Prospective study of trochanteric femoral nail in management of intertrochanteric fractures of femur

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Abstract : Intertrochanteric fractures are most frequent fractures worldwide. The intramedullary devices used are PFN and TFN. PFN size is 25cm and has complication of anterior thigh pain as it is a straight nail and abuts against the anterior femoral cortex due to the anterior femoral bow. Hence nowadays TFN is preferred as it is a short 18cm nail. The study is a prospective study carried out in our institute from September 2015 to February 2016.All patients above 18 years of age having intertrochanteric fractures were taken in the study. Total 50 patients (34 males & 16 females) were operated within 8 days of admission. In all cases standard TFN of 18cm length with 130 to 135 degree was used. Average follow up period was for 6 months. All patients were analyzed by clinic-radiological evidence of fracture union and functional evaluation was made by Harris hip score. The study concludes that trochanteric femoral nail is the treatment modality of choice for treatment of intertrochanteric fractures of femur and produces excellent results.

Keywords : Trochanteric Femoral Nail,Proximal Femoral Nail, Intertrochantric fracture, Fracture, Proximal femur.

Introduction : Intertrochanteric fracture is one of the most common fractures of the femur especially in the elderly with osteoporotic bones, usually due to low-energy trauma like simple falls.They are commonly seen in 5th – 7th decade of life. Trivial trauma like simple fall results fractures in elderly while high velocity trauma in young patients causes the fracture. Before invention of operative treatment conservative treatment favored. But in that result were poor in elderly and with lot of complication. Operative treatment permits anatomical reduction and most important it allows early mobilization[1]. Since the 20th century many implants have evolved. They are either extramedullary or intramedullary. Extramedullary devices like DHS are associated with disadvantage of being a load bearing implant[2] and 2 serious complications being uncontrolled collapse and migration of lag screw within the femoral head leading to varus and possible screw cutout[3]. Then evolved PFN (proximal femoral nailing) and TFN (trochanteric femoral nailing) which are intramedullary devices[4]. The incidence of intertrochanteric fracture is rising because of increasing number of senior citizens with osteoporosis. By 2040 the incidence of intertrochanteric fractures is estimated to be doubled. In India the figures may be much more[5].

Earlier most of trochanteric fractures were treated by a sliding hip-screw system. Since this device performed less well in unstable trochanteric fractures, with high rates of failure, intramedullary fixation devices have become increasingly popular. The main principle of this type of fixation is based on a sliding screw in the femoral neck-head fragment, attached to an intramedullary nail. The latter has advantages from the biomechanical point of view. The trochanteric femoral nail (TFN) was developed to improve the rotational stability of the proximal fracture fragment, combining the features of an unreamed intramedullary femoral nail with a sliding, load-bearing, femoral neck screw in order to combine the advantages of semi-closed intramedullary nailing, a dynamic femoral neck screw and early post-operative weight-bearing. Its introduction in 1997, several clinical studies have shown good results with few intra-operative problems and a low rate of complications. The clinical relevance of the presumed advantages and lower complication rates are still to be established[6].

Recently popular modality is 4th 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 and has been found suitable for Indian population[7].

Aims and objectives : To note the clinic-radiological outcome of trochanteric femoral nail in the treatment of intertrochanteric fractures of the femur.

To note the efficacy and usefulness of trochanteric femoral nail in the treatment of intertrochanteric fractures of the femur.

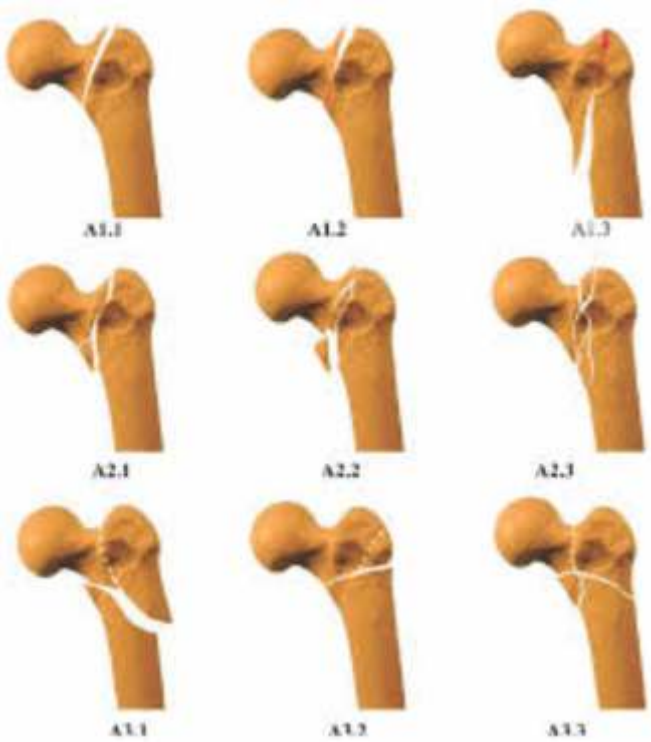
Materials and methods :

Materials : TFN is made of a stainless steel 316L type. The system consists of a cannulated nail, cannulated hip screws 8 millimeters and 6.4 millimeters, locking bolts (4.9 millimeters). The proximal diameter of the nail is 15 millimeters and length is 180 millimeters. The diameter varies from 9 to 12 millimeters. The angle between the nail and screw used is either 130 or 135degrees. Distally there are two holes for static and dynamic locking.

TFN

PFN

Inclusion criteria : All patients above 18 years of age suffering from intertrochanteric fractures of the femur are included in the study. The fracture is graded according to AO classification.



Exclusion criteria

(i) Patients having type 31-A2.3 fractures and age above 60 years.

(ii) Patients having any of the type 31-A3 fractures.

(iii) Patients having subtrochanteric extension in addition to intertrochanteric fractures.

(iv) Patients having associated bleeding / coagulation disorders.

Method : A total of 50 cases from Sept 2015 to Feb 2016 admitted in our institute meeting inclusion and exclusion criteria with written informed consent taken were included in the study.

The operative procedure was conducted under full aseptic precautions with antibiotic coverage.

Patient is positioned supine on fracture table with traction.

Reduction was achieved after positioning on

fracture table and confirmed under c-arm guidance in both A-P and lateral views.

Incision was made just proximal to the tip of greater trochanter parallel to the femoral shaft.

Entry was made with a curved awl at the modified medial tip trochanteric point.

A guide wire was passed through the entry point across the fracture site. Entry point was reamed with entry reamer.

Gradual reaming was done according to the canal diameter.

The nail of size less than 1 millimeters of largest reamer was inserted over guidewire. Proximal and distal locking was done.

The wound was closed in layers.

Observation and result

- The average age of the 50 patients was 51.6 years.
- Out of 50 patients 34 were male and 16 were female.
- Out of 50 patients 31 patients were fixed with a 130 degree nail and rest 19 patients were fixed with a 135 degree nail depending on pre-operative templating of the opposite side.
- 31 out of 50 fractures were right sided and rest 19 were left sided. Stable reduction was achieved in all the fractures pre-operatively as confirmed on c-arm.
- Dynamic locking only was done in 37 of the 50 patients operated and static plus dynamic locking was done in the rest 13 patients depending on c-arm reduction.
- Time taken from surgery was an average of 55 minutes from incision to closure.
- Post-operative check x-ray was done for the evaluating the reduction in anteroposterior and cross table lateral views and mobilization was started with support. Post-op mobilization day on an average was the 3rd day. The patients were followed for first month and follow up x-rays were taken and patient were allowed to bare full weight.
- The complications seen were screw back out in 1 case, 2 cases had superficial skin infection.
- Hip score at the end of 6 months was excellent 60%, good in 20%, fair in 14% and poor in 6%.

SR NO.	AGE	SIDE	SEX	ANGLE	LOCKING SCREW	TIME TAKEN (MINS)	COMPLICATION	HHS (6 MONTHS)
PT 1	46	R	M	135	DYNAMIC	50	NIL	FAIR
PT 2	57	R	M	130	BOTH	80	NIL	GOOD
PT 3	57	L	F	130	DYNAMIC	60	NIL	EXCELLENT
PT 4	48	L	M	135	DYNAMIC	65	NIL	EXCELLENT
PT 5	37	R	M	135	DYNAMIC	65	NIL	EXCELLENT
PT 6	62	L	F	130	BOTH	90	NIL	FAIR
PT 7	67	R	M	135	DYNAMIC	55	NIL	EXCELLENT
PT 8	49	L	M	135	BOTH	90	NIL	GOOD
PT 9	53	R	F	130	DYNAMIC	65	NIL	FAIR
PT 10	55	L	M	135	BOTH	75	SCREW BACK OUT	POOR
PT 11	39	R	M	130	DYNAMIC	70	NIL	EXCELLENT
PT 12	60	R	F	135	DYNAMIC	60	NIL	GOOD
PT 13	44	L	M	130	DYNAMIC	55	NIL	EXCELLENT
PT 14	44	R	M	130	BOTH	80	NIL	EXCELLENT
PT 15	47	R	F	130	BOTH	60	NIL	EXCELLENT
PT 16	53	L	M	135	DYNAMIC	65	NIL	EXCELLENT
PT 17	59	R	M	130	DYNAMIC	65	NIL	FAIR
PT 18	48	R	F	135	DYNAMIC	40	NIL	EXCELLENT
PT 19	57	L	M	130	DYNAMIC	45	NIL	GOOD
PT 20	57	R	M	130	DYNAMIC	45	NIL	EXCELLENT
PT 21	61	L	F	135	BOTH	70	NIL	EXCELLENT
PT 22	48	R	M	130	BOTH	60	NIL	EXCELLENT
PT 23	50	R	M	130	DYNAMIC	55	NIL	FAIR
PT 24	53	R	M	130	DYNAMIC	55	NIL	EXCELLENT
PT 25	43	R	M	135	DYNAMIC	60	NIL	EXCELLENT
PT 26	51	R	F	135	DYNAMIC	50	NIL	EXCELLENT
PT 27	63	L	M	130	DYNAMIC	55	INFECTION	POOR
PT 28	45	R	M	130	DYNAMIC	55	NIL	EXCELLENT
PT 29	55	R	F	130	BOTH	65	NIL	FAIR
PT 30	55	L	M	130	DYNAMIC	45	NIL	EXCELLENT
PT 31	34	R	M	135	DYNAMIC	55	NIL	EXCELLENT
PT 32	54	R	M	130	BOTH	60	NIL	GOOD
PT 33	37	L	F	130	DYNAMIC	30	NIL	FAIR
PT 34	65	L	M	135	DYNAMIC	35	NIL	EXCELLENT
PT 35	47	R	M	130	BOTH	65	NIL	EXCELLENT
PT 36	76	L	M	130	DYNAMIC	40	NIL	GOOD
PT 37	46	R	F	135	DYNAMIC	50	NIL	EXCELLENT
PT 38	47	L	M	130	DYNAMIC	50	NIL	GOOD
PT 39	48	R	M	130	DYNAMIC	35	NIL	EXCELLENT
PT 40	48	L	M	135	DYNAMIC	40	NIL	EXCELLENT
PT 41	37	R	F	130	DYNAMIC	35	NIL	GOOD
PT 42	68	R	M	130	DYNAMIC	45	INFECTION	POOR
PT 43	37	R	M	135	BOTH	55	NIL	EXCELLENT
PT 44	57	R	F	135	DYNAMIC	45	NIL	EXCELLENT

Case Examples

Case no.1

Fig 1 : Pre-operative

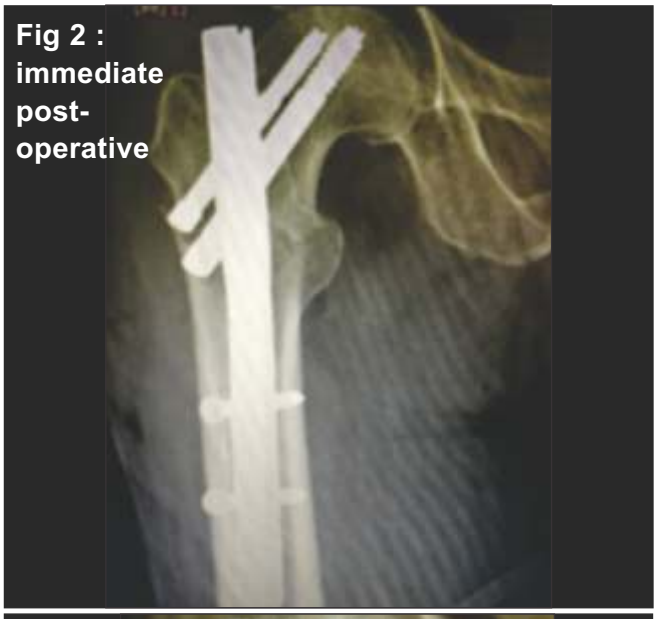


Fig 2 : immediate post-operative

Fig 3 : 1 month post-operative

Case no.2

Fig 1 : Preoperative

Fig 2 : Traction view preoperative

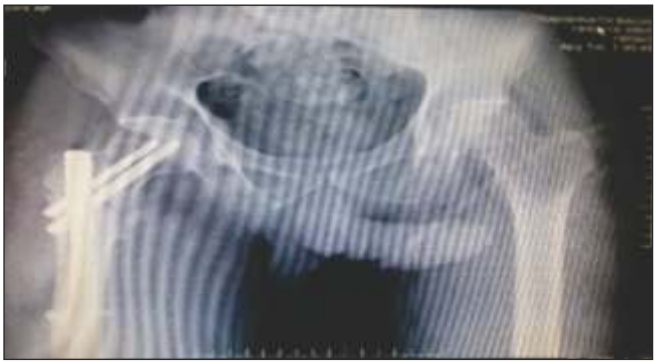


Fig 3 Immediate Post-operative A-p View

Fig 4 : Immediate post-Op cross table lateral view

Discussion : The hypothesis that TFN would produce lesser complications than the other implants was tested. Basically the determining factor in union of the fracture is the reduction of the fracture and near anatomical configuration post operatively. It is the surgeon that brings about the reduction and not the implant. The implant merely holds the reduction obtained by the surgeon in place. The advantages of using TFN as an implant for intertrochanteric fractures of femur are that it is a relatively easy procedure, is relatively faster than other procedures of course depending from surgeon to surgeon, does not require a vast exposure, associated with minimum amount of blood loss, is a load sharing implant, allows for early mobilization, is not associated with anterior thigh pain, lesser rate of other complications and gives good postoperative clinic-radiological outcome.Optimal reduction of the fracture and positioning of the nail and screws remain of crucial importance and should be obtained at all times.Al-yassari G et al and Bannister GC et al studies showed similar results and the results are in range with the above mentioned studies.[8,9]

Conclusion : The TFN is an acceptable treatment modality for intertrochanteric fractures of the femur. The general complications and mortality rates did not reveal any surprising results and are in range with the results of other studies. In our study the fractures fixed with TFN have given good union, early mobility and fewer complications.

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