



Outcome of Stainless Steel Proximal Femoral Nailing in Inter-Trochanteric Fractures of Femur

Authors

Nandakumar R, Ashish Kumar Jose, Krishnagopal R.

Department of Orthopaedics, Mahatma Gandhi Medical College & Research Institute, Pondicherry, India

ABSTRACT

Inter-trochanteric fractures of the femur are commonly seen in the elderly. Surgical fixation of these fractures significantly reduces the morbidity and mortality in the elderly by avoiding complications arising out of prolonged bed rest. Several implants have been designed for the treatment of these fractures. In this study we analyzed the functional and radiological outcome in inter-trochanteric fractures fixed with stainless steel proximal femoral nail. We concluded that stainless steel proximal femoral nail is an ideal implant for the fixation of these fractures.

Key words: *Inter-trochanteric fracture, Proximal femoral nail.*

INTRODUCTION

Inter-trochanteric fractures of femur are one of the commonest fractures encountered by orthopaedic surgeons around the world. The incidence of these fractures increases with advancing age. With the ever growing population, increased life expectancy and increase in the number of road traffic accidents, there has been an enormous increase in the incidence of these fractures. Majority of the patients belong to the older age group and have osteoporotic bones. The commonest mechanism of injury in these patients is a trivial fall. In the younger patients, these fractures result from high velocity trauma and road traffic accidents. Surgical treatment of these fractures significantly reduces the morbidity and mortality by allowing early mobilization of the patient and thus avoiding the complications of

prolonged bed rest.^[1] Over the years, various implants have been designed for the treatment of inter-trochanteric fractures but the ideal osteosynthesis system is still a matter of debate. The main objective of treatment is early mobilization with stable fixation using as minimal invasive procedure as possible. Owing to their bio-mechanical properties, intramedullary devices appear to be the ideal implant. However there have been reports of many intra and post operative complications in some cases fixed with intramedullary devices.^[2,3] To avoid these complications, the proximal femoral nail was designed. In this study we analyze the functional and radiological outcome of stainless steel proximal femoral nailing for inter-trochanteric fractures.

AIM OF THE STUDY

To study the functional and radiological outcome of inter-trochanteric fractures fixed with stainless steel proximal femoral nail.

MATERIALS AND METHODS

This is a prospective study. All patients with inter-trochanteric fracture fixed using stainless steel proximal femoral nail in our institute between January 2012 and December 2013 were included in the study. Patients treated with other implants, titanium proximal femoral nail and those with other fractures in the same limb were not included. During the study period, 25 patients with inter-trochanteric fractures were treated with stainless steel proximal femoral nail and were included. The minimum follow-up was 6 months. The fractures were classified based on Boyd and Griffin classification system (Fig.1) :^[4]

- Type I : Fractures that extend along the intertrochanteric line.
- Type II : Comminuted fractures with the main fracture along the intertrochanteric line but with multiple secondary fracture lines.
- Type III : Fractures that extend to or are distal to the lesser trochanter.
- Type IV : Fractures of the trochanteric region and proximal shaft with fractures in atleast two planes.

PROCEDURE (STEPS)

- Patient placed supine on fracture table under spinal anesthesia.
- Affected leg was placed in a traction boot and the normal limb was flexed and abducted in lithotomy position to allow easy access for image intensifier (Fig.2).
- The fracture was reduced by traction and internal rotation.
- The reduction was checked both in antero-posterior and lateral views using the image intensifier.
- Parts painted and draped (Fig.3).

- 5 cm incision made, extending proximally from the greater trochanter (Fig.4).
- Entry point made at the tip of the greater trochanter using bone awl (Fig.5).
- Guide wire inserted and position checked under image intensifier (Fig.6,7).
- Proximal reaming was done.
- The proximal femoral nail was inserted over the guide wire (Fig.8).
- Proximally the cervical lag screw and de-rotation screw are inserted with the help of the jig (Fig.9).
- Distal locking bolts are inserted using the jig (Fig.10).
- Wound closed in layers and sterile dressing applied.

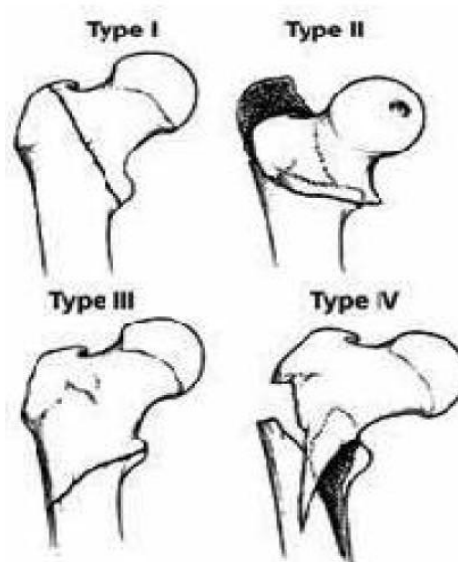


Fig.1 : Boyd and Griffin classification



Fig.2 : Patient positioning on fracture table

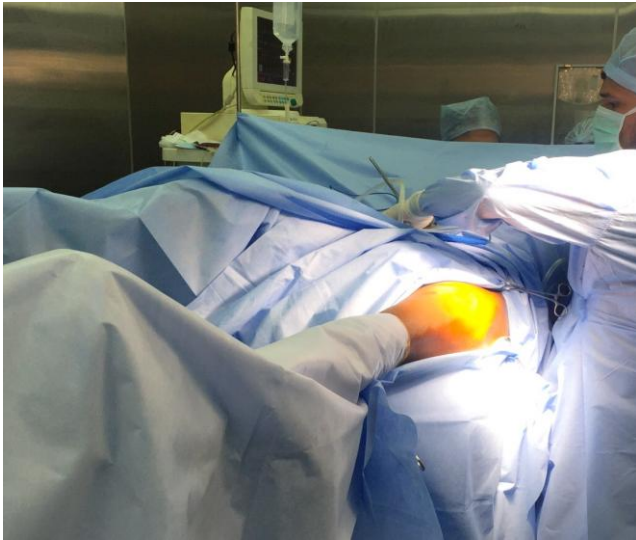


Fig.3 : Parts painted and draped



Fig.6 : Guide wire insertion

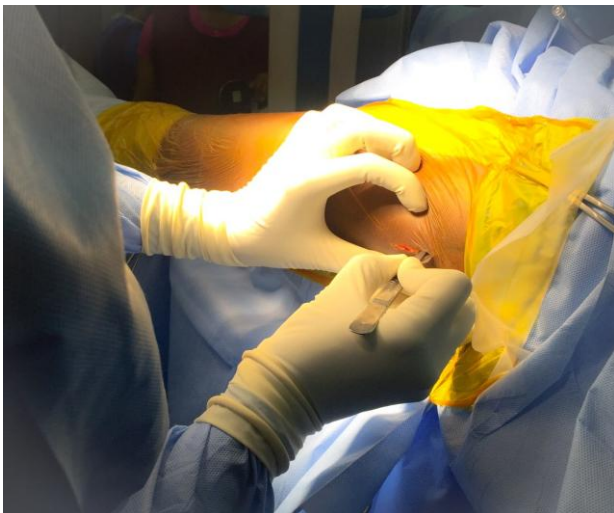


Fig.4 : Skin incision

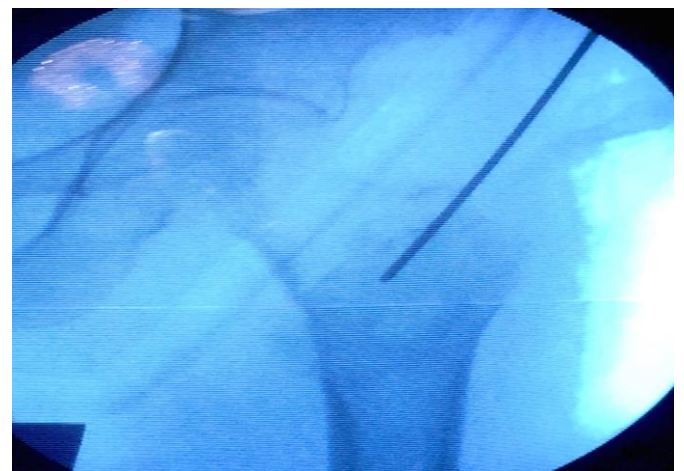


Fig.7 : Guide wire position checked under image intensifier



Fig.5 : Entry made using bone awl

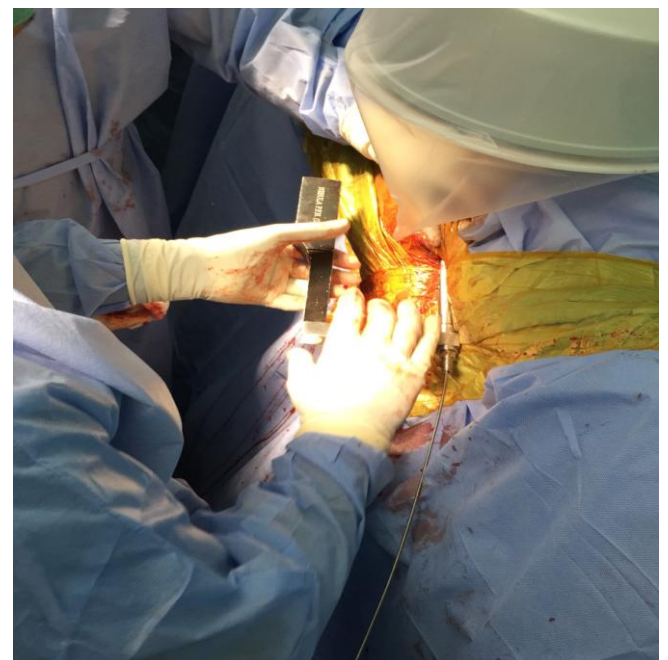


Fig.8 : Proximal Femoral Nail inserted over the guide wire



Fig.9 : Proximal lag screw insertion



Fig.12 : 6 weeks post-op.

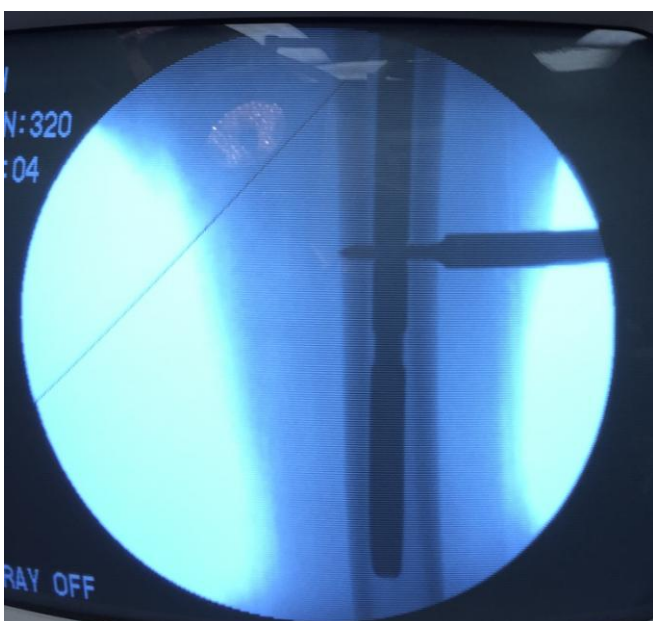


Fig.10 : Distal locking



Fig.13 : 12 weeks post-op.



Fig.11 : 1st post-operative day X-ray



Fig.14 : 6 months post-op.

POST OPERATIVE PROTOCOL

- Sit propped up and active quadriceps exercises on 1st post operative day (POD) (Fig.11).
- Stand with support on 2nd POD.
- Partial weight bearing walking with support from 3rd POD.
- Suture removal on 12th POD.
- Full weight bearing walking once radiological signs of union appear.
- Functional and radiological assessment at 6 weeks, 12 weeks and monthly until fracture union and every 6 months thereafter. (Fig.12,13,14)

SCORING SYSTEM

All patients were followed up until fracture union occurred. Kyle's criteria was used to evaluate the functional outcome :^[5]

- I. Excellent :
 - No or minimum limp
 - Absence of pain
 - Full range of motion
- II. Good :
 - Mild limp
 - Mild occasional pain
 - Full range of motion
- III. Fair :
 - Moderate limp
 - Moderate pain
 - Limited range of movement
- IV. Poor :
 - Wheelchair bound
 - Pain on any position
 - Non-ambulatory

RESULTS

Of the 25 patients, 16 were male and 9 were female with 14 patients injuring their right hip and 11 patients injuring their left hip. The age group varied from 42 years to 78 years with a mean age of 61 years. The mode of injury was trivial slip and fall in 21 patients and road traffic accidents in 4 patients.

The fractures were classified according to Boyd and Griffin classification:

- Type I : 1 patient
- Type II : 16 patients
- Type III : 8 patients
- Type IV : Nil

Average operative duration was 55 minutes (45 – 80 minutes)

Average intra-operative blood loss : 300 ml (200 – 350 ml)

Duration of follow up: 6 months to 2 years

Mean follow up: 8 months

Union rate: 100 %

Union time:
10 weeks to 16 weeks (Average 12 weeks)

Varus mal-union:
2 patients (8%)

Shortening:
2 patients (8%)

Infection:
1 patient (4%)

Non union:
Nil

Delayed union:
Nil

Implant Failure:
Nil

Based on the scoring system, the results of our study are :

- Excellent : 14 patients
- Good : 9 patients
- Fair : 2 patients
- Poor : Nil

DISCUSSION

Inter-trochanteric fractures are common in the elderly. Surgical treatment of these fractures significantly reduces the morbidity and mortality by allowing early mobilization, hence preventing the complications arising out of prolonged bed rest. Several implants have been designed for the treatment of these fractures. The use of Dynamic Hip Screw has been quite popular but the increased incidence of uncontrolled collapse in comminuted fractures leading to varus mal-union has forced the surgeons to think of an intra-medullary option. In this study we assessed the functional and radiological outcome of inter-trochanteric fractures fixed with stainless steel proximal femoral nail.

The average operative duration in our study was 55 minutes with the longest duration being 80 minutes and the shortest being 45 minutes. This is similar to the study of Pajarinen et al,^[6] and significantly less when compared to the study of Morihara (77 minutes).^[7] The average intra-operative blood loss in our study was 300 ml, which is almost similar to the study of Pajarinen et al (320ml).^[6] The average time for radiological union was 12 weeks which is similar to the study done by Muzaffar et al (12.28 weeks).^[8] Varus mal-union was seen in 2 patients. Shortening was observed in 2 patients which was less than 1.5 cm and not significant. Superficial wound infection was seen in 1 patient and it settled with regular dressing and antibiotics. Based on Kyle's criteria for functional outcome, 92% (23 patients) of the patients has excellent to good results.

CONCLUSION

The outcome of our study shows that stainless steel proximal femoral nail is very good implant for fixation of inter-trochanteric fractures of the

femur. The advantages of using this nail are that it is less invasive and prevents excess collapse at the fracture site thus helping to maintain the neck length. It is a load sharing device, hence mobilization can be started early. The infection rate is very low and the incidence of mal-union is also less. To conclude, the successful outcome of these fractures include a good understanding of the biomechanics of the proximal femur, careful pre-operative planning, good intra-operative technique and strict post-operative protocol.

REFERENCES

1. Zuckerman JD, Skovron ML, Koval KJ, Aharonoff G, Frankel VH (1995) Postoperative complications and mortality associated with operative delay in older patients who have a fracture of the hip. *J Bone Joint Surg [Am]* 77:1551–1556.
2. Albareda J, Laderiga A, Palanca D, et al. Complications and technical problems with gamma nail. *Int Orthop.* 1996;20:47-50.
3. Butt MS, Krikler SJ, Nafie S, Ali MS. Comparison of dynamic hip screw and gamma nail: a prospective, randomized, controlled trial. *Injury.* 1995;26:615-8.
4. Boyd, H. B. & Griffin, L. L. (1949) Classification and treatment of trochanteric fractures. *Arch. Surg.* 1949;58,853-866.
5. Kyle RF, Gustilo RB, Premer RF. Analysis of six hundred and twenty-two intertrochanteric hip fractures. *J Bone Joint Surg Am* 1979;61:216–21.
6. Pajarinen J, Lindahl J, Michelsson O, Savolainen V, Hirvensalo E: Pertrochanteric femoral fractures treated with a dynamic hip screw or a proximal femoral nail. A randomized study comparing postoperative rehabilitation. *JBJS (Br)* 2005; 87: 76-81.
7. T. Morihara: "Proximal Femoral nail for treatment of trochantric femoral fractures" . *Journal of Orthopaedic surgery* 2007; 15(3): 273-7.

8. N Muzaffar, A.R. Malik and A. Shilari. “A comparison between proximal femoral nail and locking compression plate-Dynamic hip screw devices in unstable intertrochanteric fractures-Which is better?” Journal of orthopaedics vol-5, no 1, 2013,11-17.