Indian Journal of Orthopaedics Surgery 2023;9(3):127–131

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Indian Journal of Orthopaedics Surgery

Journal homepage: https://www.ijos.co.in/

Original Research Article

Comparison of sub trochanteric femur fracture treatment with intra medullary proximal femur nail versus proximal femur nail with trochanteric support plate

Ajay Singh Thakur[1], Satwik Thareja[1], Sachin Patel[1], R N Sonkar[1,*]

[1] *Dept. of Orthopedics, Index Medical College Hospital and Research Centre, Indore, Madhya Pradesh, India*

ARTICLE INFO

Article history:
Received 02-05-2023
Accepted 23-05-2023
Available online 04-09-2023

Keywords:
PFN -Proximal femur Nail
TSP -Trochanteric Support Plate
HHS -Harris Hip Score

ABSTRACT

Background: Comparison of sub trochanteric femur fracture treatment with intramedullary proximal femur nail vs intramedullary proximal femur nail augmented with trochanteric support plate.
Materials and Methods: Two groups were divided from 50 patients to 25 in each and first were treated with PFN and the other with a combination of PFN plus trochanteric support plate.
Results: At the end of 6 months all except 2 patient from group 1 mobilized unassisted while all the patient from group 2 got mobilized unassisted. Based on harries hip score.
Conclusion: Intramedullary fixation with intra medullary proximal femur nail plus trochanteric support plate.is feasible for the treatment of subtrochanteric femur fracture. Intraoperative reduction and surgical skill are important for the clinical outcome and the patients.

1. Introduction

Sub trochanteric femur fracture are proximal femur fracture that occur with in 5cm of lesser trochanter.[1]

In the last few years with increased of knowledge of biomechanical and fracture biology management of sub trochanteric femur fracture have evolved to the next level. In the time before if sub trochanteric femur fracture were managed conservatively they would be associated with high deformity, shorting, malrotation plus also morbidity and mortality with prolonged immobilization.

The comprehensive stress on medial cortex is as high as 1100N so the sub trochanteric fracture are usually comminuted, fracture and there is a necessity of reconstructing the medial cortex. Transmitted stress is mostly on sub trochanteric area mainly the Cortical bone has a poor blood supply that's why delayed union and non union and resulting in loss of fixation, implant failure.[2]

In this fracture both proximal and distal segment are forced by surrounding muscular attachment of lesser and greater trochanter, proximal end is flexed and out wards rotated by traction of iliopsoas and abducted by hip abductors muscle, distal end is Adducted by pulling the pulling the great adductor muscle.

High compressive tension force of muscle separate the fracture fragment and make it unstable.

The proximal femoral nail (PFN) was Developed, used as an intramedullary device for the treatment of sub trochanteric fractures. In addition to all advantages of an intramedullary nail, PFN has several other favourable characteristics like it can be dynamically locked, allows early mobilization, has high rotational stability and minimal soft tissue damage. With this a study was taken to analyse the union of the subtrochanteric fracture, internally fixed with PFN.

However, extension into the intertrochanteric region is common. They account for approximately 10%–30% of peri-trochanteric fracture.[3]

* *Corresponding author*.
E-mail address: writetorns@gmail.com (R. N. Sonkar).

https://doi.org/10.18231/j.ijos.2023.027

2. Materials and Methods

Operative study was conducted at the department of orthopaedics, Index medical college & research centre, Indore. Operative study was approved by the institutional ethics committee. Informed written consent was taken from the operative study participants.

Individuals with subtrochanteric femur fracture >18 years of age were selected for the operative study and individual patients <18 years of age, pathological subtrochanteric fracture and open subtrochanteric femur fracture were not selected for the operative study.

Operative study was conducted on 50 subtrochanteric fracture patients amongst them 25 individuals were treated with proximal femoral nail (PFN) and grouped in first group and other 25 treated with a combination of PFN with trochanteric support plate.

Skin traction was maintained on all of the study patients before the surgical procedure. Administration of spinal anaesthesia was chosen for all the patients in the study. For all the high risk patients posted for surgery low molecular weight heparin was given and prior to surgery part preparation prophylactic antibiotics were administered. In the study hospital acquired complications, stay length at the hospital, required blood transfusions and immobilization period were recorded.

Overall for all the high energy trauma associated fractures the management primarily consist of polytrauma management for initial fracture treatment. All high risk life threatening conditions for the patients are treated with atmost priority before shifting to definite management of subtrochanteric fracture. The patients who are severely injured the treatment should be directed towards damage control. As majority of fracture treating guidelines suggest non- operative treatment would only be applied to paediatric age group and the unfit patients for surgery under anaesthesia. In today's world with advancement of anaesthesia technology and monitoring during the operation majority patients undergoing surgery have good predictable outcome.

The principle of anatomical realignment is followed in the closed method due to which the length and rotational deformities are corrected and near to normal result is achieved. Before positioning and raping measurements of rotation and length of opposite extremities were calculated.

For PFN insertion positioning of the patient was supine on the fracture table and spinal anaesthesia was given and patient was induced, reduction of the fracture was achieved by longitudinal traction on the fracture table and the position of limb was placed in slight adduction for nail insertion through pyriformis fossa. This procedure done is closed reduction and internal fixation.[4]

For management of subtrochanteric femoral fracture which were treated with a combination of PFN with trochanteric support plate positioning of the patient was given supine on the fracture table and incision was given over lateral aspect from greater trochanter to the mid shaft. Fascia and subcutaneous fat were incised after which the tensor fascia lata and the vastus lateralis muscle were incised and retracted. Entry was made and the reduction was achieved by traction and manipulation of the bone fragments followed by insertion of nail through pyriformis fossa done after which a trochanteric support plate was fixed on the lateral aspect of the femur superimposed with the nail underneath the bone. Postoperative results were assessed. This procedure done is called open reduction internal fixation.

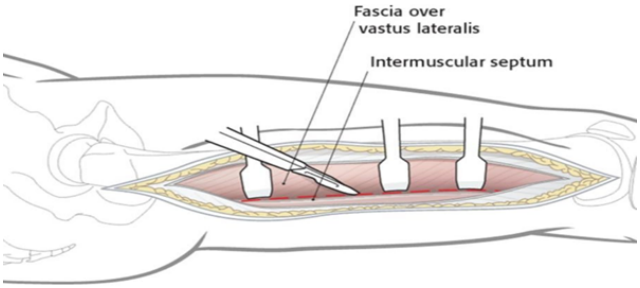

Fig. 1: Showing approach used to access the subtrochanteric region

Fig. 2: Trochanteric support plate

3. Results

Total 50 patient were included in study, 25 patient were treated with pfn and rest were treated with pfn with long trochanteric support plate. Patient were distributed in all age groups, the overall age of pfn group was 35 year and the average age of pfn with plate group was 37years. The pfn group had 17 male and 8 female and while the second group has 20 male and 5 female. The average duration of hospital stay in group 1 was 5:50 days and group 2 was 7:00 days. At the end of 6 months all except 2 patient from group 1 mobilized unassisted while all the patient from group 2 got mobilized unassisted. Based on harries hip score 3 patient outcome was excellent, 17 were good and 5 was fair in group 1. While 13 were excellent, 7 were good and 5 fair in group 2. 1 patient from group 2 got complicated with

in group 2. 1 patient from group 2 got complicated with infection which got manage subsequently.

To solve this problem, some scholars suggested that limited open reduction can decrease the interference on fracture ends, meanwhile maintain the stabilization and precision of reduction.[5]

Muller et al. made a biomechanical Analysis in 10 cadavers with subtrochanteric fractures and compared the cerclage group with uncerclage group.[6]

Fig. 3: Malreduced subtrochanteric femur fracture With broken implant insitu

4. Discussion

Delee et al said that in modern trauma there is no role of conservative treatment.[7] Treatment of subtrochanteric fracture can be done by cephalomedullary nails along with TSP. Scholars choose it because it is easy and fast to apply and also gives stability to unstable fractures.[8] Hospital average length stay was 7.5 days. After 5 month all patients were mobilized independently, no aid required except two patient. They used crunch to mobilize up to 6 months post operatively. In one patient surgical site wound infection occur which was subsided by subsequent treatment. In above cases no reoperation needed in any of the above cases.

The assessment criteria by using Harris hip score, our patient had excellent outcome. 12 patient had excellent outcome 8 patient has good outcome and 5 patient has fair outcome. In group 2 as compared to the group 1:- 4 patient has excellent outcome 15 patient has good outcome and 6 patient has fair outcome in group 2.

At the end of 6 months follow up, it was observed that PFN with TPS is better than PFN alone in treating subtrochanteric fracture.

Fig. 4: Malreduced subtrochanteric femur fracture with broken implant insitu

Fig. 5: Post operative subtrochanteric femur fracture- exchange nailing, with support plate insitu

Fig. 6: Post-operative subtrochanteric femur fracture- exchange nailing, with support plate insitu

Fig. 7: Post operative Ct scan- Subtrochanteric femur fracture- Exchange nailing with support plateInsitu

Fractures, reduction was possible in 80% of our cases were reduced by Open Reduction Internal Fixtation for satisfactory angulation and satisfactory lengthening according to kenthimathi conducted a study reports 78% reduced by the closed method and 22% by open method this disparity is mainly due to character of sample in two different studies.[9,10]

For early mobilization the reduced fracture are fixed with stable internal fixation to allow early mobilization for early healing of fracture. Internal fixation technique must follow guidelines of minimising the soft tissue trauma and osseous fragment. Plating of subtrochanteric region through lateral approach of proximal femur. The vastus latralis muscle should be elevated and split at inter muscular septum near to large branches perforating to profundus femoris artery.[11]

If medialization of more than one-third of the femoral diameter at the fracture site Occurs there is sevenfold increase of failure rate.[12] Radiological union average time in our study is 17 weeks in other studies radiological union was 19 weeks and 18 weeks respectively by Ashish et al and B. Kantimanthi et al.[13] Achieving union in our studies is in 17 weeks which is par from other studies. Patients are encourage to sit and do quadriceps exercise on a day after surgery. On second day of surgery patient with transverse, short oblique, facture and with no comminution fracture are allowed to start partial weight bearings with support of Walker and gradually shift to weight bearing as tolerated by patient.

Allowing a minimally Open approach, intramedullary nailing is closely linked to “biological internal fixation, in addition to its mechanical benefits over plate fixation.[14,15]

In this 2 group comparison we found that PFN Augmented with TSP is better than PFN alone.

5. Conclusion

PFN is a very good implant for manegement od sub trochanteric femur fracture. In the last decade, extramedullary methods of fixation with various angular plates or with a compression hip screw with a plate are more and more replaced by newer Intramedullary techniques because of their advantages, the surgical procedure is faster, the blood loss is smaller, the bone healing mainly remains in the reduced position with a biomechanically strong fixation, which allows earlier weight bearing on the bone with less local and general complications, while when PFN is use with trochanteric support plate it improves the post-operative functional outcome and ensure easy weight 18 bearing and better stability of fracture. PFN with PFN Augmentation of plate is better modality of treatment of sub trochanteric femur fracture.

6. Source of Funding

None.

7. Conflict of Interest

None.

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Author biography

Ajay Singh Thakur, Associate Professor

Satwik Thareja, Assistant Professor

Sachin Patel, Junior Resident

R N Sonkar, Junior Resident

Cite this article: Thakur AS, Thareja S, Patel S, Sonkar RN. Comparison of sub trochanteric femur fracture treatment with intra medullary proximal femur nail versus proximal femur nail with trochanteric support plate. *Indian J Orthop Surg* 2023;9(3):127-131.