ISSN: 2581 – 3633
PubMed - National Library of Medicine - ID: 101745081

International Journal of Medical Science and Advanced Clinical Research (IJMACR)

Available Online at:www.ijmacr.com

Volume – 8, Issue – 4, July - 2025, Page No.: 139 – 147

Study on Surgical Outcome of Intertrochantric Fracture Treated With Traffon Nail

[1]Dr. Binay Gowda T., Junior Resident, Department of Orthopedics, BGS Global Institute of Medical Sciences, Kengeri, Bengaluru 560060, India

[2]Dr. Chunnchesh Kumar D, Associate Professor, Department of Orthopedics, BGS Global Institute of Medical Sciences, Kengeri, Bengaluru 560060, India

[3]Dr. Vani Ahuja, Assistant Professor, Department of Orthopedics, BGS Global Institute of Medical Sciences, Kengeri, Bengaluru 560060, India

[4]Dr. Sushan K, Senior Resident, Department of Orthopedics, BGS Global Institute of Medical Sciences, Kengeri, Bengaluru 560060, India

[5]Dr. Raju K P, Head and Professor, Department of Orthopedics, BGS Global Institute of Medical Sciences, Kengeri, Bengaluru 560060, India

Corresponding Author: Dr. Binay Gowda T., Junior Resident, Department of Orthopedics, BGS Global Institute of Medical Sciences, Kengeri, Bengaluru 560060, India.

How to citation this article: Dr. Binay Gowda T., Dr. Chunnchesh Kumar D, Dr. Vani Ahuja, Dr. Sushan K, Dr. Raju K P, "Study on Surgical Outcome of Intertrochantric Fracture Treated With Traffon Nail", IJMACR- July - 2025, Volume – 8, Issue - 4, P. No. 139 – 147.

Type of Publication: Original Research Article

Conflicts of Interest: Nil

Abstract

Purpose: To review outcomes of 40 patients who underwent TRAFFON nailing for stable and unstable Intertrochanteric fractures.

Methods: This study included 40 patients with fresh Intertrochanteric fractures who were admitted to BGS Global Institute of Medical Sciences, Bangalore, from November 2022 to November 2024.Records of 22 Men and 18 Women, who underwent TRAFFON nailing for Intertrochanteric fracture were reviewed.

Results: 40 patients achieved anatomic reduction. At the one-year follow-up, 75% of the patients had Good or excellent outcomes and 50% had returned to their pre-injury functional level. One patient had a Z-effect. One patients had shortening of <2 cm. None had fractures of the femoral shaft or trochanter or experienced nail breakage.

Conclusion: The Traffon 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.

Keywords: Infection, Pedestrian Injuries, Soft-Tissue Damage, Traffon Nail,

Introduction

Injuries to the femur, the longest bone in the body present challenging situation to the orthopaedic surgeon. Femur fractures are commonly seen in polytrauma patients-mechanism of injury include automobile crashes, vehicle versus pedestrian injuries, gunshot wounds, fall from height and industrial accidents.

These fractures account for 10% -34% of all hip fractures. They have bimodal age distribution and very different mechanisms of injury. The older patient typically sustains low velocity trauma whereas in younger patients these fractures commonly result from high energy trauma and often are associated with other fractures.

The treatment options were few and less effective than the treatment now available.

Now the Intertrochanteric fracture is best treated surgically in most cases as restoration of femoral length and rotation and correction of femoral head and neck angulation can be done.

There are two ways to treat fracture proximal femur by internal fixation i.e. sliding compression hip screw with side plate assembly and intramedullary fixation devices.

The open technique entailing the sliding hip screw may result in deterioration of pre-existing comorbidities in elderly patients owing to increased blood loss, soft-tissue damage, and longer rehabilitation.[1] Cutting out of the sliding hip screw, excessive medialisation of the distal fragment (in unstable fractures), and collapse upon weight bearing are major concerns.[2]

Advantages of Intramedullary devices include retained blood supply to bone fragments, less operative blood loss and less disruption of the environment.

Objectives

To study the various fracture patterns of proximal region of femur (Intertrochanteric):

1. To study the management of these fracture with TRAFFON NAIL.
2. To study operative difficulties encountered during the procedure.
3. To evaluate the result in terms of radiological union and ultimate functional outcome.
4. To determine the correct indications for the use of TRAFFON NAIL in these fractures.

Materials and Methods

Traffon nail

An Intramedullary device for the treatment of stable and unstable Intertrochanteric fracture.

It is a closed section cephalomedullary nail with 2 proximal screws that extend into the femoral head and 2 distal locking screws. The proximal 2 screws are of 6.4mm and 8mm. Both screws are self-tapping and partially threaded to allow for sliding compression.

The distal screws are of 4.9mm fully threaded self-tapping locking bolts. The nail has 5 ^{o} valgus bend proximally. Zigs are available for proximal locking & distal locking.

Traffon nail has all the advantages of an intramedullary device:

1. Because of its location it provides more efficient load transfer.
2. Possibility of insertion by closed technique.
3. Decreased blood loss.
4. Decreased infection rate.

5. Minimum soft tissue dissection and wound complications.

In addition:

1. The shorter lever arm of the intramedullary device decreases bending stresses on implant.
2. It can be dynamically locked.
3. It allows length and rotational control even when the lesser trochanter is not intact.

The advantages of short nail over long ones are avoidance of mismatch between anterior bowing of femur and longer nails and the relatively reliable targeting of the distal locking screws through a proximally attached insertion guide.

The main advantages of Traffon nail over its precursor gamma nail[4, 5, 6] are:

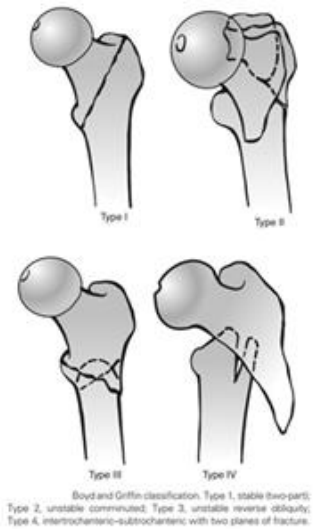
1. The presence of two proximal screws provides better rotational control of proximal fracture fragment
2. Since the 2 proximal screws are smaller in diameter, it is not necessary for the nail to be stout unlike gamma nail and hence theoretically induces less comminution of proximal segment and less disruption of abductor insertion.

Disadvantages of TRAFFON NAIL that has been found in literature include Greater trochanter fracture, Femoral shaft fractures, at the nail tip and the insertion sites of the distal locking screws (secondary to stress riser effect), fracture of smaller superior screw and **Z –effect** (seen in unstable fractures due differing tension and compression forces on the two lag screws).

Classification of Fracture

A useful classification not only identifies the fracture pattern but serves as a definite guide to treatment and prognosis.

Boyd and Griffin's Classification



Boyd and Griffin classification. Type 1, stable (two-part); Type 2, unstable comminuted; Type 3, unstable reverse obliquity; Type 4, intertrochanteric-subtrochanteric with two planes of fracture.

TYPE I: Fracture that extends along the intertrochanteric line from the greater trochanter to lesser trochanter.

TYPE II: The main fracture being along the intertrochanteric line but with multiple comminuted fractures in the cortex.

TYPE III: Basically sub trochanteric fracture with at least one fracture passing across the proximal end of the shaft just distal to or at the lesser trochanter with varying degrees.

TYPE IV: Fractures of trochanteric region and proximal shaft with fractures in at least two planes.

This prospective study included 30 patients with fresh Intertrochanteric fractures who were admitted to BGS Global Institute of Medical Sciences, Bangalore, from November 2022 to November 2024. Patients were selected according to the following inclusion and exclusion criteria:

Criteria to Include the Patients in This Series Were

- All Intertrochanteric fractures
- Age > 20 years

Exclusion criteria

1) Less than 20 yrs.
2) Sub-trochanteric fractures.

3) Compound Intertrochanteric fractures with Previous wound or bone infections, operatively treated fractures, or retained hardware in the same extremity

These cases would be studied on the basis of mechanism of injury, classification and treatment with Traffon nail and their surgical and functional outcome with or without residual complication.

The end results were evaluated in terms of:

- Clinical parameters
- Wound healing
- Fracture union
- Mobilization status
- Range of motion; hip, knee
- Complications
- Subsequent procedures
- Resumption of activities

Emergency management in casualty

Emergency management of all life threatening conditions was carried out in casualty with respect to- Airway, Breathing and Circulation.

Pre –operative management

All the routine investigations were done.

Operative procedure

Anaesthesia: All cases were done under spinal epidural anaesthesia.

Antibiotic: Prophylactic IV antibiotic usually a third generation cephalosporin was given 15 minutes before surgery.

Position of patient

- All patients were given supine position following anaesthesia, on a radiolucent table top to facilitate the use of image intensifier.
- The reduction is carried out by either open or closed
- Closed reduction by manipulation attempted initially after patient is anaesthetized.

Procedure

1. **Position of the Patient:** The Patient is positioned supine on the fracture table under spinal or general anaesthesia as the condition of the patient permits. Trunk is deviated to opposite side by 15°. The fracture is reduced by longitudinal traction and the limb is placed in neutral or slight adduction to facilitate nail insertion through the greater trochanter.
2. **Reduction of fracture:** Closed reduction is confirmed in AP and lateral planes by C-arm. If close reduction fails percutaneously placed Steinman pin or bone hook can be used as joystick to reduce the Fracture. In unstable fractures, a temporary 3 mm kirschner wire fixation is carried out.
3. **Incision:** A straight lateral 5cm long incision was taken from tip of the trochanter. Make an incision in the gluteus and split the medius in line with incision.
4. **Entry Point:** In the AP view, the nail insertion point is normally found on the tip of the greater trochanter in the curved extension of the medullary cavity. Entry point is made at the tip of the trochanter with the bone awl & the 2.5 mm Guide Wire is inserted manually with the Universal Chuck with T Handle. The K-wire is advanced into the femoral shaft in such a way that it is located in the middle of the shaft in both AP and lateral directions. Insert the Solapur protection Sleeve (18x15 mm). Guide the centering awl -cannulated 15.0 mm over the guide wire through the protection sleeve and ream manually till the stop on the protection sleeve. Remove protection sleeve.
5. **Assemble the Instruments on jig:** Choose the nail of 130°or 135° according to the angle of the contra lateral hip. Length of the nail is 180 mm. and

diameter 9 to 12 mm according to the size of the cavity. Secure the nail with assembly by coupling bolt and supine driver

6. **Insertion of the nail:** Carefully insert the nail manually. The insertion can be supported by light blows at the end of the insertion of the nail. After insertion of the nail check the position of the Screw hole. Imaginary line for the screw should be just above the calcar in the lower half of the femoral neck. (Hour glass appearance of the holes in the nail should correspond with the level just above the calcar)
7. **Insertion of the Guide wire in the neck:** Abduct the limb and insert the drill sleeves of the compression screw and stabilization screw. Small stab incision is given on lateral part of the thigh to introduce drills sleeves with the help of Awl for proximal bolt till the lateral cortex of the trochanter. Insert the guide wires of 2 mm, deeper into the femoral head. The final position the guide wire of compression screw should be just above the calcar in lower half of neck and in lateral view positioned in the centre of the femoral neck. The insertion of the Guide wire for hip pin is carried out.
8. **Insertion of the screws:** Advance the cannulated step drill for the stabilizing screw and fix the 6.4 mm hip pin first which helps in stabilization nail. Advance the cannulated step drill for compression screw and fix the fracture by 8 mm bolt. The stabilizing screw should be 10-15 mm less than the hip pin.
9. **Distal locking:** Distal locking is usually performed with a single locking bolt, for **static** interlocking use the proximal locking hole, and the distal locking hole for **dynamic** interlocking. Postoperative removal of the static locking bolt allows secondary dynamization. Make a stab incision and insert the protection Sleeve 1Ox8mm through the locking hole selected in the Target Device to the bone and drill through both cortices using the 4.0 mm Drill bit, followed by 4.9 locking bolt is used.
10. **Closer of the Wound:** The stability of the construct is assessed and wounds are closed in layers over negative suction drain. Antiseptic dressing is done.

Post Operative Management

- Limb elevation.
- IV antibiotics in the form of third generation cephalosporin's, aminoglycosides were given.
- Oral antibiotics started from fifth post op day and continued till suture removal.
- Analgesics/Epidural top up for 2 days.
- Drain removal after 48 hrs.
- Static quadriceps exercises from day 2 were begun.
- Early hip and knee assisted ROM exercise were started from third day.
- Suture removal after 10 days.
- Patient discharged 1 week after operation after giving appropriate physiotherapy instructions.
- Rehabilitation: partial weight bearing was started 2 to 4 weeks post operatively. Full weight bearing was allowed after radiological and clinical signs of union.

Follow Up

Regular follow up of every patient was carried out at 4 weeks interval initially and later at 6 weeks until union.

Clinical and radiological evaluation done:

Clinical evaluation	Radiological evaluation
Gait	Signs of union
Pain	Loss of fixation
Deformity, shortening	Failure of implant
Range of hip and knee motion	
Ability to sit cross legged, squat	
Whether return to pre injury occupation	

Kyle's criteria[7]

Excellent	Good	Fair	Poor
Normal ROM No limp No Pain Independent Gait	Normal ROM No limp Occasional Pain Use of Cane	Restriction of ROM Noticeable Limp Moderate Pain Use of Walker/2 canes	Pain in Every ROM Non Ambulatory

Results

Age Incidence	20-40yrs	05	12.5%
	40-60yrs	12	30%
	>60yrs	23	57.5%
Sex Incidence	Male	22	55%
	Female	18	45%
Mechanism of Injury	High velocity injury	12	30%
	Trivial fall	28	70%
Side of Injury	Right	28	70%
	Left	12	30%
Classification of Fractures	Type 1	-	
	Type 2	11	27.5%
	Type 3	21	52.5%
	Type 4	08	20%
Time Interval between Trauma and Surgery	<7 days		
	> 7 days		

Type Of Surgery	Closed reduction	31	77.5%
	Open reduction	09	22.5%
Duration of Surgery	< 2hrs	27	67.5%
	>2 hrs.	13	32.5%
Type of Union and Duration	Union	34	85%
	Delayed union	06	15%
	Non union		
	Duration in month	02	
Functional Grading of Patient as per Kyle's Criteria	Excellent	20	50%
	Good	11	27.5%
	Fair	07	17.5%
	Poor	02	05%

Complications	Intraoperative	Flaring of tip of nail		
		Difficulty in distal locking	2	05%
		Difficulty in proximal locking	4	10%
		Difficult in entry point		
		Difficulty in achieving closed reduction		
	Early	Shortening	1	2.5%
		Rotation deformity		
		Superficial infection		
		Deep infection		
		Bed sores		
		Mortality		
	Late	Malunion	1	2.5%
		Non union		
		Implant failure	1	2.5%
		Delayed union		
		Knee stiffness	2	05%

Discussion

Successful treatment of Intertrochanteric fractures depends on bone quality, patient age, general health, interval from fracture to treatment, treatment adequacy, comorbidities, and fixation stability. Surgical management is preferred because it facilitates early rehabilitation.

1. In the series of conducted by Christophe sadowski, Anne Lubekke, Marc Saudan, Nicolas Riand and

others[7], 20 patients of proximal femoral fractures were treated by PFN.

2. In the series conducted by Schipper, Steyerberg, Castelein[8] and others, 210 patients of proximal femoral fractures were treated by PFN, and they could in all assess 144 patients
3. In the series conducted by Boldin C, Seibert FJ, Fankhauser F and others[9], 55 patients of unstable proximal femoral fractures were treated by PFN.

The comparison of this series with the present series is as follows.

Sn.	Series	No. of patient	Union	Non union	Delayed union
1.	Christophe's	20	90%	01%	09%
2.	Schipper's	144	83.3%	2.8%	13.9%
3.	Boldin's	55	88%	3%	9%
4.	Our Study	40	85%	--	15%

Conclusion

Literature suggests that Dynamic hip screw is the Gold standard for treatment of stable type of intertrochanteric fractures as well as unstable types.

According to our study and use of Traffon nail in Intertrochanteric fractures we can say that: Traffon Nail Can Be Considered the Most Judicious and Rational Method of Treating Intertrochanteric Fractures, especially the unstable and reverse oblique type.

The reasons to support this are:

- It can be used in all configurations of Intertrochanteric fractures.
- It is closed method thus minimal soft tissue damage & preserves the fracture hematoma and yields early healing and early union.
- Closer to weight bearing axis.
- It can be used with equally good results in all grades of osteoporosis.
- It is a quick procedure with a small incision and with significantly less amount of blood loss.
- It gives good results even with non-anatomical reduction.
- Complications were minimal and comparable with other fracture systems.

But TRAFFON nailing requires a higher surgical skill, good fracture table, good instrumentation and C-arm control. It has a steep learning curve.

Thus we can conclude that the TRAFFON NAIL is after proper training and technique a safe and easy implant option for treatment of complex intertrochanteric fractures.

References

1. Morris AH, Zuckerman JD, American Academy of Orthopaedic Surgeons Council of Health Policy and Practice. National Consensus Conference on Improving the Continuum of Care for Patients with Hip Fracture. J Bone Joint Surg Am 2002; 84:670–4.
2. Flores LA, Harrington IJ, Heller M. The stability of intertrochanteric fractures treated with a sliding screw-plate. J Bone Joint Surg Br 1990; 72:37–40.
3. Hesse B, Gachter A. Complications following the treatment of trochanteric fractures with the gamma nail. Arch Ortho Trauma Surg 2004; 124:692–8.
4. Halder SC. The Gamma nail for peri trochanteric fractures. J Bone Joint Surg Br 1992; 74:340–4.
5. Klinger HM, Baums MH, Eckert M, Neugebauer R. A comparative study of unstable per- and intertrochanteric femoral fractures treated with

dynamic hip screw (DHS) and trochanteric butt-press plate vs. proximal femoral nail (PFN) [in German]. Zentralbl Chir 2005; 130:301–6.

6. 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.
7. Pertrochanteric Fractures: Is there an Advantage to an Intramedullary Nail? Richard E. Stern, MD; Christophe Sadowski, MD; Anne Lubbeke, MD; Marc Saudan, MD; Nicolas Riand, MD; Pierre Hoffmeyer, MD, University Hospital of Geneva, Geneva, Switzerland
8. Treatment of unstable trochanteric fractures. Randomised comparison of the gamma nail and the proximal femoral nail. Schipper IB, Steyerberg EW, Castelein RM, van der Heijden FH, den Hoed PT, Kerver AJ, van Vugt AB.
9. The proximal femoral nail (PFN)--a minimal invasive treatment of unstable proximal femoral fractures: a prospective study of 55 patients with a follow-up of 15 months. Boldin C, Seibert FJ, Fankhauser F, Peicha G, Grechenig W, Szyszkowitz R.