TREATMENT OF SUBTROCHANTERIC FEMUR FRACTURES WITH PROXIMAL FEMORAL NAILS: A PROSPECTIVE STUDY

Abstract:

Introduction: The subtrochanteric fracture of the femur remains a challenging injury for the orthopaedic surgeon. In this study we observed outcome of closed reduction and internal fixation with proximal femoral nail for subtrochanteric femur fracture in 30 patients in age group of 20 years and above.

Objective: To study the outcome of the treatment of subtrochanteric femur fracture with proximal femoral nail.

Material and methods: 30 patients of age group 20 years and above having subtrochanteric femur fracture, admitted and treated with closed reduction and internal fixation with proximal femoral nail from December 2014 to November 2015 were enrolled for this study and followed up for a minimum period of 12 weeks. The patients were assessed and graded for clinical outcome, limb length discrepancy and range of movement at hip and knee joint according to Modified Harris Hip Score.

Result: All cases showed union. Mean union rate was 14.7 weeks. Superficial wound infection was seen in 1 patient which resolved with regular dressing and antibiotics. Mean range of hip flexion was 126.6º and extension was 14.3º. Mean abduction and adduction was 28.6º and 25.3º respectively. Mean internal and external rotation were 29.2º and 34.33º respectively. Mean range of knee flexion was 119.16º. Shortening was seen in three patients, out of which one patient had shortening of 2 cms shortening and two patients had shortening of less than 2 cms. No morality, fat embolism or non-union was reported in our series. Overall 70% excellent and 30% good results were achieved with no poor result.

Key-words: Subtrochanteric Fractures, Femur, Proximal Femoral nails

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Introduction:

Subtrochanteric fractures of the femur are sustained by the elderly from trivial trauma such as slipping from the stairs or fall in the toilet and in younger patients they are caused due to high energy trauma. Despite marked improvement in the implant design, surgical technique and patient care, hip fractures continue to consume a substantial proportion of our health care resources. Many implants have been recommended for the use in Subtrochanteric fractures of femur but a high incidence of complications has been reported after surgical treatment with each implant. A lack of satisfactory implant in surgical treatment of Subtrochanteric fracture femur has led to continuous evolution in design of a perfect implant.

Our study highlights the incidence and epidemiology of Subtrochanteric fractures, their management by Proximal Femoral Nail, outcome and results.

Aims and objectives:

The present study aims to study the modes of injury in Subtrochanteric fractures of femur and assess the efficacy of operative management in treatment of Subtrochanteric fracture of femur.

Materials And Method:

The present study consists of 30 patients of traumatic Subtrochanteric fractures of femur treated with Proximal Femoral Nail. This study was carried to find out age, sex and side incidence of Subtrochanteric fractures to testify anatomical and functional outcome of treatment with Proximal Femoral Nail.

Patient Position: Supine position on fracture table was given to all the patients.

A) Patient positioning and fracture reduction:

The image intensifier was positioned so that AP and Lat views of the affected femur can be easily obtained.

B) Anteversion guide wire insertion:

Once the fracture was reduced, a sharp, guide wire inserted percutaneously along the femoral neck. Using the image intensifier, its position was checked to ensure it lies parallel to the femoral neck.

C) Determination of the soft tissue incision position:

The tip of the greater trochanter located by palpation, and 5cm incision extended proximally from it without marking. The incision deepened through the fascia lata, splitting the abductor muscle for approximately 3 cm immediately above the tip of the greater trochanter, thus exposing its tip.

After treatment:

- Postoperatively foot end elevation was given depending on blood pressure.
- Every ½ hourly blood pressure, pulse rate, respiratory rate and temperature recorded for first 24 hours.
- Antibiotics continued in postoperative period. Analgesics were given as per the patient’s compliance.
- Patients were encouraged to sit in bed with back support on day one.
- Quadriceps strengthening exercises started from day one. Depending on fracture stability, patients were encouraged to do active knee bending exercises.
- Sutures removed after 14 days.
- They were regularly observed during their stay

Discharge:

Patients were discharged when independent walking was possible with walking aids, with the advice to follow up in the out patients department regularly.

Follow up:

All patients were radiographed at an interval of 6 weeks till evidence of union. Those who could not follow up answered the questionnaire on phone. The patient followed up for one year after the surgery at regular interval and if necessary subsequent follow up was done.

Clinically, union of fracture was assessed and also examination for shortening and deformity was done.

Functional ability of the patients with respect to ambulatory status, ability to squat, sit cross legged and walk for varying distance was assessed based on Modified Harris Hip Score.

Modified Harris Hip Score²:

Pain:

- None or ignores it (44)
- Slight, occasional, no compromise in activities (40)
- Mild pain, no effect on average activities, rarely moderate pain with unusual activity, may take aspirin (30)
- Moderate pain, tolerable but makes concession to pain, some limitation of ordinary activity or work, may require occasionally medicines stronger than paracetamol (20)
- Marked pain, serious limitation of activities (10)
- Totally disabled, crippled, pain in bed, bedridden (0)
Limp:
- None (11)
- Slight (8)
- Moderate (5)
- Severe (0)

Support:
- None (11)
- Cane for long walks (7)
- Cane most of the time (5)
- One crutch (3)
- Two canes (2)
- Two crutches (1)
- Not able to walk (0)

Distance Walked:
- Unlimited (11)
- Six blocks (8)
- Two or three blocks (5)
- Indoors only (2)
- Bed and chair (0)

Stairs:
- Normally without using railing (4)
- Normally using a railing (2)
- In any manner (1)
- Unable to do stairs (0)

Put on Shoes and Socks:
- With ease (4)
- With difficulty (2)
- Unable (0)

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)

Enter Public Transportation: Yes / No

Flexion Contracture: (degrees)

Limb Length Discrepancy: (cm)

Absence Of Deformity (All Yes = 4; Less than 4 = 0)
- Less than 30° fixed flexion
- Less than 10° fixed adduction
- Less than 10° fixed internal rotation in extension
- Limb length discrepancy less than 3.2 cm

Range Of Movement (* Normal)
- Flexion (*140°)
- Abduction (*40°)
- Adduction (*40°)
- External rotation (*40°)
- Internal rotation (*40°)

Range of movement scale:
- 211°-300° (5)
- 161°-210° (4)
- 101°-160° (3)
- 61°-100° (2)
- 31°-60° (1)
- 0°-30° (0)

Range of movement score:

Total harris hip score:

Readmission to hospital: yes no

Harris hip score

| Excellent | 60-100 |
| Good      | 15-59  |
| Poor      | <14    |

Results:

In our study the maximum aged patient was 70 years. Most of the patients were in the age group of 21 to 40 years, with mean average of 41.3 years. 25 patients were males and 5 were females. This shows preponderance of males over females. In 21 cases Right side was affected and in remaining 9 cases left side was affected. Out of 30 cases, 23 cases gave history of road traffic accidents and 7 cases gave history of slip and fall. In our series road traffic accidents contributed to 76.67% of the injuries.

In our study the majority of cases belong to Seinsheimer type III A i.e., 46.67%. Majority of the patients i.e., 93.33% were operated within first 5 days after trauma soon after patient is stabilized and medically fit. In our study, we used proximal femoral nail in all the patients for fracture fixation. Commonly used nail diameter was 10 mm 135° i.e., 50% The mean duration of hospital stay was 7.63 days. Mobilization of patient to full weight bearing was done in mean of 13.63 days. The mean time to achieving union was 14.7 weeks. In our study full range of flexion of hip at 12 weeks post operative was observed in 73.33% of cases and about 26.67% of patients showed minimally limited flexion.

On a whole, all the patients had a satisfactory range of movements post operatively. In our study showed 80% of patients showed full range of movements and 20% showed minimally limited movements at 12 weeks post-operative. Shortening was seen in 3 patients out of patients of 30 who had severe comminution, out of which one patient had 2 cm shortening and two other had less than 1 cm shortening. On the whole
shortening was seen in 10% of our cases.1 patient who had superficial infection which was controlled with dressings regularly and antibiotics. Clinical outcome was assessed based on modified Harris Hip Score10. 70% showed excellent and 30% showed good results.

Discussion:
The characteristic anatomy, the biomechanical stress and forces acting at the Subtrochanteric region makes it difficult to manage. Young patients usually sustain high energy trauma, which results in comminuted fractures whereas in older patients usually comminuted fractures are seen after minor fall.3

At present it is generally believed that all subtrochanteric fractures should be internally fixed to reduce the morbidity and mortality by early ambulation. Because of comminution and high incidence of complication reported after surgical treatment, surgeons are compelled to give a second thought regarding the selection of proper fixation device.4,5 The most common current methods of fixation are sliding nail plate systems and intramedullary devices.

In our study, the average age for Subtrochanteric fractures was 41.3 years which is comparable to the studies of El-Mowafi HM et al6 (2014), and Kakkar et al7 2005.

Right side was more common than left side as seen in our study.
High velocity injuries due to road traffic accidents were the main cause of these fractures seen in our studies similar to the study of Kakkar et al7 2005.

In the study group, majority of fractures belonged to class IIIA of Seinsheimer’s classification i.e., 46.67%. The mean period of hospital stay was 7.63 days.
Shortening was seen in three patients of whom two patients had shortening of less than 2cms and one patient had shortening of 2cms which is comparable to the studies of Hotz et al5, and Kakkar et al. Postoperative quadriceps exercises were started on second day in all cases and full weight bearing was allowed early i.e., 13.63 days which was found statistically significant. Time to union was 14.73 weeks. Our results matched with Boldin et al8 and Herrera et al9.

After fracture union, range of movements in all patients was good at both hip and knee. The mean range of flexion at hip was 126.66º. The mean range of knee flexion was 119.16º. Mean range of hip extension and knee extension was equal to normal side. The mean range of abduction was 28.66º and adduction was 25.33º. Internal rotation was 29.16º and external rotation was 34.33º. Our results were similar to the studies of Yadkikar SVet al10 (2015) and Hotz et al5.

None of the patients in our series showed non–union, implant failure or fat embolism, only 1 patient had superficial infection. Yadkikar SVet al10 (2015) No mortality was seen in our series, 3 patients had shortening in (83.33%) which is comparable to the studies of El-Mowafi HM et al6 (2014), and Kakkar et al7 2005.
our series. Our outcomes were similar to that of Robinson et al11.

Overall we had 70% excellent results and 30% good results.

Summarizing the impression about the device used, we feel that all Subtrochanteric fractures can be treated by close reduction and internal fixation with Proximal Femoral Nail.

**Conclusion:**

Proximal Femoral Nail is an excellent minimal invasive implant for Subtrochanteric fractures, if closed reduction is possible. The terms of successful outcome include a good understanding of fracture biomechanics. The number and severity of complications may be reduced by observing proper principles of reduction and exact surgical technique. It is a relatively easy procedure and a biomechanically stable construct allowing early weight bearing. Femoral neck screws positioning is critical. Proximal Femoral Nail offers the advantages of high rotational stability of the head-neck fragment, an unreamed implantation technique and the possibility of static or dynamic distal locking. Thus, the Proximal Femoral Nail is a suitable implant for treatment of all Subtrochanteric fractures.

**References:**