Original Article

A prospective study of intertrochanteric neck femur fractures managed with trochanteric fixation nail

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Abstract

Background: The fractures of proximal femur are associated with substantial morbidity and mortality. The primary goal of intertrochanteric fracture treatment in the elderly is to restore mobility while minimizing the risk of medical complications. A number of different treatment modalities for management of these fractures have been proposed and tried with varying results. The present study was carried out to analyze the outcome and complications of intertrochanteric neck femur fractures managed with trochanteric fixation nail. **Material and Methods:** A total of 30 patients with intertrochanteric neck femur fractures were managed with trochanteric fixation nails. Outcome measures included the following parameters: age, gender, fracture classification, operation time, blood loss, complications, follow-up and length of stay. **Results:** Out of 30 cases, 9 were females and 22 were males with an average age of 61.36 years. Most common AO type was A1-2 followed by A2-2. A1 and A2 comprised 93.33% of all cases. Average intra-operative time was 53.66 minutes with average blood loss of 90 ml. Time to reach union and time required for full weight bearing were same i.e. 14.8 weeks. Shortening of limb was found to be the major complication. **Discussion:** TFN reduces stress concentration at the tip and the smaller distal shaft diameter may prevent femoral shaft fractures. It is a superior implant for stable and unstable intertrochanteric fractures in terms of operating time, surgical exposure, blood loss and complication rates.

Key Words: Intertrochanteric neck femur fractures, Trochanteric fixation nail, outcome, complications.

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Received Date: 21/01/2017 Revised Date: 16/02/2017 Accepted Date: 14/03/2017

Access this article online	
Quick Response Code:	Website: www.statperson.com
	DOI: 16 March 2017

INTRODUCTION

Fractures of proximal femur are relatively common injuries in adults. The incidence of fractures of proximal femur is increasing, because the general life expectancy of the population has increased significantly during the past few decades[1]. The fractures of proximal femur are associated with substantial morbidity and mortality. 30% of elderly patients die within one year of fractures[2]. After one year, patients seem to resume their age adjusted mortality rate[3]. In younger patients, these fractures result from high energy trauma. Despite similar locations of the fractures, the difference in low-velocity and high-velocity injuries in older patients compared with younger patients overweigh the similarities. The primary goal of intertrochanteric fracture treatment in the elderly is to restore mobility safely and efficiently while minimizing the risk of medical complications and technical failure and to restore the patient to preoperative status. Restoration of mobility in patients with unstable intertrochanteric fracture ultimately depends on the strength of surgical construct. The intertrochanteric fractures pose a number of management dilemmas depending on the fractures configuration and status of the bones. A number of different treatment modalities for management of these fractures have been proposed and tried with varying results[4-8]. Trochanteric fixation nail significantly enhances the anatomical result and functional outcome of these fractures[8]. The present study was carried out to analyze the outcome and complications of intertrochanteric neck femur fractures managed with trochanteric fixation nail.

How to site this article: Vilas Musale, Prashant Ghule, Shashikant Kukale. A prospective study of intertrochanteric neck femur fractures managed with trochanteric fixation nail. *International Journal of Recent Trends in Science and Technology*. March 2017; 22(2): 121-124. http://www.statperson.com (accessed 17 March 2017).

MATERIAL AND METHODS

This study comprises a series of intertrochanteric neck femur fractures treated with TFN over a period of two years in the department of Orthopedics at a tertiary care hospital. A total of 30 patients with age ranging from 35 to 75 years were treated in our series. Most cases were due to domestic fall and road traffic accidents. Patients below 18 years of age, with pathological fractures, severe morbidity, infection and unfit for surgery were excluded from the study. An incisive history regarding mode of trauma, time since injury, associated co-morbidity was taken. A thorough clinical examination was done. Patients were classified using AO/ASIF classification[9]. Written informed consent was taken and after routine investigations and anaesthetic workup patients were posted for surgery as early as possible.

Operative technique

All the fractures were treated with the TFN implant made up of a stainless steel 316L type and of the same manufacturer. The system consists of a cannulated nail, cannulated hip screws 8 mm and 6.4 mm, locking bolts (4.9 mm). The proximal diameter of the nail is 15 mm. Nails of 180 mm length were used. The diameter varies from 9, 10, 11 and 12 mm. All nails had an anatomical valgus angle of 6°. The angle between the nail and blade we had used was 130° and 135°. Under spinal or epidural anaesthesia, closed reduction was achieved and underwent limited open reductions in few cases. 3 to 5 cm incision was made just proximal to the tip of greater trochanter parallel to the femoral shaft. An entry was made with a curved awl just lateral to the tip of greater trochanter. A guide wire was passed through the entry point across the fracture site. It was reamed gradually to the size according to canal diameter. Entry point was reamed with entry reamer of large size to accommodate the nail tip. The nail size of less than 1 mm of largest reamer used was mounted on a radio-opaque jig at 130° in 5 cases and 135° in 25 cases, depending on the neck shaft angle of the opposite hip which was calculated with radio-lucent ruler placed over opposite hip and thigh. Guidewire was passed through proximal nail, its position was checked under c arm image intensifier in antero-posterior and lateral views. Adequate screw length was taken from guide wire. Proximal locking was achieved through one stabilization screw and one compression screw of 6.4 mm and 8 mm respectively. The lag screw had to be positioned into the femoral head in the antero-posterior view and centrally or slightly posterior in the lateral view to decrease complications in osteoporotic bones. Distal interlocking entailed both static and dynamic modes. The wound was closed in layers. Post-operatively, active quadriceps exercises, ankle and toe movements and knee mobilizing exercises begun from second day. Toe touch weight bearing started with walker from second day followed by partial weight bearing till radiological union seen on X-ray followed by full weight bearing thereafter. Cases were followed up until fracture union or for a minimum of six months.

RESULTS

Out of 30 cases of intertrochanteric fractures of neck femur, 9 were females and 22 were males with an average age of 61.36 years (range 35-75). Average age of females and males were 61.44 years and 61.33 years respectively. Fall in the house was the most common cause of fractures in 22 (73.33%) cases followed by RTA in 8 (26.66%) cases. Twenty-four (80%) patients had sedentary lifestyle at the time of injury and 6 (20%) had active living. Most fractures were on the left side 21 (70%) that is on non-dominant side. Most common AO type was A1-2 followed by A2-2. A1 and A2 comprised 93.33% of all cases (Table 1).

Table 1: Distribution of cases according to AO/ASIF classification

AO/ASIF type		No. of cases	Subtotal	Total
Type A1	1	1	12	30
	2	9		
	3	2		
Type A2	1	4	16	
	2	7		
	3	5		
Type A3	1	2	2	
	2	0		
	3	0		

Associated injuries such as fractures of surgical neck of humerus (1 case; fixed with close reduction and percutaneous k wires), extra articular distal radius fractures (3 cases; fixed with close reduction and below elbow cast for 6-8 weeks) and inferior pubic ramus fracture (1 case; managed conservatively) was also observed and managed uneventfully. Average intra-operative time for fractures treated by TFN was 53.66 minutes. In our study, operative time required was more in case of unstable AO type A-3 intertrochanteric fractures. Average blood loss during surgery was around 90 ml. None of the patient required intra-operative blood transfusion. Most patients spent up to a week after trauma before being discharged. Average post-operative time was 4.3 days (2-7 days) (Table 2).

Table 2: Intra and post-operative parameters in cases

Parameters	No. of cases	Percentage
Intra-operative duration (min)		
<40	1	3.33
40-60	26	86.66
>60	3	10
Intra-operative blood loss (ml)		
<70	2	6.66
70-100	24	80
>100	4	13.33
Duration of hospital stay (days)		
1-7	18	60
8-12	11	36.66
>12	1	3.33
Duration of follow up (months)		
6-9	22	73.33
9-12	4	13.33
>12	4	13.33
Time required for full weight bearing (wks)		
8-12	22	73.33
12-16	4	13.33
16-20	4	13.33
Time required to reach union (wks)		
12-16	25	83.33
16-20	5	16.66
>20	0	0
Time required to return to previous activity levels (wks)		
8-12	2	6.66
12-16	22	73.33
16-20	4	13.33
20-24	2	6.66

All patients were followed up for a minimum of 6 months. In most cases (73.33%) the follow up was kept for around 9 months. Average time required for radiological union was 14.8 weeks (range 12-20 weeks). In cases of unstable fractures weight bearing was delayed. It was also impaired in cases with associated injuries. Most of the patients started walking after 8 to 12 weeks. Time to reach union and time required for full weight bearing were same in our study. About 73.33% patients returned to their previous activity levels at around 12 to 16 weeks (Table 2).

Table 3: Complications encountered in post-operative period

Complications	No. of cases	Percentage
Superficial infection	1	3.33
Deep infection (implant removal)	1	3.33
Shortening in limb	4	13.33
Varus collapse	1	3.33

In our study, shortening of limb (0.7 cm in 2 cases and 0.5 cm in 2 cases) was found to be the major complication in four cases (Table 3).

DISCUSSION

Outcome of intertrochanteric fracture treatment depends on bone quality, patients age, general health, interval from fracture to treatment, treatment adequacy, co-morbidities and fixation stability[1-3]. Surgical management is preferred because it facilitates early ambulation with less complications. The design of TFN provides stability against rotation and minimizes neck mal-unions through linear intra-operative compression of head/neck segment to shaft resulting negligible complication rate[7]. The average age of the patients in our study was 61.36 years, which was lesser than population studied from western countries[10,11]. This was probably due to higher life expectancy and much active lifestyle with good bone quality of the elderly population in western countries. Also, the majority of old Indian population being formed by people in the 6th and 7th decades of life, formed the bulk of the patients in the study. In present study, there were 70% males, that could be the fact that males are more commonly exposed to trauma. The total operative time required was around 53.66 minutes. Rucker *et al*[7] required average least time of 41 minutes whereas, Gill *et al*[5] required maximum average time of 56.5 minutes. The average time required in most of the studies was between 40-60 minutes[5,7,8,10,11]. Total A1 and A2 comprised 93.3% of all cases, as in case of other studies[4,6,7]. The associated injuries were important in terms of fracture healing which may have a bearing on rehabilitation of the patient. They prevent early immobilization and early weight bearing. Patients were followed up at monthly intervals. Fractures healed with good callus radiologically at an average of 14.8 weeks (range 12-20 weeks). Lenich *et al*[10,11], Gardner *et al*[6] and Rucker *et al*[7] observed average time of 6-12 weeks, 12-14 weeks and 10-16 weeks respectively. In our study, shortening of limb (0.7 cm in 2 cases and 0.5 cm in 2 cases) was found to be the major complication in four cases. One patient was infected deeply may be because of anaemia and associated co-morbidities. Infection did not subside so implant was removed and patient was given skin traction thereafter. Lenich *et al*[10,11] found seven complications in 120 patients with superficial infection as major complication in 7.5% cases. Loubignac *et al*[8] got eight complications, Gardner *et al*[6] found only six complications in 255 patients and Beinkowski *et al*[12] got no complications in 60 patients. TFN reduces stress concentration at the tip and the smaller distal shaft diameter may prevent femoral shaft fractures. It also acts as a buttress to prevent medialization of the shaft and provides more efficient load transfer. It is a superior implant for stable and unstable intertrochanteric fractures in terms of operating time, surgical exposure, blood loss and complication rates.

REFERENCES

1. Dhanwal DK, Dennison EM, Harvey NC, Cooper C. Epidemiology of hip fracture: Worldwide geographic variation. Ind J Ortho 2011; 45(1):15-22.
2. Abrahamsen B, van Staa T, Ariely R, Olson M, Cooper C. Excess mortality following hip fracture: a systematic epidemiological review. OsteoporosInt 2009; 20:1633-50.
3. Panula J, Pihlajamäki H, Mattila VM, et al. Mortality and cause of death in hip fracture patients aged 65 or older- a population-based study. BMC Musculoskeletal Disorders 2011; 12:105.
4. Crawford CH, Malkani AL, Cordray S, Roberts CS, Sligar W. The Trochanteric Nail versus the Sliding Hip Screw for Intertrochanteric Hip Fractures: A Review of 93 Cases. J Trauma-Injury Infect Crit Care 2006; 60(2):325-8.
5. Gill JB, Jensen L, Chin PC, Rafiei P, Reddy K, Schutt RC Jr. Intertrochanteric hip fractures treated with the trochanteric fixation nail and sliding hip screw. J SurgOrthopAdv 2007 Summer; 16(2):62-6.
6. Gardner MJ, Briggs SM, Kopjar B, Helfet DL, Lorich DG. Radiographic outcomes of intertrochanteric hip fractures treated with the trochanteric fixation nail. Injury 2007; 38(10):1189-96.
7. Ruecker AH, Rupprecht M, Gruber M, et al. The treatment of intertrochanteric fractures: results using an intramedullary nail with integrated cephalocervical screws and linear compression. J Orthop Trauma. 2009; 23(1):22-30.
8. Loubignac F, Chabas JF. A newly designed locked intramedullary nail for trochanteric hip fractures fixation: results of the first 100 Trochanteric implantations. OrthopTraumatolSurg Res. 2009; 95(2):139-44.
9. Muller ME, Nazarian J, Koch P, et al. The comphrensive classification of fractures of long bones. Berlin: Springer Verlag, 1990.
10. Lenich A, Mayr E, Rüter A, MöcklCh, Füchtmeier B. First results with the trochanter fixation nail (TFN): a report on 120 cases. Arch Orthop Trauma Surg 2006; 126(10):706-12.
11. Lenich A, Fierlbeck J, Al-Munajjed A, et al. First clinical and biomechanical results of the Trochanteric Fixation Nail (TFN). Technol Health Care 2006; 14(4-5):403-9.
12. Bienkowski P, Reindl R, Berry GK, Iakoub E, Harvey EJ. A new intramedullary nail device for the treatment of intertrochanteric hip fractures: Postoperative experience. J Trauma 2006; 61(6):1458-62.

Source of Support: None Declared
Conflict of Interest: None Declared