



ASSESSMENT OF CLINICAL AND RADIOLOGICAL OUTCOME OF INTERTROCHANTERIC FRACTURES FIXED WITH TFN (TROCHANTERIC FIXATION NAIL) ESPECIALLY IN OSTEOPOROTIC BONES & COMMUNUTED FRACTURES

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ABSTRACT

Introduction: Intertrochanteric femoral fractures constitute approximately 50% of all hip fractures. Reliable fixation of intertrochanteric hip fractures, particularly those /with unstable patterns and cortical comminution, remains an unsolved problem. Recently popular modality is fourth generation of intramedullary nails like the Proximal Femoral Nails. But these are not found to be very suitable in Indian population because of variation in anthropometry of proximal femur. This may lead to an increased difficulty in placement of femoral neck screws. Therefore, Trochanteric Fixation Nail (TFN) which is smaller in size than Proximal Femoral Nail (PFN) was introduced.

Aim of the Study- To assess the clinical & radiological outcome of Unstable Intertrochanteric fractures treated with TFN.

Materials & Methods- A prospective study done at the Department of Orthopaedics, Rajah Muthiah Medical College & Hospital, Annamalai University, Chidambaram. Patient with Intertrochanteric fractures were treated with TFN (short intramedullary nail) & Follow up done at regular intervals for a period of 18 months.

Results & Conclusion-- Thirty patients with unstable Intertrochanteric fracture were treated with TFN from June 2014 to August 2016. Mean age of the patients 65.07 years (35-92 years). Overall mean time of radiological fracture union was 15 weeks (range 13-18). Mean hospital stay was 13 days (range 12 to 18 days). The mean Modified Harris Hip Score of the TFN was 88.25. In our study, Patients with Unstable intertrochanteric fracture treated with trochanteric fixation nail had results that were comparable with that of other studies done elsewhere with good radiological and functional outcome.

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INTRODUCTION

A hip fracture is a significant cause of increased morbidity and mortality in elderly people and India presents the one of the highest incidence of hip fractures worldwide. The hip fracture is a serious consequence of osteoporosis which demands acute surgery with a high risk of complications and a threat to a continued independent living.

Intertrochanteric femoral fractures constitute approximately 50% of all hip fractures. The incidence of intertrochanteric femoral fractures has increased significantly during recent decades, and this tendency will probably continue in the near future owing to the considerable increase in the life expectancy leading to an increasing geriatric population¹.

Reliable fixation of intertrochanteric hip fractures, particularly those with unstable patterns and cortical comminution, remains an unsolved problem. Screw and slide plate devices have been used most commonly, with predictable fixation and healing in stable fractures. Unstable fractures, in contrast, do not have

single cortical fracture lines and depend more on implant purchase in the femoral head. These fractures are mechanically distinct, and thus may be more prone to implant failure.

The comminuted intertrochanteric fractures being in cancellous area, fixation of all fragments is difficult. The posteromedial void is generally present which makes the fracture very unstable². Resulting instability with osteoporosis makes early resumption of full weight bearing difficult if conventional methods of fixation like Dynamic Hip Screws are used. Recently popular modality is fourth generation of intramedullary nails like the Proximal Femoral Nails³. But these are not found to be very suitable in Indian population because of variation in anthropometry of proximal femur. This may lead to an increased difficulty in placement of femoral neck screws. Therefore, Trochanteric Fixation Nail (TFN) which is smaller in size than Proximal Femoral Nail (PFN) was introduced and has been found suitable for Indian population⁴.

In this context there is inadequate data are available about an alternative, the Trochanteric fixation nail (TFN), and its merits in the management of intertrochanteric fractures especially when the fracture does not involve the lesser trochanter, especially for elderly osteoporotic & grossly comminuted. The present study would look at the outcome of fractures fixed with trochanteric fixation nail.

MATERIALS AND METHODOLGY

A prospective study was conducted, the data for this study was collected from the patient admitted to Rajah Muthiah Medical College and Hospital, Annamalai University, Chidambaram, diagnosed to have Intertrochanteric Femur fracture, were treated surgically using trochanteric fixation nail during the period JUNE 2014 to AUGUST 2016. The clinical and radiological outcome was assessed and recorded. The ethical committee clearance was obtained from the institution. Inclusion Criteria was 1) Patients with intertrochanteric fractures aged 20 years and above, 2) All types of intertrochanteric fractures not involving lesser trochanter (especially those of osteoporotic & grossly comminuted) treated with trochanteric fixation nail, 3) Both males & females, 4) No specific duration of illness, 5) adequate quality preoperative, immediate postoperative, atleast one set of adequate quality postoperative radiographs. Exclusion Criteria 1) Previous surgery of the proximal femur, 2) patients with pathological fractures other than osteoporosis, 3) Patients managed conservatively for other medical reasons, 4) Ongoing chemotherapy or irradiation treatment due to malignancy, 5) patients with Sub-trochanteric extension, 6) Patients who are not able to give consent were excluded from the study.

All parts of the TFN implant are made up of a stainless steel 316L type. The system consists of cannulated nail, cannulated hip screws of sizes 8 millimetres and 6.4 millimetres and locking bolts (4.9 millimetres). There is a locking mechanism in the upper part of the nail to control the rotation of the hip screw. The proximal diameter of the nail is thirteen millimetres. Length of nails is 180 millimetres. The diameter varies from nine to twelve millimetres. All nails have an anatomical valgus angle of six degrees. All parts of the nail are cannulated allowing insertion over guide wire. The angle between the nail and hip screws are available in 130 and 135 degrees. In the nail, there are two holes distally for static and dynamic locking. The locking bolts have a diameter of 4.9 millimetres.

Surgical treatment was performed by experts. All patients underwent attempted closed reduction of the fracture using traction and manipulation in a supine position on a fracture table. When fracture reduction was unacceptable, as determined by the surgeon, open reduction was done. Thus fracture reduction is the most important step prior to the fixation. Implants were placed and compression of the fracture was performed. Two Cephalomedullary screws were inserted with one or two distal screw as deemed by the surgeon Weight bearing was encouraged immediately postoperatively.

The tip apex-distance was measured accurately prior to the placement of the Cephalomedullary screws. The distance was calculated in both AP & lateral views. The adequacy of reduction of the posteromedial calcar was determined using both AP and lateral radiographs⁵. Initial radiographs were classified according the AO system and further sub-classified

into unstable fractures (31-A2.2, 31-A2.3, 31-A3.1, 31-A3.2, and 31-A3.3).

Post-operatively early mobilization was begun within limits of pain tolerance. Active, assisted and active range of motion exercises proved to be valuable adjuvant for achieving good range of motion. All patients were advised partial weight bearing with a walker for a period of six to eight weeks. Patients were allowed full weight bearing after radiological evidence of fracture union. Radiographs were taken at regular intervals and evaluated for fracture healing alignment, screw breakage or screw back-out, cut-out, Varus malunion collapse. Clinical union was defined as a painless fracture site during full weight bearing. Radiographic union was defined as bridging trabeculations across the fracture line on two orthogonal views in the absence of migration, loosening or breakage of hardware. Cases were followed up until eighteen months. Functional assessment of patients was done using Modified Harris Hip Scoring system.

RESULTS

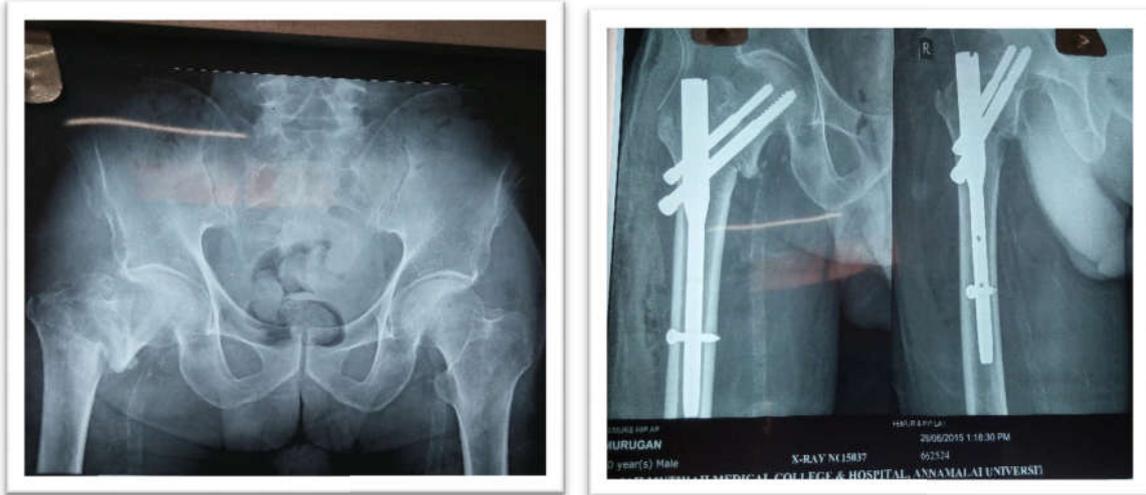
During the period of study a total of 40 cases with intertrochanteric fracture were received out of 10 cases were excluded because of sub-trochanteric extension. Remaining 30 cases were treated with TFN (trochanteric femoral nail) and patients were followed up at three months, six months, twelve & eighteen month's intervals.

Average age of patients was 65.07 (range 35 to 92) years. There were twelve male patients, eighteen were females. The youngest patient in our series was thirty five years old and the oldest was ninety two years old. Seventeen fractures involved right side. Thirteen fractures were left sided. The fracture types are given in table 1. Average trauma surgery interval was 8 days (range 2 to 15 days). The average surgical time was 67 minutes (range 30 to 95 min). Closed reduction was done in 26 patients whereas 4 patients required open reduction. Average blood loss was 165 ml (range 130 to 350ml) Average hospital stay was 15 days (range 13 to 18 days). Partial weight bearing was achieved in mean 5 days (range 3 to 9 days). Full weight bearing was achieved after 50 days (41 to 57 days). Mean radiological union was 15 weeks (12-18 weeks) Mean Modified Harris Hip Score was 88.25. The average neck shaft angle was 138 degrees (range 130- 145 degrees). In our series most of the complications were minor and resolved with minimal interventions without causing any lasting morbidity. Only three patients had Varus collapse, one patient had backing out of Cephalomedullary screws due to poor purchase in head and one patient had significant shortening of 3 cm

Table 1 fracture pattern

Type of fracture	No. of patients
31-A2.1	6
31-A2.2	12
31-A2.3	8
31-A3.1	2
31-A3.2	1
31-A3.3	1

PRE OP X-RAY IMMEDIATE POST OP X-RAY



6 WEEKS POST OP X-RAY



12 WEEKS POST OP X-RAY

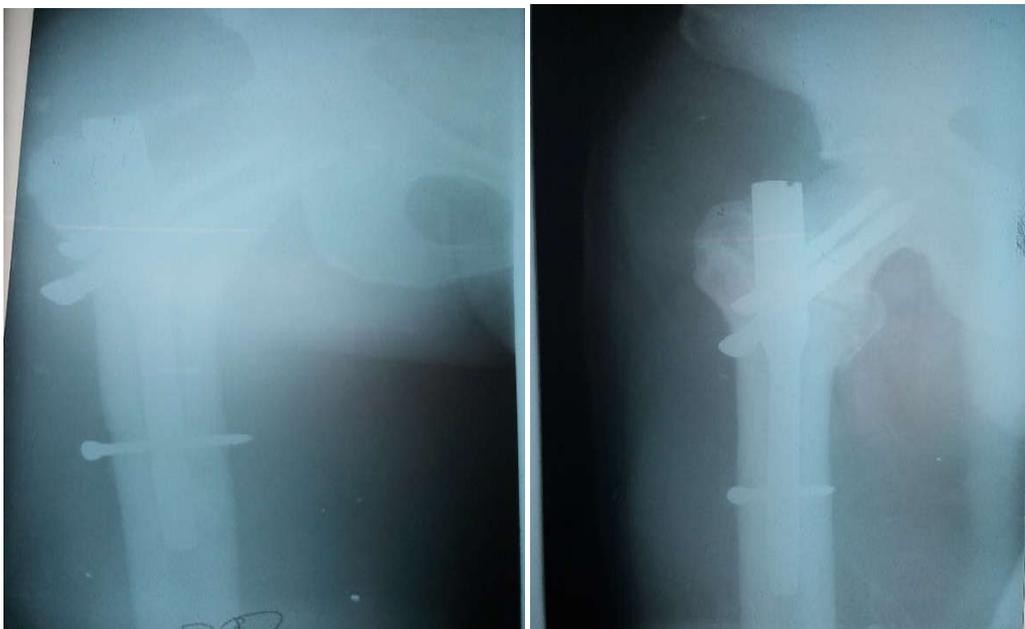




Table 2 Modified Harris Hip Score

Score	No of Patients
Excellent (more than 90)	7
Good (81-90)	18
Fair (71-80)	5
Poor (less than 70)	0

Table 3 Complications

Post-operative Infection	0
Varus collapse	3
Screw backing out (reverse migration)	1
Significant shortening (> 2cm)	1
Non union	0
Sciatic nerve palsy	0
Wound gaping	0

DISCUSSION

Intertrochanteric fractures in the elderly pose certain special problems. In this age group the fracture configuration is generally comminuted with presence of extensive

osteoporosis. There is problem with correct and accurate placement of the implant and hold of the implant. So if the fixation is not stable, prolonged immobilization may be required to achieve complete union. On the other hand there is a need for rapid weight bearing and mobilization of this group of patients as they are generally medically compromised due to age and associated diseases.

Anthropometry of proximal femur in Indian population is different from western population. Generally, it is deemed smaller than that of Caucasian population as the build of our population is smaller as well. So there appeared a need of design suitable for Indian Population. Egol KA, Chang EY, Cvitkovic J, Kummer FJ, Koval KJ (2004)¹⁰⁷ did a study on the mismatch of current intramedullary nails with the anterior bow of the femur. They inferred that Intra-operative complications such as splintering and fractures are due to oversized implants that are manufactured according to western population parameters. Proximal femoral nail was designed to overcome implant related complications. It is an intramedullary device. In India, the proximal femoral nail is available with a length of 240-250 mm. It crosses the middiaphysis of the femur. This may give rise to intra-operative femoral shaft fractures and thigh pain, because the implant touches the anterior cortex of the femur.

Modification of the gamma nail by reducing its diameter and length has been performed in a Chinese population. Hence complications such as splintering and fractures due to oversized implants can be avoided by using implants designed specifically for the relatively small Asian femur.

The TFN was designed for the Asian population keeping all these considerations in mind. Currently, there is only one study reported till date, of the TFN for treating intertrochanteric fractures in Asians. Currently there is only one study with TFN.

Gadegone WM, Salphale YS (April 2010) reviewed outcomes of 100 Asian patients who underwent trochanteric femoral nailing for stable and unstable intertrochanteric fractures. They concluded, that trochanteric fixation nail is a superior implant for stable and unstable intertrochanteric fractures in terms of operating time, surgical exposure, blood loss, and complications, especially for patients with relatively small femur.

The results of our study was very much similar to that of Gadegone. Union time of around 17 weeks for their study and 16 weeks our studies They reported a intra-operative complication rate of 13 % which was similar to the study (13.2). but the post-operative complication was far less in our study with only 13.2 % compared to 33 % in their study

Outcomes of treatment of intertrochanteric fractures depends on quality of bone, age of patient, general health, trauma surgery interval, and adequacy of treatment, comorbidities and stability of fixation^{9,10,11}.

TFN acts as a buttress to prevent medialisation of the shaft and provides more efficient load transfer¹⁶. It is designed to provide linear intraoperative compression of head neck segment to shaft along with rotational stability which minimizes neck malunions, resulting in negligible complication rate¹⁷. It also reduces stress concentration at the tip and the smaller distal diameter may prevent femoral shaft fractures¹⁸. It has been proved to be a superior implant compared to previous implants for stable and unstable

intertrochanteric fractures in terms of operating time, surgical exposure, blood loss, and complication rates¹⁹

CONCLUSION

For unstable intertrochanteric fractures fixation is must. Fracture reduction is the key step of the surgery. Trochanteric fixation nailing is effective method of fixation in unstable osteoporotic intertrochanteric femur fractures with satisfactory results and reasonably low complication rates.

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