

Management of Sub-trochanteric Fractures by Long Proximal Femoral Nail in Young Adults

Shukla R, Patel D

Study performed at Department of Orthopaedics, Sri Aurobindo Medical Science & Post Graduate Institute, Indore (M.P.)

Abstract

Background: Sub-trochanteric fractures are difficult to manage and are frequently associated with complications, owing to high stresses in this region. We evaluated the outcome of long proximal femoral nailing in management of these sub-trochanteric fractures.

Material and methods: 32 patients of closed sub-trochanteric fractures of femur in patients more than 18 years' age were treated with long proximal femoral nail and were assessed functionally by Harris Hip Score and radiologically to assess union.

Results: 32 patients of sub-trochanteric fractures with mean age 50.09 years treated with long proximal femoral nailing were included in the study. 24 were male and 8 were female. Right side was affected in 18 cases and left in 14 cases. Mean operative blood loss was 122.6 ± 27.6 ml (range 110 to 143 ml). The mean union time was 14.37 weeks (range 12 to 24 weeks). The mean Harris Hip score was 85.9. Only one patient had complication in form of proximal screw back out.

Conclusion: Long proximal femoral nailing provides reliable and excellent to good results in the management of difficult sub-trochanteric fractures, with minimal complications, but the surgery is technically demanding and requires learning curve.

Keywords: Sub-trochanteric fracture, Proximal femoral nailing

Address of correspondence:

Dr. Divyanshu Patel
Department of Orthopaedics, Sri Aurobindo
Institute of Medical Science, Indore (M.P.)

Email –divyanshupatel88888@gmail.com

How to cite this article:

Shukla R, Patel D. Management of sub-trochanteric fractures by long proximal femoral nail in young adults. Ortho J MPC. 2021;27(2):90-93

Available from:
<https://ojmpc.com/index.php/ojmpc/article/view/139>



Introduction

Sub-trochanteric fractures are the fractures occurring in the area from just below the level of lesser trochanter to 5 cm distally in the shaft of femur [1]. These fractures typically occur at the junction between trabecular bone and cortical bone where the mechanical stresses across the junction are highest in the femur, hence these fractures are usually comminuted. In this region of femur, the stresses are further increased during activities of daily living by axial loading forces through the hip joint which create a large lever arm with significant lateral tensile stress and medial compressive loads. In addition to the

bending forces, muscle forces at the hip also create torsional effects that lead to significant rotational shear forces. During normal activities of daily living, up to 6 times the body weight is transmitted to the sub-trochanteric region of the femur. As a result of these high forces in this area, the bone in this region is a thick cortical bone with less vascularity and has increased potential for healing disturbances. Hence, sub-trochanteric fractures are difficult to manage and are frequently associated with complications [3]. Management of these fractures by conservative methods poses difficulties in obtaining and maintaining a reduction, thus making operative management as the

preferred treatment. The goal of operative treatment is restoration of normal length, alignment and angulation of the femur to restore adequate tension to the abductors and to start early mobilization and weight bearing [4]. Hence, the objective of this study was to determine the time to union, complications, operative risks and functional outcomes in sub-trochanteric fractures treated with long proximal femoral nail.

Material and methods

The study was conducted on 32 patients of sub-trochanteric fractures of femur treated with long proximal femoral nailing at our centre from 2018 to 2020. Institutional ethical committee approval and written informed consent was taken from all the patients prior to the study. All patients of closed sub-trochanteric fracture femur more than 18 years' age were included in the study. Open, pathological or fractures extending to intertrochanteric area were excluded from the study.

Patients were initially, hemo-dynamically stabilized and then X rays of the involved limb were taken. Fractures were classified according to Seinsheimer classification. Routine investigations were done and fitness for surgery was obtained. All patients underwent closed reduction and long proximal femoral nailing under spinal anaesthesia on fracture table under C-arm by standard method. Closed reduction of the fracture was achieved by traction and internal rotation primarily with mild adduction or abduction as required. Reduction was checked on a C-arm in both the views anterior-posterior and lateral. After achieving closed reduction, a 4 cm incision was given above the tip of the greater trochanter, deepened to clear muscle attachment and entry point was made with an awl over a protector sleeve on the tip of the greater trochanter and checked in both AP and lateral views. A flexible guide wire was passed and sequential reaming was done over the wire to know the diameter of the canal and the diameter of the nail to be used. The decided nail was mounted over the jig and was inserted into the femur till the desired depth, such that the position of the holes for

the proximal screws directed over the head of the femur. Following this, both the proximal locking screws were passed via the jig and drill sleeve over the guide wire. The distal locking was done free hand with the help of image intensifier.

Postoperatively, antibiotics and analgesic were continued and suture removal was done after 2 weeks. Patients were encouraged to sit in the bed 24 hours after surgery. Quadriceps exercises and knee mobilization were started on the 2nd post-operative day. Patients were started on weight bearing depending on the pain tolerance. Patients were followed up regularly at 4 weeks interval till minimum of 6 months. Functional outcome of the patients was assessed by Harris Hip Score and radiological assessment was done to see union and implant placement.

Result

32 patients of sub-trochanteric fractures of femur treated with long proximal femoral nailing were included in the study. The mean age was 50.09 years (range 20 to 80 years). 24 were male and 8 were female. Right side was affected in 18 cases and left in 14 cases.

The most common mode of injury was road traffic accidents accounting for 16 cases followed by fall from height in 7 cases and slip and fall in 9 cases. According to Seinsheimer classification, 6 cases were of type II A, 10 cases of type II B, 9 cases of type III A and 7 cases had type III B. Associated diabetes mellitus was seen in 4 patients, hypertension in 2 patients and coronary artery disease in 1 patient.

The mean duration of hospital stay following the surgery was 10 days. Mean operative blood loss was 122.6 ± 27.6 ml (range 110 to 143 ml). The mean union time was 14.37 weeks (range 12 to 24 weeks). All patients had improvement in the gait and daily activity in mean duration of 6 months (fig 1). The mean Hip Harris score was 85.9 with 10 patients having excellent results, 14 having good and 7 patients having fair results. Except for the one patient none of patient in our series had poor outcome. The only patient

having poor outcome was the patient who had proximal screw back out, which was seen after 3 months of surgery.

Fig 1. Preoperative, immediate postoperative and one year follow up antero-posterior (a,c,e) and lateral (b,d,f) X ray of sub-trochanteric fracture in 50 years male treated by long proximal femoral nail. Clinical photographs (g,h) of the patient showing excellent results at one year.



Discussion

Sub-trochanteric fractures account for 10% to 34% of all hip fractures [2]. Owing to high stress area, these fractures are difficult to manage and treat and are frequently associated with complications. Debate still continues regarding the ideal management of these fractures and various range of implants are available. Long proximal femoral nailing has been recently widely used for the treatment of sub-trochanteric fractures.

We evaluated the functional outcome of sub-trochanteric fractures treated with intramedullary fixation using long proximal

femoral nail in 32 patients with mean age of 50 years. All of our patients had significant improvement in pain, gait and activity of daily living. The findings of our study were similar to the published series by Parker et al, Chinoy MA et al, Herrera et al and Boldin et al [5-8].

Average union time in our series was 14.37 weeks which was almost comparable to the other series whereas union time in series by Harrington et al and Lechner et al was 17 weeks, which was slightly higher than that of our series [5-12]. Pelet & Arlettaz et al compared the results of intramedullary locking nails and blade plate in sub-trochanteric fractures and found that mean union time was 4.2 months in intramedullary locking nail group and was 5.3 months in blade plate group [13].

The mean period of hospital stay in our series was 10 days which was more than the other reported series [14], this was because these were geriatric patient and ours is a territory care centre and hence it took time for the patient to reach the operation theatre.

Our study showed that 65 % patients had good to excellent results and only one patient had poor outcome. The mean Harris hip score in our series was 86, which was almost comparable to reported series by Harshwardhan et al, Liu et al and Kashid et al [15-17]. Complications which we encountered in our series was only screw back out as seen in only one patient and rest all of our patients had satisfactory outcome with union seen in all the cases without any augmentation or any implant failure. Our series is limited by a small group, smaller follow up and lack of control group.

Conclusion

Long proximal femoral nailing provides reliable and excellent to good results in the management of difficult sub-trochanteric fractures, with minimal complications, but the surgery is technically demanding and requires learning curve. Proper patient selection and good preoperative planning are must before the surgery.

References

1. Nath RG, Ansari S. Role of Proximal Femoral Locking Plate in treatment of Subtrochanteric Fractures. *Med Pulse Int J Orthop*. July 2017;3(1):1-7.
2. Ibrahim S, Meleppuram JJ. A retrospective analysis of surgically-treated complex proximal femur fractures with proximal femoral locking compression plate. *Rev Bras Orthop*. 2017 Jan 7;52(6):644-50.
3. Jansen H, Doht S, Frey SP, Meffert RH. Subtrochanteric femoral fractures: influence of patient age on fracture type and mobility. *J Orthop Sci*. 2013 May;18(3):451-5.
4. Mattisson L, Bojan A, Enocson A. Epidemiology, treatment and mortality of trochanteric and subtrochanteric hip fractures: data from the Swedish fracture register. *BMC Musculo skelet Disord*. 2018 Oct 12;19(1):369.
5. Parker MJ, Handoll HH. Gamma and other cephalocondylic intramedullary nails versus extramedullary implants for extracapsular hip fractures in adults. *Cochrane Database Syst Rev*. 2010 Sep 8;(9):CD000093.
6. Chinoy MA, Parker MJ. Fixed nail plates versus sliding hip systems for the treatment of trochanteric femoral fractures: a meta analysis of 14 studies. *Injury*. 1999 Apr;30(3):157-63.
7. Herrera A, Domingo LJ, Calvo A, Martínez A, Cuenca J. A comparative study of trochanteric fractures treated with the Gamma nail or the proximal femoral nail. *Int Orthop*. 2002;26(6):365-9.
8. Boldin C, Seibert FJ, Fankhauser F, Peicha G, Grechenig W, Szyszkowitz R. The proximal femoral nail (PFN)--a minimal invasive treatment of unstable proximal femoral fractures: a prospective study of 55 patients with a follow-up of 15 months. *Acta Orthop Scand*. 2003 Feb;74(1):53-8.
9. Edwards SA, Pandit HG, Clarke HJ. The long gamma nail: a DGH experience. *Injury*. 2000 Nov;31(9):701-9.
10. Kamboj P, Siwach R, Kundu Z, Sangwan S, Walecha P, Singh R. Results of Modified Proximal Femoral Nail in Peritrochanteric Fractures in adults. *Internet J Orthop Surg*. 2006;6(2): 1-6.
11. Harrington KD, Johnston JO. The management of comminuted unstable intertrochanteric fractures. *J Bone Joint Surg Am*. 1973 Oct;55(7):1367-76.
12. Lechner JD, Rao JP, Stashak G, Adibe SO. Subtrochanteric fractures. A retrospective analysis. *Clin Orthop Rel Res*. 1990 Oct(259):140-5.
13. Pelet S, Arlettaz Y, Chevalley F. Ostéosynthèse des fractures per- et sous-trochantériennes par plaque angulée versus clou Gamma. Uneétude prospective randomisée [Osteosynthesis of per- and subtrochanteric fractures by blade plate versus gamma nail. A randomized prospective study]. *Swiss Surg*. 2001;7(3):126-33.
14. Manu KT, Kumar A, Ravi KB. Treatment of subtrochanteric femur fractures with proximal femoral nails: a prospective study. *J applied Res*. 2019;9(4):25-7.
15. Harshwardhan H, Jain S, Sharma M. An outcome analysis of intertrochanteric fracture of femur managed with proximal femoral nail antirotation II. *Int J Res Orthop*. 2019;5:699-702.
16. Liu Y, Tao R, Liu F, Wang Y, Zhou Z, Cao Y, Wang H. Mid-term outcomes after intramedullary fixation of peritrochanteric femoral fractures using the new proximal femoral nail antirotation (PFNA). *Injury*. 2010 Aug;41(8):810-7.
17. Kashid MR, Gogia T, Prabhakara A, Jafri MA, Shaktawat DS, Shinde G. Comparative study between proximal femoral nail and proximal femoral nail antirotation in management of unstable trochanteric fractures. *Int J Res Orthop*. 2016;2:354-8.