



Journal Homepage: - [www.journalijar.com](http://www.journalijar.com)

## INTERNATIONAL JOURNAL OF ADVANCED RESEARCH (IJAR)

Article DOI: 10.21474/IJAR01/16337

DOI URL: <http://dx.doi.org/10.21474/IJAR01/16337>



### RESEARCH ARTICLE

#### FUNCTIONAL OUTCOME OF TROCHANTERIC FIXATION NAIL TREATMENT IN ELDERLY PATIENTS WITH INTERTROCHANTERIC FEMUR FRACTURE

Dr. Rajeev Shukla, Dr. Sanjul Bansal, Dr. Aayush Kumar Soni, Dr. Abhishek Keshav and Dr. Sourabh K. Khande

Department of Orthopaedics, Sri Aurobindo Medical College & PG Institute-Indore (M.P.).

#### Manuscript Info

##### Manuscript History

Received: 25 December 2022

Final Accepted: 27 January 2023

Published: February 2023

#### Abstract

Intertrochanteric fractures are disabling injuries in geriatric population and they are the most frequently operated fracture type which has the highest postoperative fatality rate of all surgically treated fractures. The objective of the study was to evaluate the functional outcomes of intertrochanteric fractures treated with trochanteric fixation nail (TFN) in elderly patients.

Copy Right, IJAR, 2023,. All rights reserved.

#### Introduction:-

Intertrochanteric fractures are one of the most frequent fractures of the proximal femur and occur predominantly in geriatric patients and are among the most devastating injuries in the elderly. Incidence of the fractures of the proximal femur is increasing since the general life expectancy of the population has increased significantly during the last few decades.<sup>1</sup>

Intertrochanteric fractures involve from the extra-capsular basilar neck region to the region along the lesser trochanter proximal to the development of the medullary canal. Most of the proximal femoral fractures occur in elderly individuals as a result of only moderate or minimal trauma. In younger patients, these fractures usually occur as a result of high energy trauma. Intertrochanteric fractures mostly occur due to a simple self-fall. The chances of self-fall increase with age, which is further increased by decreased muscle power, decreased reflexes, poor vision, and labile blood pressure.<sup>1,2,3</sup>

Cummings et al. attributed four factors in determining whether a fall in an elderly is significant to cause fracture:

1. The fall must be oriented in such away that the person lands on or near the hip.
2. The protective reflexes must be inadequate to reduce the energy of fall below the critical threshold.
3. Muscles and fat acting as local shock absorbers around the hip must be insufficient.
4. The bone density at the hip must be inadequate to withstand the fall.

Prophylactic interventions to decrease the risk of falls and aggressive screening and treatment of osteoporotic patients with risk of fragility fractures are very important.<sup>4</sup>

Unstable intertrochanteric fracture<sup>5,6</sup> include: -

- 3-fragment fracture with posteromedial combination
- Fracture >2 intermediate fragments (lateral wall blowsout)
- Reverse oblique fracture
- Transverse oblique fracture

**Corresponding Author:- Dr. Sanjul Bansal**

Address:- Department of Orthopaedics, Sri Aurobindo Medical College & PG Institute-Indore (M.P.).

· Intertrochanteric fracture with subtrochanteric extension.

Unstable intertrochanteric fractures stabilized surgically still remains a challenge. Before the introduction of appropriate fixation devices, treatment of intertrochanteric fracture was non-operative<sup>9</sup>, consisting of prolonged bed rest in traction until fracture union (10 – 12 weeks). This is followed by a lengthy program of walking training. In elderly people, this was associated with high complication rates.<sup>1</sup> and to prevent these complications, the treatment of intertrochanteric fracture by reduction and internal fixation has become the standard management.

TFN preserve the fracture hematoma and associated with less blood loss and short operating time. The intramedullary position of the TFN prevents the excessive collapse of the proximal fragment & medialization of the distal fragment. Being an intramedullary load-sharing device, TFN aids in early postoperative mobilization, weight-bearing, and ultimately the early fracture union.

### **Materials And Methods:-**

This is a prospective and retrospective study with 30 patients of Intertrochanteric femur fractures carried out in the Department of Orthopaedics, Sri Aurobindo Medical College, and P.G. Institute, Indore from Jan. 2020 to Aug. 2022.

#### **Duration Of The Study**

2 years (one and half years for data collection and 6 months for analysis and writing) from September 2020 to August 2022. method of collection of data and selection of cases

System of collection of data and selection of cases of Intertrochanteric fractures presented to the Emergency Department or OPD were treated surgically are included in the study after previous informed written consent. The cases were operated with standard styles of obsession. Cases coming for follow up were studied regularly.

#### **Inclusion Criteria**

1. All Intertrochanteric femur fractures.
2. Patient more than 65 years of age.

#### **Exclusion Criteria**

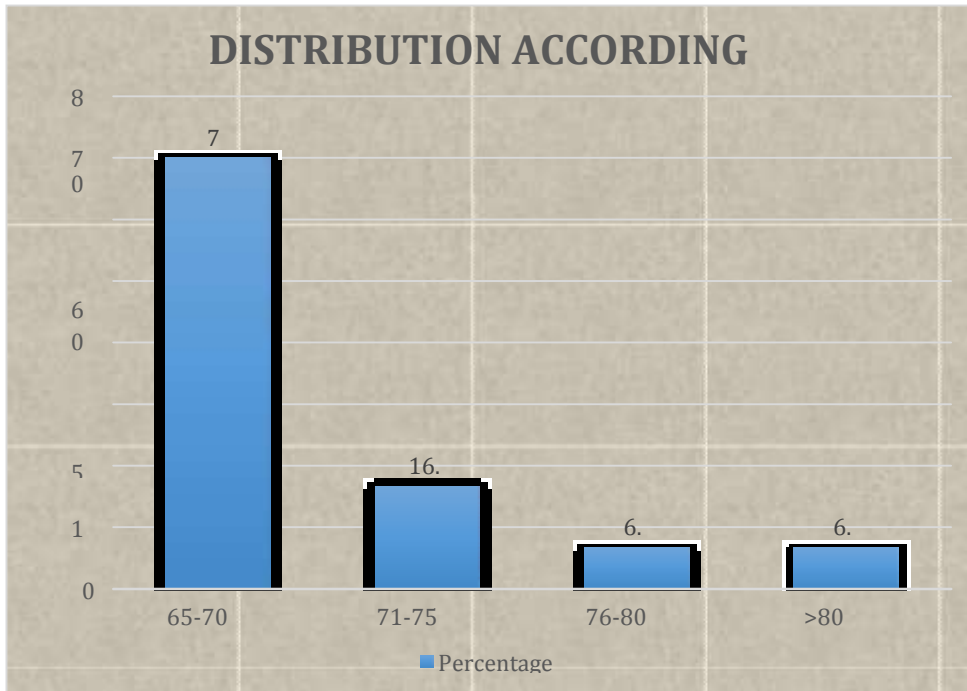
1. Patient having any other injury
2. Open fractures.
3. Patients with previous history of fracture in the same limb treated either conservatively or surgically.

30 patients were included in the study, out of which 6 were retrospective cases and 24 were prospective cases managed surgically.

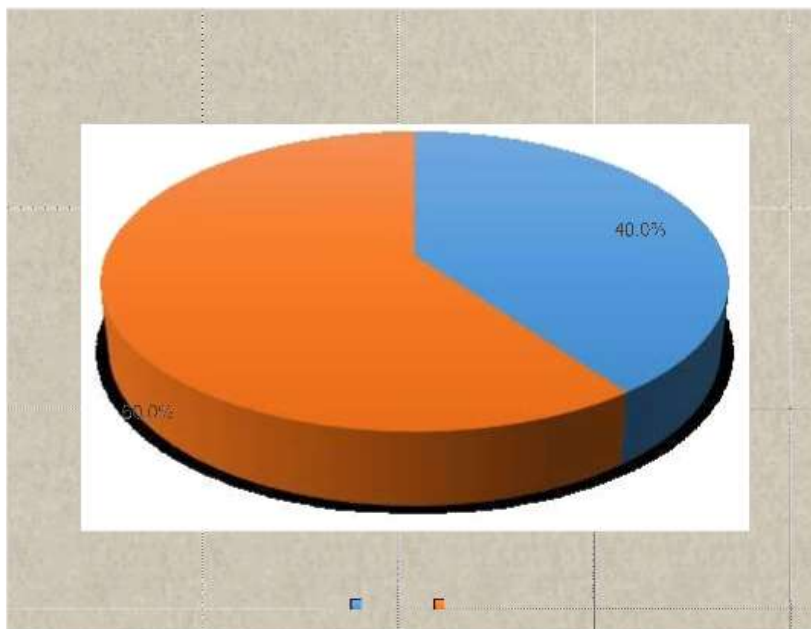
Patients admitted with Intertrochanteric fracture were examined and investigated with an X-ray pelvis with both hips AP and Lateral view (whenever possible).

### **Results:-**

There were 21 (70%) patients in the age group 65-70 years, 5 (16.7%) patients were in the age group 71-75 years, 2 (6.7%) patients were in the age group 76-80 years and 2 (6.7%) patients were in the age group more than 80 years. Majority of the patients were in the age group 65-70 years, followed by 71-75 years. The mean age of the patients was  $70.27 \pm 5.82$  years with a range from 65 to 85 years.



1 : Graph Bar diagram showing distribution of patients according to age



Graph 2:- Pie diagram showing distribution of patients according to sex.

There were 12(40.0%)females and18(60.0%)males in the present study. There was a male predominance in thestudy. The male: female ratio was 1.5:

22(73.3%) patients sustained this injury due to fall and 8(26.7%) patients sustained injury due to road traffic accidents. Fall was the most common mode of trauma.

In 17 (56.7%) patient’s left side was involved and in 13 (43.3%) patients’ right side was involved. In majority of the patients left side involvement was seen in our study.

All the fractures were classified as per the Evan’s Classification. In which Type 1 was considered stable fractures. Type 2 was unstable fractures. 28 (93.3%) patients had fractures of Evan’s Classification type 1 and 2 (6.7%) patients had type 2 intertrochanteric fracture.

One (3.3%) patient was suffering from chronic kidney disease, 4 (13.3%) patients were suffering from diabetes mellitus type-2, 4 (13.3%) patients were suffering from hypertension, 1 (3.3%) had anemia and 1 (3.3%) patient had pulmonary tuberculosis of the 30 patients, 19 (63.3%) patients were not having any comorbidity.

22 (73.4%) patients underwent surgical intervention within 3 days, 7 (23.3%) patients in 4-7 days, and only 1 (3.3%) patient was operated after 7 days of the injury. The mean duration between injury and day of surgery is  $3.47 \pm 1.85$  days. It was subjected to the day of admission after trauma and availability of OT and surgical fitness of the patient.

The average operating time was 67mins (45min-110min) after incision.

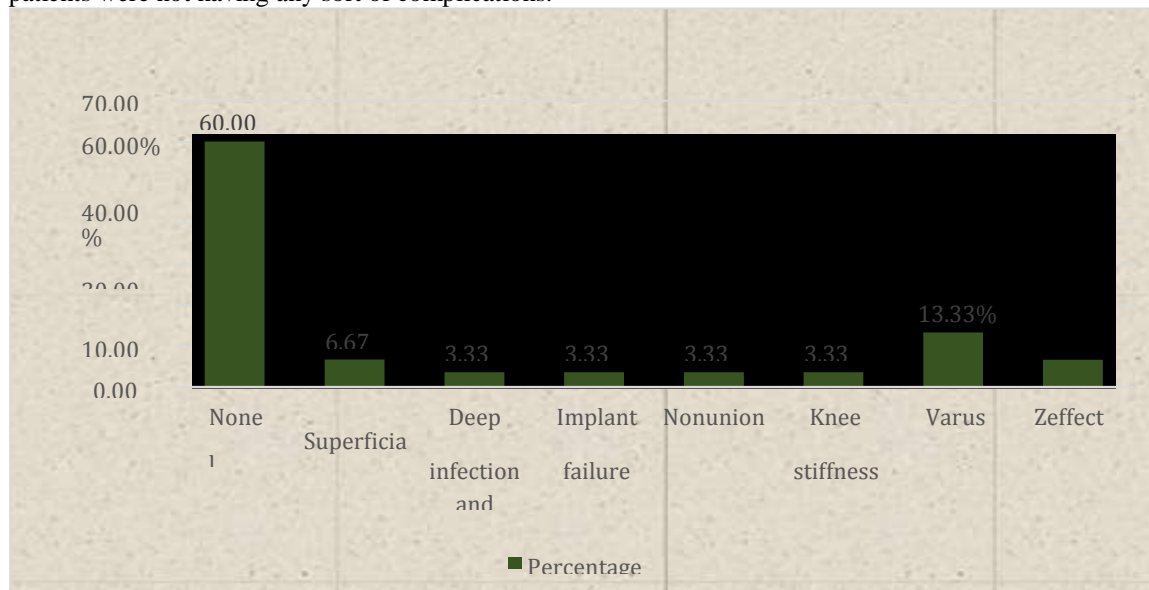
The fracture was reduced anatomically by closed means. If that was not achieved then it was achieved by limited open reduction during surgery.

Blood loss was counted intraoperatively by the number of mops used during the surgery. One mop equal to 50 ml blood loss and 1 gauge piece equal to 10 ml approximately. The average blood loss was 1.4 mops so 71ml (50-150ml). 5 patients required intra operative blood transfusion as their pre-operative hemoglobin was less. 3 required blood transfusion postoperatively.

The fracture was reduced anatomically by closed means. If that was not achieved then it was achieved by limited open reduction during surgery. 29 (96.7%) patients were managed with closed reduction and 1 (3.3%) patient, it was achieved through open reduction. 20 (66.7%) patients had a hospital stay less than or equal to 5 days, 6 (20.0%) patients had hospital stay between 6-7 days and 4 (13.3%) patients had stay of more than 7 days. The mean hospital stay was  $6.03 \pm 3.13$  days, with a range from 2 days to 13 days.

The majority of the patients were discharged within 5 days of hospitalization

Union time was calculated radiologically on serial follow up x-rays of the patient. The follow-up x-rays were taken at 6 weeks, 3 months, 6 months and 1 year. 4 (13.3%) patients achieved fracture union in <10 weeks, 22 (73.4%) patients in 10-15 weeks, and rest 4 (13.3%) patients achieved in more than 15 weeks. The most common complication encountered was Varus collapse and shortening seen in 4 (13.33%) patients, superficial wound infection in 2 patients (6.67%); Varus collapse and shortening and Z effect and screw revision was seen in 2 (6.67%) while Deep infection and secondary ‘Z’ effect, Implant failure, Non-union, Knee stiffness in 1 patient each. The vast majority of the patients were not having any sort of complications.

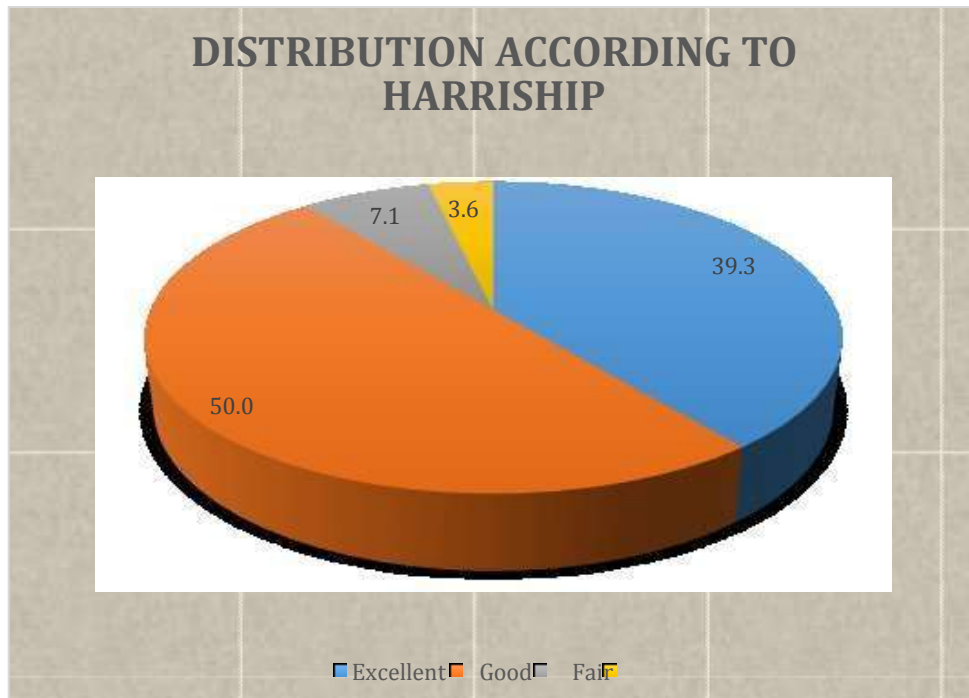


Graph 3:- Bar diagram showing distribution according to complications.

Of the 30 patients included in the study, 2 (6.7%) patients died and 28 (93.3%) patients survived. Majority of the patients survived. Of the two patients who expired, 1 died due to chronic illness and other died due to Covid-19 infection. Both the deaths were not related to the trauma.

The further analysis was carried out on the patients who survived (N=28). 2 patients had expired during the study period, so were excluded from the analysis.

Of the 28 patients who followed-up till 12 months, 11 (39.3%) patients had excellent outcome at 12 months, 14 (50.0%) patients had good outcome, 2 (7.1%) patients had fair outcome and 1 (3.6%) patient had poor outcome. Majority of the patients i.e. 25 (89.3%) patients had good to excellent outcome according to Harris Hip Score



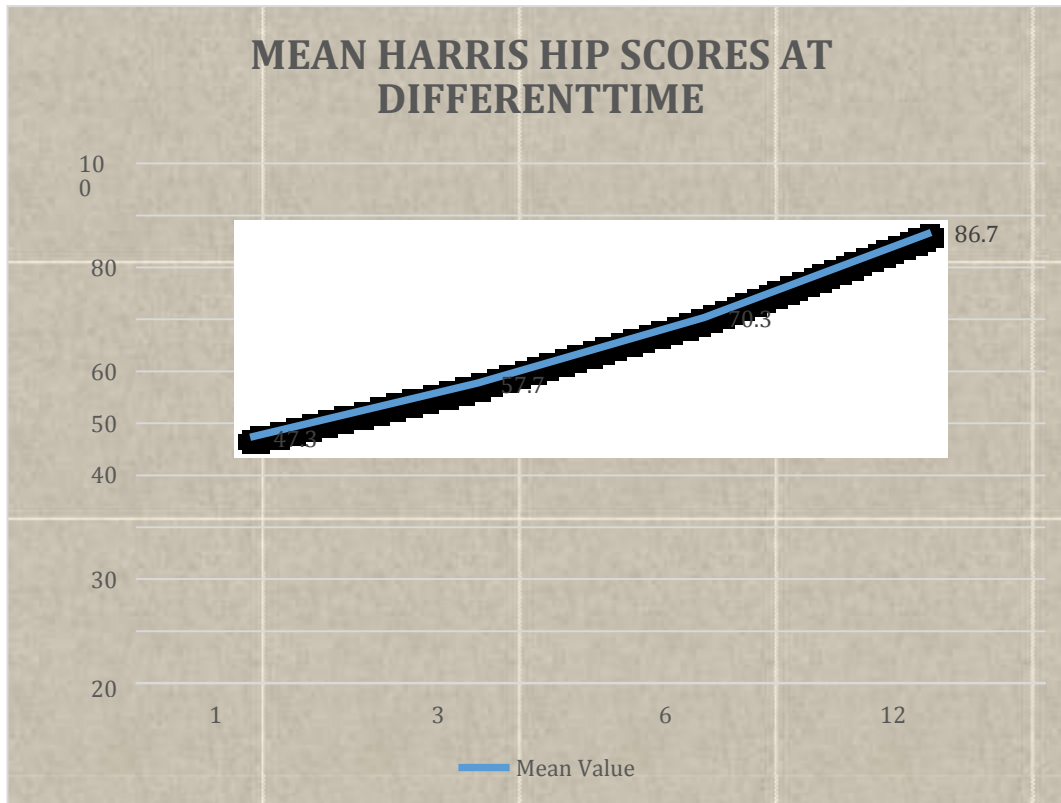
**Graph 4:-** Pie diagram showing distribution of patients according to Harris Hip Score at 12 months

The mean Harris Hip Score at 1 month was  $47.32 \pm 8.06$  and at 3 months it was  $57.75 \pm 7.74$ . The difference was found to be statistically significant ( $p=0.001$ ), showing as insignificantly improved Harris Hip Score at 3 months in comparison to 1-month score.

The mean Harris Hip Score at 3 months was  $57.75 \pm 7.74$  and at 6 months it was  $70.39 \pm 7.95$ . The difference was found to be statistically significant ( $p=0.001$ ), showing as insignificantly improved Harris Hip Score at 6 months in comparison to 3 months score.

The mean Harris Hip Score at 6 months was  $70.39 \pm 7.95$  and at 12 months it was  $86.75 \pm 4.45$ . The difference was found to be statistically significant ( $p=0.001$ ), showing a significantly improved Harris Hip Score at 12 months in comparison to 6 months score.

There was a persistent statistically significant improvement in the mean Harris Hip Score at 3 months, 6 months and 12 months ( $p<0.05$ ).

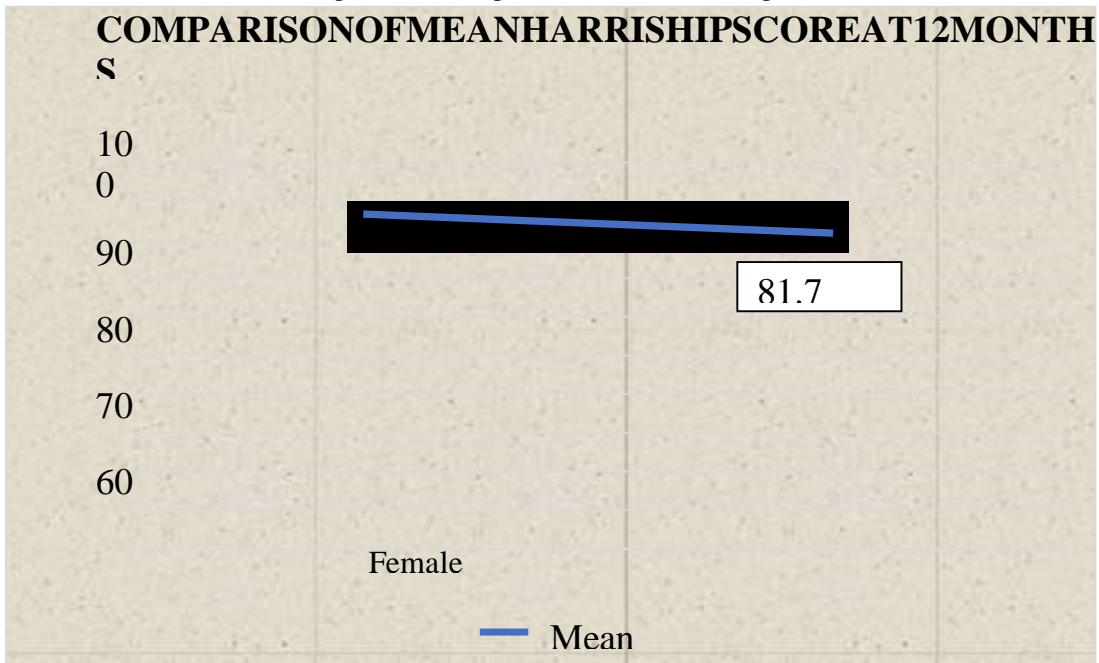


**Graph 5:-** Line diagram showing mean Harris Hip Scores at different time intervals

**Unpaired ‘t’ test applied. P-value < 0.05 was taken as statistically significant**

The mean Harris Hip Score in females was  $86.67 \pm 4.68$  and in males was  $81.78 \pm 18.59$ . The difference was found to be statistically not significant ( $p=0.383$ ), showing that the mean Harris Hip Score at 12 months is comparable between males and females.

We can conclude that the Harris Hip Score is independent of the sex of the patients.



**Graph 6:-** Line diagram showing the comparison of the mean Harris Hip Score.



**Conclusion:-**

Intramedullary nailing with the TFN has distinct advantages over other management options like shorter operating time and lesser blood loss for intertrochanteric fractures

Early mobilization and weight bearing are allowed in patients treated with TFN there by decreasing the incidence of bed sores, uremia, and hypostatic pneumonia. For favorable outcomes, good preoperative planning with intraoperative reduction and sound surgical technique is vital and cannot be emphasized more. TFN is a momentous advancement in the treatment of intertrochanteric fractures which have the unique advantage of closed reduction, preservation of fracture hematoma, less tissue damage during surgery, early rehabilitation, and early return to work.

Osteo synthesis using a TFN, used introchanteric fractures, resulted in low rates of clinical complications, excellent stabilization, few mechanical complications, and adequate functional results. Thus, the treatment of intertrochanteric fractures with TFN had a more favorable outcome and it is the ideal implant of choice for intertrochanteric fractures at present.

**References:-**

1. Abrahamsen B, van Staa T, Ariely R, et al. Excess mortality following hip fracture: A systematic epidemiological review. *Osteoporos Int.* 2009;20(10):1633–1650.
2. Ahrengart L, Törnkvist H, Fornander P, et al. A randomized study of the compression hip screw and Gamma nail in 426 fractures. *Clin Orthop Relat Res.* 2002;401:209–222.
3. Cummings SR, Nevitt MC.: —A Hypothesis: The Causes of Hip Fractures||; *J Gerontol* 1989;44:107-111.
4. T.Lindner, NKKanakaris, BMarx, Acockbain. —Fracture of the hip and osteoporosis|| *Journal of bone and joint surgery*, 2009;91- B:294-303.
5. Dhiraj VS. Evans – classification of intertrochanteric fractures and their clinical importance. *Trauma International* 2015;1(1):7-11.
6. Tronzo RG. Use of extramedullary guide pin for fractures of the upper end of the femur. *Orthop Clin North Am* 1974;5(3):525-7.
7. Koval KJ, Aharonoff GB, Rokito AS, Lyon T, Zuckerman JD. Patients with femoral neck and intertrochanteric fractures. Are they the same? *Clinical orthopaedics and related research.* 1996; (330):166-72.
8. Bucholz RWH, James D, Court-Brown, Charles M. Tornetta, Paul. *Rockwood and Green's Fractures in Adults, 7th Edition.* Russell ITA, editor. Philadelphia.
9. Windoff J, Hollander DA, Hakimi M, Linhart W (2005) Pitfalls and complications in the use of Trochanteric Fixation nail. *Langenbecks Arch Surg* 390(1):59–65, Feb Epub 2004 Apr 15.
10. Brammar TJ, Kendrew J, Khan RJ, Parker MJ (2005) Reverse obliquity and transverse fractures of the trochanteric region of the femur; a review of 101 cases. *Injury* 36(7):851-857.
11. Herman A, Landau Y, Hazanov A, Segev T, Thein R, et al. (2013) Differences in Survival Rates between Different Patterns of Unstable Pertrochanteric Femoral Fractures. *OJO* 3(6):261-268.
12. Karn NK, Ashish Jain, Nepal P et al. A prospective randomized control trial comparing Trochanteric Fixation nail and sliding hip screw in the management of trochanteric fracture of the femur. *Health Renaissance*, January-April 2011; Vol 9 (No.1). 7-11.
13. Pajarinen J, Lindahl J, Savolainen V, Michelsson O, Hirvensalo E. Femoral shaft medialisation and neck-shaft angle in unstable pertrochanteric femoral fractures. *Int Orthop* 2004;28:347–53.
14. Dousa P, et al. Osteosynthesis of trochanteric fractures using TFN. *Acta Chir Orthop Traumatol Cech* 2002;69(1):22-30.
15. Review paper by Kenneth. J. koval on IMN of proximal femur (A supplement to American journal of orthopaedics april 2007).
16. Egol KA, Chang EY, Cvitkovic J, Kummer FJ, Koval KJ. Mismatch of current IMN with the anterior bow of femur. *J Orthop trauma* 2004;18(7):410-415.
17. The —Z-Effect|| Phenomenon Defined: A Laboratory Study Eric J. Strauss, 1 Frederick J. Kummer, 1 Kenneth J. Koval, 2 Kenneth A. Egol (journal of orthopaedic research 2007 doi:10.1002/jor).
18. Werner-Tutschku W, Lajtai G, Schmiedhuber G, Lang T, Pirkl C, Orthner E. Intra- and perioperative complications in the stabilization of per- and subtrochanteric femoral fractures by means of TFN. *Unfallchirurg.* 2002;105(10):881-5.
19. Dr. Justin Moses, Dr. Kalyan Deepak Sreenivas. A prospective study on outcomes of stainless steel proximal femoral nail for unstable intertrochanteric fractures in rural population. *International Journal of Orthopaedics Sciences* 2020; 6(1):379-382.

20. J. Li 1, L. Cheng1, J. Jing. The Asia proximal femoral nail antirotationversusthe standard proximal femoral antirotation nail for unstable intertrochanteric fractures in elderly Chinese patients. *Orthopaedics&Traumatology:Surgery&Research*101(2015)143– 146.
21. ChristianBoldin,FranzJSeibert,FlorianFankhauser,GeroifPeicha, WolfgangGrechenig and Rudolf Szyszkowitz. "The Trochanteric Fixation nail (TFN) - a minimal invasive treatment of unstable proximalfemoralfracturesAprospectivestudyof55patientswitha follow-up of 15 months *Acta OrthopScand*2003;74(1):53-58.