cases in subtrochanteric fractures.

Conclusion: Proximal femoral nail antirotation in Peritrochanteric fracture is a good method of fixation. The procedure is easy with reduced operative time and radiation exposure. So we strongly recommend PFNA2 for fixation of Peritrochanteric fracture of hip.

Key Words: PFNA2; Peritrochanteric; Subtrochanteric; Trochanteric

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INTRODUCTION

Extracapsular fractures (Intertrochanteric and Subtrochanteric fractures) primarily involve cortical and compact cancellous bone. Because of the complex stress configuration in this region and its non homogenous osseous structure and geometry, fracture occur along the path of least resistance through the proximal femur.

The goal of treatment of these fractures is stable fixation which allows early mobilization of the patient. These fractures are associated with substantial morbidity and mortality. Associated co morbid medical problem like Diabetes, hypertension, pulmonary, renal and cardiac problems add to the insult of fracture. Elderly patients are threatened with life threatening complications such as Hypostatic pneumonia, catheter sepsis, cardio respiratory failure and decubitus ulcer. All the circumstances mentioned above require using an urgent surgical solution for early rehabilitation and mobilization of the patient.

They are also one the most common fractures encountered in todays orthopaedic practice. Many treatment options are described aiming for stable fixation which allows early mobilization of the patient as they are unable to even partially restrict weight bearing.

In 2004 the proximal femoral nail antirotation developed by the AO/ ASIF group was introduced as one of the modern generation intramedullary nails. The unique characteristic of this implant is the use of single helical blade with a large surface area instead of screw. The inserted blade achieves an excellent fit through the bone compaction and requires less bone removal compared with a screw.the helical blade allows better purchase in the femoral head to limit cutouts due to varus deviation and rotation. This feature provides optimal anchoring and stability especially when inserted into osteoporotic bone and has been biomechanically proven to retard rotation and varus collapse. Biomechanical studies has proved PFNA as one of the most effective methods in the treatment of peritrochanteric femur fractures.

OBJECTIVES

1. To assess the stable fixation and early mobilization of patients.
2. To analyze the anatomical and functional outcome of treatment of peritrochanteric fractures using Proximal Femoral Nail Antirotation.
3. To compare the results with standard studies and draw conclusions.

METHODOLOGY

The present study consists of 30 adult patients of peritrochanteric fractures of femur satisfying the inclusion criteria, who are treated with Proximal Femoral nail in DMMC Wayanad. The study is carried out from June 2019 to June 2022.

Criteria for selection of patients:

Inclusion criteria:

1. Sub trochanteric fractures
2. Stable and unstable intertrochanteric fractures (Reverse oblique fractures and Inter trochanteric fractures with loss of posteromedial cortex)

Exclusion criteria:

1. Inter trochanteric fractures involving piriformis fossa
2. Open hip fractures
3. Pathological fractures
4. Periprosthetic fractures
5. Peadiatric fractures (before physeal closure)

Data collection:

After the patient with subtrochanteric or trochanteric fracture was admitted to hospital all the necessary clinical details were recorded in proforma prepared for this study. After the completion of the hospital treatment patients were discharged and called for follow up at

outpatient level at regular intervals for serial clinical and radiological evaluation. The patients were followed up till fracture union and function recovery after surgery at regular interval and if necessary subsequent follow up was done.

Management of patients:
As soon as the patient with suspected subtrochanteric or trochanteric fracture was seen, necessary clinical and radiological evaluation done and admitted to the ward after necessary resuscitation and splintage using skin traction.
The following investigations were done routinely on all the patients preoperatively:
Blood: Hb%, total leucocyte count, differential count, blood grouping, cross matching, fasting
blood sugar, blood urea, serum creatinine, serum electrolytes.
Urine: Albumin, sugar and microscopic examination.
X-rays:
• Pelvis with both hips-AP view.
• Involved side hip with femur full length-AP and Lateral view in all patients.
• Chest-PA view in necessary patients.
All the patients were evaluated for associated medical problems and were referred to respective departments and necessary treatment was given. Associated injuries were evaluated and treated simultaneously. All the patients were operated on elective basis after overcoming the avoidable anaesthetic risks.

Pre-op planning:
1) Determination of nail diameter: Nail diameter was determined by measuring diameter of the femur at the level of isthmus on an AP x ray.
2) Determination of neck shaft angle: Neck shaft angle was measured on the unaffected side on an AP x-ray using goniometer.
3) Length of the nail: A standard length PFN nail(250mm) is used in all our cases.

Proximal Femoral Nail implant details:
The implant consists of a proximal femoral nail, self-tapping 6.5mm hip pin, self-tapping 8 mm femoral neck screw, 4.9 distal locking screws, and an end cap. Proximal femoral nail is made up of either 316L stainless steel or titanium alloy which comes in following sizes.
1] Length: standard PFN –250 mm Long PFN- 340, 380, 420mm.
2] Diameter: 9,10,11,12 mm
3] Neck shaft angle range: 1250, 1300,1350.
The nail is having 14mm proximal diameter. This increases the stability of the implant.
There is 60 mediolateral valgus angle, which prevent varus collapse of the fracture even when there is medial comminution.
The distal diameter is tapered to 9 to 12 mm which also has grooves to prevent stress concentration at the end of the nail and avoids fracture of the shaft distal to the nail.
Proximally it has 2 holes the distal one is for the insertion of 8 mm neck screw which acts as a sliding screw, the proximal one is for 6.5 mm hip pin which helps to prevent the rotation. Distally nail has two holes for insertion of 4.9 mm locking screws, of which one is static and the other one is dynamic which allows dynamization of 5 mm.
In our study we used a standard length PFN of 250 mm with distal diameter of 10,11, 12mm.the proximal diameter of nail is 14mm.The proximal derotation screw of 6.5mm and distal lag screw of 8mm.Distal locking is done with self tapping 4.9mm cortical screws one in

static mode and the other in dynamic mode allowing 5mm dynamization. The nail is universal with 6 degrees mediolateral angulation and with a neck shaft angle of 135 degrees. we did not use end cap.

OPERATIVE TECHNIOUE:

Patient positioning and fracture reduction:

The patient was placed in supine position on fracture table with adduction of the affected limb by 10 to 150 and closed reduction of the fracture was done by traction and gentle rotation. The unaffected leg was flexed and abducted as far as possible in order to accommodate to image intensifier. The image intensifier was positioned so that anteroposterior & lateral views of the hip and femur could be taken. The patient was then prepared and draped as for the standard hip fracture fixation. Prophylactic antibiotic was given to all patients 30 minutes before surgery.

Percutaneous fixation of fracture:

In Trochanteric fractures we fixed the fracture percutaneously using two "k"wires which pass along the anterior cortex of greater trochanter and neck of femur into the head of femur. By doing so we can prevent the fracture opening up on adduction of limb for nail insertion.

Approach:

The tip of the greater trochanter was located by palpation in thin patients and in hefty patients we used image intensifier and 5 cms longitudinal incision taken proximal from the tip of the greater trochanter. A parallel incision was made in the fascia lata and gluteus medius was split in line with the fibres. Tip of the greater trochanter is exposed.

Determination of the entry point and insertion of guide wire:

In AP view on C-arm, the entry point is on the tip or slightly lateral to the tip of the greater trochanter. In lateral view, guide wire position confirmed in the center of the medullary cavity. The guide wire is inserted in this direction to a depth of 30cms with a T-handle.

Opening of the femur:

Over the guide wire, a cannulated rigid reamer is inserted through the protection sleeve and manual reaming was done as far as the stop on the protection sleeve.

Insertion of the PFN:

After confirming satisfactory fracture reduction an appropriate size nail as determined pre operatively was assembled to the insertion handle and inserted manually as far as possible into the femoral opening. This step was done carefully without hammering by slight twisting movements of the hand until the hole for 8mm screw is at the level of inferior margin of neck. In cases where satisfactory reduction was not possible by closed means, open reduction was done.

Insertion of the guide wire for neck screw and hip pin:

These are inserted with the help of the aiming device tightly secured to the insertion handle and using the colour coded drill sleeve systems. A 2.8 mm guide wire was inserted through the drill sleeve after a stab incision with its position in the caudal area of the femoral head for neck screw. This guide wire is inserted 5 mm deeper than the planned screw size. The final position of this guide wire should be in the lower half of the neck in AP view and in the

center of the neck in lateral view. Proper positioning of the nail will aid in proper anteversion of the neck screw as there is inbuilt anteversion in the hole on the nail. A second 2.8 mm guide wire is inserted through the drill sleeve above the first one for hip pin. The tip of this guide wire should be 5mm deeper than the planned hip pin but approximately 25-20 mm less deep than planned neck screw.

Insertion of the hip pin:
The hip pin is inserted first to prevent the possible rotation of the medial fragment when inserting the neck screw. The length of the hip pin is indicated on measuring device and is calculated 5 mm before the tip of the guide wire. Drilling is done over the guide wire with 6.5 mm drill bit to a depth up to the length of hip pin previously measured. The same length 65 mm hip pin is inserted with the help of hexagonal cannulated screwdriver. Length and position to be confirmed with C-Arm Guide wire is then removed.

Insertion of the neck screw:
A measuring device is inserted over the 2.8 mm guide wire until it touches the bone. The correct length is indicated on the measuring device and calculated to end approximately 5 mm before the tip of the guide wire. This length is set on the 8 mm reamer by securing the fixation sleeve in correct position. Drilling is done over 2.8 mm guide wire till the fixation sleeve prevents further drilling. Tapping is not done as the neck screw is self tapping. Neck screw is inserted using cannulated screw driver. Final position confirmed with image intensifier.

Distal locking:
Distal locking is usually performed with two cortical screws. For standard PFN, aiming was used. A drill sleeve system was inserted through a stab incision. A drill hole is made with 4 mm drill bit through both cortices length is measured directly from the drill marking. Locking screw is inserted through protection sleeve position confirmed with image intensifier.

Closure:
After the fixation is over, lavage is given using normal saline. Incision closed in layers. Sterile dressing is applied over the wounds and compression bandage given.

After treatment:
Postoperatively, patients pulse, blood pressure, respiration, temperature were monitored. Foot end elevation is given depending on blood pressure. Antibiotics were continued in the post operative period. Analgesics were given as per patients compliance. Blood transfusion was given depending on the requirement. Sutures removed on 10^{th} postoperative day. Patients were encouraged to sit in the bed after 24 hours after surgery. Patients were taught quadriceps setting exercises and knee mobilization in the immediate post operative period. Patient was taught gait training before discharge from the hospital. Only in very unstable fracture patterns weight bearing was not advised. Rest of the patients were encouraged to weight bear partially with axillary crutches or walker depending on the pain tolerability of individual patient.

Discharge:
Patients were discharged from the hospital when independent walking was possible with or without walking aids.

Follow up:
All patients were followed up at an interval of 6 weeks till the fracture union is noted and then after once in 3 months till 1year. At every visit patient was assessed clinically regarding hip and knee function, walking ability, fracture union, deformity and shortening.
Modified Harris Hip scoring system was used for evaluation.
X-ray of the involved hip with femur was done to assess fracture union and implant bone interaction.

Results of the surgery:
Functional Results:
Assessed based following hip scoring system adopted.

Harris Hip Scoring System (Modified)[3] Table 1
Maximum points possible - 100

- Pain relief- 44
- Function- 47
- Absence of deformity- 4
- Range of motion- 5

(1) Pain (44 Possible)

- None or ignores it (44)
- Slight, occasional, no compromise in activities (40)
- Mild pain, no effect on average activities, rarely moderate pain with usual activity; may take aspirin (30)
- Moderate pain, tolerable but makes concessions to pain, some limitation of ordinary activity or work; may require occasional medicine stronger than aspirin (20)
- Marked pain, serious limitation of activities (10)
- Totally disabled, crippled, pain in bed, bed ridden (0)

(2) Function (47 Possible)
Gait (33 POSSIBLE)

(A) LIMP
- None (11)
- Slight (8)
- Moderate (5)
- Severe (0)

(B) SUPPORT
- None (11)
- Cane for long walks (7)
- Cane most of the time (5)
- One crutch (3)
- Two canes (2)
- Two crutches (0)
- Not able to walk (0)

(C) DISTANCE WALKED
- Unlimited (11)
- Six blocks (8)
- Two or three blocks (5)

- Indoors only (2)
- Bed and chair (0)

Activities (14 Possible)
(A) STAIRS
- Normally without use of railing (4)
- Normally use of railing (2)
- In any manner (1)
- Unable to do stairs (0)

(B) SHOES AND SOCKS
- With ease (4)
- With difficulty (2)
- Unable (0)

(C) SITTING
- Comfortably in ordinary chair one hour (5)
- On a high chair for half an hour (3)
- Unable to sit comfortably in any chair (0)

(D) ENTER PUBLIC TRANSPORTATION (1)

(3) Abscense of deformity (All yes = 4; Less than 4 = 0)
- Less than 30 degrees of fixed flexion contracture.
- Less than 10 degrees of fixed adduction.
- Less than 10 degrees of fixed internal rotation in extension.
- Limb length discrepancy less than 3.2 cm.

(4) Range of motion (5 Possible) (* Normal)
Total degree measurements, then check range to obtain score
- Flexion (*140 degrees)
- Abduction (*40)
- Adduction (*40)
- External rotation (*40)
- Internal rotation (*40)

Range of motion scale
- 210-300 (5)
- 161-210 (4)
- 101-160 (3)
- 61-100 (2)
- 31-60 (1)
- 0-30 (0)

RESULTS

The following observations were made from the data collected during this study of proximal femoral nail in the treatment of 30 cases of Peritrochanteric fractures of proximal femur in the Department of Orthopaedic Surgery, DM WIMS Wayanad between June 2019 to June 2021.

Age Distribution:
In our series, majority of the cases i.e.8 (40%) were in the age group of 41-60 years, followed by 6 (30%) cases in the age group 61-80 years. The youngest patient was 22 years old and eldest patient was 94 years. The mean age was 55.18 years. **Table 2, Table 3**

Nature of violence:
9 cases (45%) affected were due to Slip and Fall, 8 cases (40%) due to RTA, and 3 cases (15%) due to Fall from height. Slip and fall was the most common mode of injury. **Table 4**

Side Affected:
Right side was involved in 11 (55%) cases and left in 9 (45%), right side was more commonly involved than left side.

Type of fracture Table-5, Table – 6, Table – 7
In the present study, majority of the cases i.e. 6 (50%) had type 2 , followed by 4(33%) cases of type 3 Boyd and Griffin.

Associated Injuries Table – 8
Intraoperative complications:
In our study, we did not encounter any complications intraoperatively.

Post-operative complications
Immediate complications:
We had one case of superficial wound infection post operatively, which was managed with regular dressing, culture and sensitivity and appropriate i.v antiobitics. No deep infection was seen.
Delayed complications:

- We encountered three cases of delayed union and three case of mal union (varus <10 degree).
- Two case had shortening more than 1 cms who were treated with sole raise.
- We had no cases of nonunion or implant failure or cutting out of screws.
- Two patient had knee stiffness. Patient improved after rigorous physiotherapy.

In our study the average duration of hospital stay was 20.67 days. The mean time for full weight bearing was 16.5 weeks. All patients enjoyed good range of hip and knee range of motion except two who improved with physiotherapy. Post operative mobility was aided in immediate post operative period but later all patients were ambulatory independently with or wit out walking aid after 6 weeks. **Table – 9**

Follow up:
All patients were followed at 6 weeks, 12 weeks, 6 months and some patients upto one year and further if necessary. At each follow up radiograph of operated hip with upper half femur was taken and assessed for fracture union and implant failure and screw cut out.

Anatomical Results:
Anatomical results were assessed by presence or absence of deformities, shortening, hip and knee range of motions.
In our study two patients had shortening >1cm, three patients had varus malunion <10 degrees.

Functional Results: Table-10, Table-11

Functional and anatomical results were assessed Harris Hip Scoring System (Modified)
Intertrochanteric -12
Subtrochanteric -08

In our study, According to Harris Hip Scoring System (Modified), Good to excellent results are seen in 91.66 % cases of trochanteric fractures and 87.5% cases in subtrochanteric fractures. Overall, we had Good to excellent results in in 90%, Fair in
10 %. we had no case with poor results.

Associated medical problems:

4 patients were known case of hypertension and on treatment and continued the same.
2patiens were known case of type 2 diabetes mellitus since 2 years and were on regular treatment.

DISCUSSION

The treatment of peritrochanteric fractures of the proximal femur is still associated with some failures. The reasons are: disregard for biomechanics, overestimation of the potentials of new surgical techniques or new implants or poor adherence to established procedures. High stress concentration that is subject to multiple deforming forces, slow healing time because of predominance of cortical bone, decreased vascularity, high incidence of complications reported after surgical treatment compels the surgeon to give a second thought regarding selection of the proper implant.

The most common current modes of fixation are Blade plate systems, Sliding screw systems and Intramedullary devices. From the mechanical point of view, a combined intramedullary device inserted by means of minimally invasive procedure seems to be better in elderly patients. Closed reduction preserves the fracture haematoma, an essential element in the consolidation process. Intramedullary fixation allows the surgeon to minimize soft tissue dissection there by reducing surgical trauma, blood loss, infection, and wound complications.

PFN is a novel, modern intramedullary implant based on experience with the gamma nail. The currently used gamma nail as an intramedullary device also has a high learning curve with technical and mechanical failure rates of about 10%. The gamma nail is susceptible to fail at its weakest point, the lag screw-implant interface.

The Arbeitsgemeinschaft fur osteosynthesefragen (AO ASIF) in 1996, therefore developed the proximal femoral nail with an antirotational hip pin together with a smaller distal shaft diameter which reduces stress concentration to avoid these failures. Proximal femoral nail has all advantages of an intramedullary device, such as decreasing the moment arm, can be inserted by closed technique, which retains the fracture haematoma an important consideration in fracture healing, decrease blood loss, infection, minimizes soft tissue dissection and wound complications.

In an experimental study, Gotze et al[4]. (1998) compared the load ability of osteosynthesis of unstable per and subtrochanteric fractures and found that the PFN could bear the highest loads of all devices.

Comparison of Results:

Simmermacher et al[5] (1999), in a clinical multicentric study, reported technical failures of PFN after poor reduction, malrotation or wrong choice of screws in 5% of the cases. In our study poor reduction occurred in two cases, three with varus malreduction. A cut out of the

neck screw occurred in 0.6% cases in the study conducted by Simmermacher but we did not encounter such complication in our study. Anatomical fracture reduction was found in 86% of the patients and full weight bearing stability was achieved in 94%. In our study acceptable anatomical reduction was obtained in all the patients.
An intraoperative fracture displacement during manual introduction of the nail into the femoral shaft has not been reported with the gamma nail but this has been a problem with the PFN. One reason may be that the entry point of the PFN at the tip of the greater trochanter is located directly in the fracture region which can cause an intraoperative fracture displacement.
However, Simmermacher et al. (1999) had no cases of intraoperative fracture displacement using the PFN mainly in 31- A2 fractures. In our study we had no case of intraoperative fracture displacement after nail insertion.

W. M. Gadegone & Y. S. Salphale[6], in 2007, reported a study on Proximal femoral nail – an analysis of 100 cases of proximal femoral fractures with an average follow up of 1 year. Postoperative radiographs showed a near-anatomical fracture reduction in 88% of patients.. The fracture consolidated in 4.5 months. No perceptible shortening was noted. Of the patients, 7% had superficial infections which were controlled with antibiotics, 82% had a full range of hip motion. We had a non-union in one case which was due to the primary distraction in a high subtrochanteric fracture. In our Study we had 100% near normal anatomical # reduction and # consolidated in 16.5 weeks. All patients had full range of hip motion. We encountered no nonunion.

Metin Uzun[7] et al, in 2009, In a study of 35 patients reported Long-term radiographic complications following treatment of unstable intertrochanteric femoral fractures with the proximal femoral nail and effects on functional results. Reduction was assessed as good or acceptable in all the patients. Complete union was achieved in all but two patients. The mean Harris hip score was 82.1. The results were excellent in 11 patients (31.4%), good in 15 patients (42.9%), fair in seven patients (20%), and poor in two patients (5.7%). Radiographic complications mainly included secondary varus displacement in nine patients (25.7%). Secondary varus displacement was due to cut-out of the proximal screws (n=2), screw loosening due to collapse of the fracture site (n=2), and reverse Z-effect (n=5). In our study mean Harris hip score was 83.5. we had no implant failure or reverse z effect.
The aim of the study was to study the epidemiology of peritrochanteric fractures in adults and anatomical and functional outcome with this newer method of intramedullary fixation with PFN. The assessment criteria for the efficiency of surgical technique included duration of surgery, number of intraoperative complications, blood loss and radiographic screening time. Clinical assessment includes post operative walking ability, hip and knee function, fracture union time, and implant bone interaction.
In our study, peritrochanteric fractures were more common due to Slip and fall. Age ranged from 22 to 94 years with mean age of 55.18 years. Males were more common contributing of 75% of cases. Right sided fractures were more common in our study accounting for 55% of cases.
In our study Trochanteric fractures contributed 60% of cases, out of which Boyd and griffin type 2 consisted of 50% followed by 33.33% of type 3. Subtrochanteric fractures accounted for 40% of cases out of which Seinsheimer's type 3a consisted of 37.5% cases, followed by 3b of 25%.

The mean duration of radiation exposure was 80 seconds, mean duration of surgery was 90 minutes and mean blood loss was 120 ml.
The mean duration of hospital stay was 20.67 days; mean time for full weight bearing was 16.5 weeks. Post operatively all patients were ambulatory of which three of them required walking aids. Two patients had 2 cms shortening after fracture union which was treated conservatively by sole rise. All patients enjoyed good range of hip and knee motion except in two who had stiffness of knee improved by physiotherapy.
Over all 90 % of our cases had excellent to good results according to Harris Hip Score. Fair in 10 %. we had no case with poor results. Our Results are comparable with other studies.

CONCLUSION

In the present study 30 patients with peritrochanteric fractures (which includes 22 intertrochanteric, 8 subtrochanteric) of femur were surgically managed with Proximal Femoral Nail. Figure 1; Figure 2; Figure 3
The data was assessed, analyzed, evaluated and the following conclusions were made:
• Peritrochanteric fracture of the femur is common in the elderly, due to osteoporosis and in young due to high velocity trauma.
• The mode of injury for Peritrochanteric fracture in the elderly is a trivial trauma, however in the young individuals it occurs following a high velocity trauma.
• Since in the elderly the mode of injury is a low velocity trauma, the incidence of associated injuries is less.
• Since the fracture is common in the elderly the incidence of associated diseases requiring medical attention is high.
• 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.
• Anatomical reduction can be achieved by closed manipulative or open methods. As the incidence of comminution is high, these fractures may require a stable reduction and internal fixation. Bone grafting is required if there is a deficiency.
• PFN has the advantage of collapse at fracture site and is biomechanically sound as it is done by closed technique, fracture opened only when closed reduction could not be achieved and it is an intramedullary device.
• Another advantage of this device is it prevents excess collapse at fracture site thus maintaining neck length.
• The entry point determination is the most crucial step in this procedure which is the tip of trochanter. The device is fixed distally in both dynamic and static mode so in case of delayed union it can be dynamised.
• The two neck screws should be placed in the centre of neck and head, the proximal one acts as derotation screw and the distal one as collapsing screw.
• The nail has a 6° mediolateral angulation which prevents medial collapse and a 135° neck shaft angle which maintains the normal neck shaft angle.
• Post-operatively early mobilization can be begun as the fixation is rigid and because of the implant design.
• The fixation of Peritrochanteric fractures with a PFN markedly reduces the morbidity and mortality, in the elderly individuals in whom the fracture is more common.
• If the above technical details are achieved, the function of the hip joint is regained to near normal and the rehabilitation of the patient is smooth.

• Most of the complications are surgeon and instruments related which can be cut down by proper patient selection and good preoperative planning.
• With the experience gained from each case the operative time, radiation exposure, blood loss and intraoperative complications can be reduced drastically.
Hence we conclude, though the learning curve of this procedure is steep, with proper patient selection, good instrumentation, image intensifier and surgical technique, PFN remains the implant of choice in the management of Peritrochanteric fractures.

SUMMARY

Pertrochanteric femoral fractures are of intense interest globally. Peritrochanteric fracture is a leading cause of hospital admissions in elderly people. The number of such admissions is on a raise because of increasing life span, sedentary habits and increased road traffic accidents. Conservative methods of treatment results in malunion with shortening and limitation of hip movement as well as complications of prolonged immobilization like bed sores, deep vein thrombosis and respiratory infections. This study is done to analyze the surgical management of Peritrochanteric fractures using Proximal Femoral Nail. In our series of 20 cases there were 15 males and 5 females, maximum age of 94 yrs and minimum age of 22 yrs, most of the patients were between 40 to 60 yrs. Mean age of 58.18 yrs. 45% of cases were admitted due to Slip and fall and with slight predominance of right side. Out of 20 cases, 12 were trochanteric and 8 were subtrochanteric. In Trochanteric class 50% were Boyd and Griffin type 2 33.33% were of type 3, in Subtrochanteric class 37.5% were Seinsheimer type 3a and 25% were 3b. Mean duration of hospital stay is 20.67 days and mean time of full weight bearing is 16.5 wks. Good to excellent results are seen in 91.66% cases of trochanteric fractures and 87.5% cases in subtrochanteric fractures. Overall, we had Good to excellent results in in 90%, Fair in 10 %. we had no case with poor results. From this sample study, we consider that PFN is an excellent implant for the treatment of Peritrochanteric fractures. The terms of successful outcome include a good understanding of fracture biomechanics, proper patient selection, good preoperative planning, accurate instrumentation, good image intensifier.

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LEGENDS TO FIGURES

FIGURE 1 POST OPERATIVE
FIGURE 2 POST OPERATIVE
FIGURE 3 POST OPERATIVE

LEGENDS TO TABLES

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Table 11: Functional results of subtrochanteric fractures

Figure 1: Post operative 73 year old male

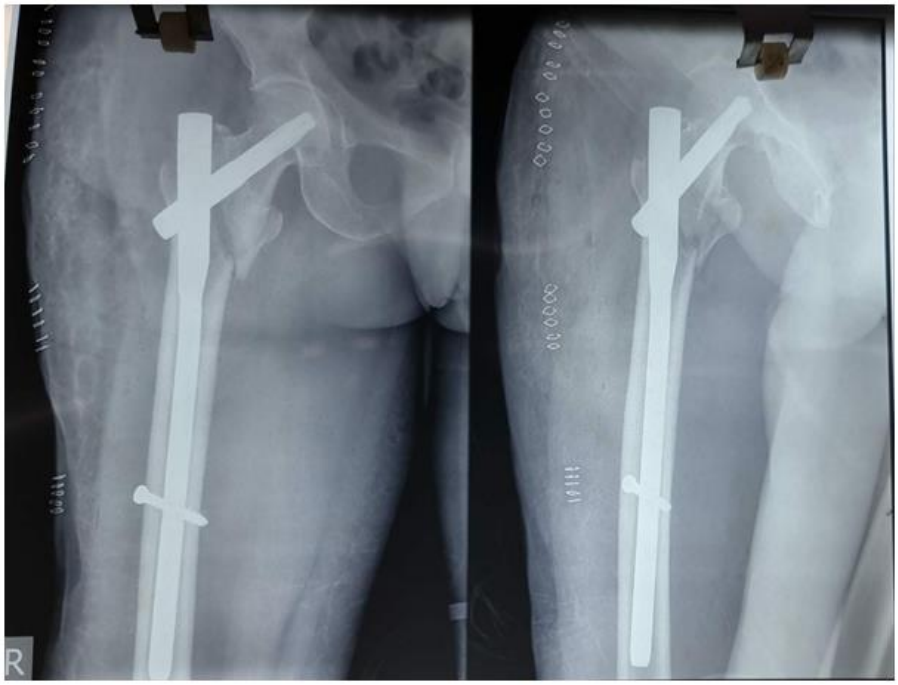

Figure 2: Post operative 62 year old female

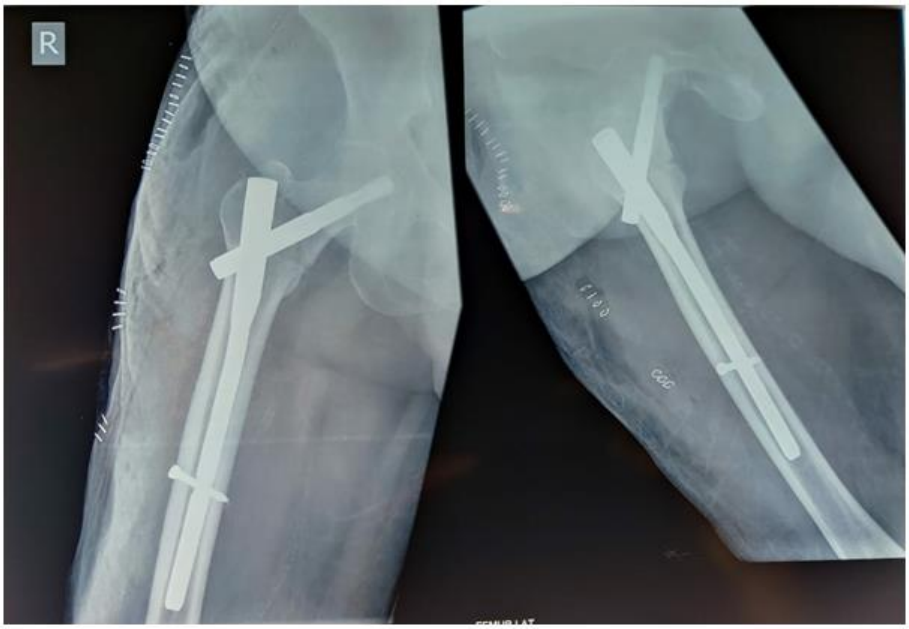

Figure 3: Post operative 60 year old female

Table 1: Total Harris Hip Score

Score	**Rating**
90-100	Excellent
80-89	Good
70-79	Fair
<70	Poor

Table 2: Age Distribution

Age group	Number of cases	Percentage
0 – 20	0	0 %
21 – 40	4	20%
41 – 60	8	40%
61 -80	6	30%
81 -100	2	10%

Table 3: Sex Distribution

Male	15
Female	5

Table 4: Nature of violence

Nature of violence	Number of cases	Percentage
Motor vehicle accidents (RTA)	8	40%
Fall from height	3	15%
Slip and fall	9	45%

Table 5: Type of fracture
Peritrochanteric fractures are classified according to

Type of fracture	Number of cases	Percentage
Trochanteric	12	60%
Subtrochanteric	8	40%

6) Boyd and griffin classification

Table 6: Trochanteric Fractures are classified according to Boyd and griffin classification

Type of fracture	Number of cases	Percentage
Type 1	1	8.33%
Type 2	6	50%
Type 3	4	33.33%
Type 4	1	8.33%

7) Seinsheimer Classification

Table 7: Subtrochanteric fractures are classified according to Seinsheimer Classification

Type of fracture	Number of cases	Percentage
Type I	0	0
Type IIa	1	12.5%
Type IIb	1	12.5%
Type IIc	1	12.5%
Type IIIa	3	37.5%
Type IIIb	2	25%
Type IV	0	0
Type V	0	0

8) Associated Injuries

Table 8: Associated Injuries

Nature of injury	No. Of. Cases	Percentage (%)
Head injury	2	10%
Tibial shaft	1	5%
Distal radius fracture	1	5%

Table 9: Assessment of Results

Mean duration of hospital stay	20.67 days
Mean time to full weight bearing(in weeks)	16.5
Mobility after surgery	
Independent /Aided	20
Non-ambulatory	0
Mean range of movements(10 weeks postoperatively)	
Hip joint –0 to 110	20/20
Knee joint—0 to 120	20/20

Table 10: Functional results of Intertrochanteric fractures

Functional results	Number of cases	Percentage
Excellent	8	66.66%
Good	3	25%
Fair	1	8.33%
Poor	0	0

Table 11: Functional results of subtrochanteric fractures

Functional results	Number of cases	Percentage
Excellent	5	62.5%
Good	2	25%
Fair	1	12.5%
Poor	0	0