Original Article

Functional & radiological outcome of fracture intertrochanter femur treated by Trochanter Femoral Nail

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Abstract

Background*:* Intertrochanteric fractures with varying fracture geometry pose a significant challenge to the treating orthopaedic surgeon. The aim of the study is to evaluate the radiological union and functional outcome in patients of intertrochanteric fracture femur treated with Trochanteric Femoral Nail (TFN)

Method*:* Study of 33 patients with fracture intertrochanteric femur treated by internal fixation using TFN from June 2011 to September 2013. The results were evaluated by assessing the patients regarding radiological union and functional outcome at follow-up as per Modified Harris Hip Score.

Results*:* Two cases (6.67%) expired during follow up and 1 case (3.33%) did not revert back for follow up. Results were assessed in thirty patients and Harris hip score was excellent in 43.33% patients, good in 36.67% patients and fair in 10 %patients.

Conclusion*:* Trochanter Femoral Nail is a suitable implant for management of intertrochanteric fractures of femur.

Keywords: Trochanter Femoral Nail (TFN), intertrochanteric fractures

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Introduction

Intertrochanteric fractures are one of the commonest fractures especially in the elderly with osteoporotic bones, usually due to low energy trauma. The overall increase in the incidence of trochanteric fracture can be attributed to two factors, one, increased life expectancy which increases the geriatric population, secondly high energy trauma which victimizes more number of young adults.

Trochanter femoral nail (TFN) is a versatile implant for fixation of intertrochanteric fractures which include fractures of different geometry. Development of this nail progressed through various designs. Initial design was called as Mark I. Subsequent designs that followed were called Mark II and Mark III. Initially it was called Halifax Nail after the place where it was developed by Dr. Subhash Haldar. [1] A group of surgeons from Strasbourg changed the name of this nail to a universal one i.e. Gamma Nail as the shape resembled the Greek letter. [2]

But these initial designs were associated with a host of per-operative complications when applied to Asiatic femora like jamming

of nail, impingement of tip of nail on the anterior cortex and fracture of lateral cortex of femur. K. S. Leung in Hong Kong undertook an anthropometeric study on Asiatic femora to circumvent these complications and brought out a design called Asia Pacific gamma nail. [3,4]

The history of treatment of trochanteric fractures has been of changes, modifications and evaluation. Though intertrochnateric fractures have been treated by variety of fixation devices, the present study was carried out by managing the fractures by TFN.

Materials and Methods

Thirty patients with fracture intertrochanteric femur (Evan's type I, II, III, IV, V & R) [5] were treated by internal fixation using TFN over a period of 16 months from June 2011 to September 2013 at Department of Orthopaedics & Traumatology, R D Gardi Medical College & associated CRGH Hospital, Ujjain, M.P. The cases excluded were pathological intertrochanteric fractures, compound intertrochanteric fractures and patient with associated lower limb injuries, vertebral column injuries and incompletely recovered surgical illness as they act as confounding factors. Preoperative assessment of fracture geometry was done using Evan's classification [5]. Intra operatively pattern of reduction achieved was seen on Anteroposterior and Lateral projections by image intensifier. Neck shaft angle measured on pre op & immediate post op x-ray with the help of Goniometer. 1st follow up (4 weeks post op), 2nd follow up (3 months post op) and 3rd follow up (6 months post op) plain radiographs (true AP and true lateral hip with thigh) were obtained to look for signs of union and impaction. Functional results were evaluated after a period of 3rd and 6th months postoperatively using Modified Harris Hip Score. [6]

Results

Distribution of sample by Sex & Age Group

Table No.1

Age group	Male	Female
45-59 yrs.	6	2
60-74 yrs.	12	6
75yrs & more	2	2
Total	20	10

Mode of trauma in majority of Patients has domestic fall as mode of trauma (n=17), RTA (n=12), Assault (n=1).

Distribution of sample by limb length shortening post-operative (in cm)

Table No 2

Limb Length Shortening (in cm)	Number of Patients
0	11
0.5	10
1	7
1.5	2

Distribution of patients on the basis of Modified Harris Hip Score at 6 month

Table No. 3

Modified Harris Hip Score	Number of Patient
0-69 POOR	0
70 – 79 FAIR	3
80 – 89 GOOD	11

90–100 EXCELLENT	13

Distribution of sample by complications seen.

Table No 4

Complications	**No. of patients**
Systemic	0
Chest infection	1
Pulmonary embolism	0
Respiratory distress	0
Urinary tract infection	1
Urinary retention	0
Deep vein thrombosis	0
Local complication	0
Superficial wound	1
Deep wound infection	0
Death	0

Distribution by implant related intra-operative complication

Table No. 5

Intra operative complications	**No.of patients**
Ill fitting jig	1
Difficulty in distal locking	00
Inappropriate length of proximal screws	00
Fracture of greater trochanter	00
Fracture below tip of nail	00
Revision surgery	00
Guide wire breakage	1
Reamer Breakage	1

Distribution of sample by functional outcome in various age group.

Table No. 6

Age Group	**Number of cases Harris Hip Score**			
	Excellent	Good	Fair	Poor
45-59yrs	6	1	0	0
60-74yrs	7	10	0	0
75yrs & More	0	0	3	0

Discussion

Most of patients in present study were from age group of 5th to 7th decade of life. Mean age in years for group operated is 63 yrs. This signifies the fact that patients from these age groups are involved in low energy trauma like fall at home.

Gallaghar et al (1980) reported an eight fold increase in trochanteric fractures in men over 80 years and women over 50 years of age. [7]

There was a male preponderance in our patient. Amongst them majority were in 5th-7th decade of life. The ratio of males to female was 2:1. H. B. Boyd and L. L. Griffin in their study of 300 cases found a marked sex difference. 226 (75.8%) of the patients were females and 74 (24.2%) were males.[8] Cleveland et al in their study had 87.7% of female patients. They had given the explanations for their observations which

are females have slightly wider pelvis with a tendency to having coxa vara and they are usually less active and are more prone to senile osteoporosis. [9]

Most of our patients were 50 years and above in them domestic fall (fall at home) and trivial trauma was main reason behind fracture while in road traffic accident (RTA) young patients were affected. In our study, there were 17 cases (56.67%) due to domestic fall while there were 12 cases(40%) due to Road traffic accident(RTA) and 1 case (3.33%), it was due to assault. This may be attributed to the factors as enumerated by Cummings and Nevitt in 1994 as follows, Inadequate protective reflexes, to reduce energy of fall below a certain critical threshold, Inadequate local shock absorbers e.g. muscle and fat around hip and inadequate bone strength at the hip on account of osteoporosis or osteomalacia. [10]

Young patients with intertrochanteric or subtrochanteric fractures sustained trauma either as a result of road traffic accident or fall from height, there by reflecting the requirement of high velocity trauma to cause fracture in the young.

Keneth J. Koval and Joseph D. Zuckerman observed that 90% of hip fractures in the elderly result from a simple fall. Hip fractures in young adults were observed to result most often with high energy trauma such as motor vehicular accidents or a fall from height. [11]

In our study, one patient was found to have chest infection while another patient had complication of urinary tract infection(UTI).

The patient with chest infection was known case of COPD and was a chronic bidi smoker. This complication was noticed in preoperative phase and appropriate treatment was given. The patient who had urinary traction infection was due to prolonged catheterization. Accordingly appropriate treatment in the form of antibiotics was given. Superficial wound infection was seen in 1 case. This may be attributed to low immunity status of patient as the patient was of asthenic built and belonging to low socioeconomic status. In this patient treatment of IV Antibiotics was prolonged.

Average hospital stay was 18 days. During postoperative period as per pain and tolerance of patient, they were made to standup with help of support on 2-3rd post operative day. Partial weight bearing started in 3 weeks. Patients were discharged after suture removal. In the series of B. Mall (30 patients) average time of ambulation was 14 days. [12] In the series of Dr. G.S Kulkarni ambulation was usually started after 11-12 days after the stitch removal. [13]

Average time of union in our series was about 14 weeks (Range:12 to 20 weeks). There is some controversy regarding criteria for time of fracture union in different studies. Some use radiological while some use radiological and clinical union. Assessment of early callus formation at fracture site & its subsequent progress was done with the help of subsequent radiograph. We have used criteria for union as presence of bridging callus at fracture site, most of the fracture circumference with density similar to adjacent cortical bone and clinically absence of pain at fracture site.

Radiological time of union in other series:

Table No. 7

Sr. No.	Series	Radiological union (in weeks)
1	Kevin D. Harrington [14]	16
2	Juluru- P. Rao [15]	18

3	Luis A. Flores [16]	13
4	B. Mall [12]	14
5	Present Series	14

In our study, we observed Average Flouroscopic screening time was 163 seconds. Average blood loss was 138 ml

In the series of Simon H. Bridle et al average blood loss was 162 ml. [17] In series of Christopher I Adams et al average blood loss was 244ml. [18] In recent study in June 2013 by Zhiyong et al the mean intra operative blood loss was 100 ml. [19]

The functional outcome of patient treated with trochanter femoral nail is calculated by the Modified Harris Hip Score, 89% of patients have excellent and good score.

The functional outcome categorization was done on the basis of age group distribution and results showed that patients of 45-59 yrs age group had excellent score irrespective of type of fracture and patients of age group 75 yrs and more had fair score.

Conclusion

It is concluded that TFN in management of intertrochanteric fracture prevents excessive collapse & limb shortening. Thus it helps in achieving overall good functional outcome.

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