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Original research article

A comparative study to evaluate clinical outcome in patients of age above 50 years with intertrochanteric fractures of femur treated with either by PFN (proximal femoral nail) or DHS (dynamic hip screw)

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Abstract

Introduction: Intertrochanteric fractures are the most common, especially in elderly people with osteoporotic bones. They typically occur as a result of low-energy trauma, such as a simple fall. There is a bimodal age distribution for hip fractures. Only 3% of patients under the age of 50 years, while 97% of patients over 50 years of age. The goal of this study is to compare PFN and DHS outcomes and complications when treating patients with unstable intertrochanteric fractures.

Methods and Methodology: This study consists of 30 cases of intertrochanteric fractures of femur that met the inclusion exclusion criteria, which randomly divided into group A and group B.

Results: Anatomical results were assessed by the presence or absence of shortening, the range of movements and deformities.73.33% of these cases had good results in PFN series as compared to 66.66% in DHS series. Functional results were assessed in the 30 cases based on modified harris hip scoring system. These constituted of 15 cases in PFN series and 15 cases in DHS series. In PFN Series, results were excellent results in 11 cases, good in 4 cases. In DHS Series, results were excellent in 7 cases, good in 6 cases and poor in 2 cases.

Conclusion: In the light of these results, one can conclude that the proximal femoral nail, despite a few unfavorable results and complications, it is a satisfactory method of treatment in intertrochanteric fractures, with Comminution and instability. Results with intramedullary devices have been very good with union ratesupto 100% compared with other extra medullary devices which show union upto 80% only. The nail in the medullary canal provides a physical block to a significant shortening of the head and neck segments in the fractures.

Keywords: Intertrochanteric Fractures of Femur, Proximal Femoral Nail, Dynamic Hip Screw

Introduction

Intertrochanteric fractures are the most common, especially in elderly people with osteoporotic bones. They typically occur as a result of low-energy trauma, such as a simple fall [1]. There is a bimodal age distribution for hip fractures. Only 3% of patients under the age of 50 years, while 97% of patients over 50 years of age. The majority of hip fractures in this younger group are subtrochanteric or basicervical, and they typically affect men between the ages of 20 and 40 as a result of high- energy trauma from sports, industrial, and motor vehicle accidents. The majority of elderly hip fractures unstable intertrochanteric fractures [2].

Any intertrochanteric fracture treatment aims to restore the patient's preoperative status while minimizing the risk of medical complications and technical failure, restoring mobility and preventing complications from immobilization and prolonged bed rest. Since then, both extramedullary and intramedullary implants of various kinds have been utilized [3, 4].

The goal of this study is to compare PFN and DHS outcomes and complications while treating patients with unstable intertrochanteric fractures.

Materials and Methods

This study consists of 30 cases of intertrochanteric fractures of femur that met the inclusion and exclusion criteria, admitted to GOVERNMENT GENERAL HOSPITAL, KURNOOL between October

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2020 to October 2022. 30 of the patients were assigned to groups A and B using computer-generated random numbers.
After these femur fractures were surgically treated with a Dynamic Hip Screw or Proximal Femoral Nailing, this study was carried out for the purpose of clinical observation and analysis of the outcomes.

Inclusion criteria

- All adult patients with intertrochanteric fractures of Grades 3 and 4 (Boyd and Griffin Classification).
- Patients who are healthy enough to undergo surgery.
- Fractures within two weeks old.
- Patients over age of 50 years.

Exclusion Criteria

- Less than 50 years of age.
- Grades 1 and 2 (Boyd and Griffin Classification).
- Patients with pathological or compound fractures.
- Segmental fractures.
- People who were unable to give their consent.
- People who have bone metabolism problems like Paget's disease, renal osteodystrophy, or osteomalacia. (not osteoporosis).
- Medically unfit for surgery.

Results of the Surgery

The anatomical results were either good or bad.

- A good result had a good range of hip movements, no deformity, and < 1 cm shortening.
- A poor outcome had a shortening of more than l cm, a fixed deformity, and limited hip movement.

Results

Anatomical results

Anatomical results were assessed by the presence or absence of shortening, the range of movements and deformities.73.33% of these cases had good results in PFN series as compared to 66.66% in DHS series.

Table 1a: Anatomical results PFN SERIES and

	No. of cases	Percentage
Good	12	80%
Poor	3	20%

Table 1b: DHS series

	No. of cases	Percentage
Good	10	66.66%
Poor	5	33.33%

Table 2: Cross table and p-value for Anatomical results

	DHS	PFN	Total
Count good percentage within group	1173.33%	1066.66%	2170%
Count poor percentage within group	426.66%	533.33%	930%
Count within group	15100%	15100%	30100%

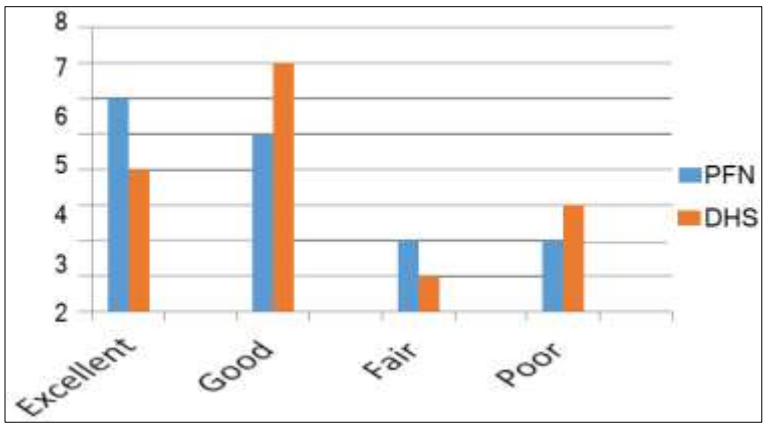

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Fig 1: Graph showing anatomical results (no. of patients)

Functional results

Functional results were assessed in the 30 cases based on modified harris hip scoring system. These constituted of 15 cases in PFN series and 15 cases in DHS series. In PFN Series, results were excellent results in 11 cases, good in 4 cases. In DHS Series, results were excellent in 7 cases, good in 6 cases and poor in 2 cases.

Table 3a: Functional results PFN SERIES

	No. of cases	Percentage
Excellent	11	73.33%
Good	4	26.67%

Table 3b: DHS SERIES

	No. of cases	Percentage
Excellent	7	46.67%
Good	6	40%
Poor	2	13.33%

Table4: Cross tabulation for functional results

	PFN	DHS	TOTAL
Excellent count%within group	11	7	18
	73.33%	46.67%	33.33%
Good count% within group	4	6	10
	26.67%	40%	40%
Poor count% within group	0	2	2
	13.33%	13.33%	16.66%
Total count% within group	15	15	30
	100%	100%	100%

Table 5: Symmetric measures

	Value	Approx. Sig.
Nominal by Nominal contingency Coefficient	0.221	0.0481
N of valid cases	30	

Discussion

The goal of our study was to compare the functional outcome of a patients treated with pfn and dhs Our study has 30 patients with intertrochanteric fractures out of which 15 was treated with DHS and 15 with PFN. All the patients are selected randomly who was admitted to KURNOOL GOVERNMENT HOSPITAL with Intertrochanteric fractures from October 2020 to October 2022.

Age distribution

In our study, the age group of the patients was ranged from 50 to 80 years with an average age of 64.4 years. The main cause for the fracture that occurred in the very old population is due to the trivial fall.

White and colleagues5did a study on the rate of mortality for elderly patients after fracture of the hip in the 1980s and they concluded that the average age for trochanteric fractures is 75.4years. Our study has an average age for fractures was 63 years which was nearly correlated to White and his colleagues5 Average age group reported in various other western series were as follows.

Sex Distribution

In our study, there were 17 males and 13 females showing male preponderance. Sex distribution in our study correlates with that of other studies.

Table 6: The ratio of males: females in other series are given below

Series	Males	Females
Boyd and Griffin (1949)	74	226
Murray and Frew 1949	56	46
Scott(1951)	35	65
Robey1956	46	53
Clawson 1957	75	102

In this series 17 patients were male and13 patients were females.

In western countries, women suffering from osteoporosis far outnumber men, and this is largely thought to be due to the effects of the menopause [6].

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The men: women ratio may be distorted in India because men are more likely to be brought for hospital care [7]. And engaged in activities like agriculture, driving of motor vehicles and are more likely to be involved or prone to accidents/ fall. Females play a more dormant role and are involved more in household activities.

Mode of Injury

The most common mode of injury in our study was fall on the side or a trivial fall which was noted in 20 cases, and the History of RTA noted in 8 cases and history of fall from height was in 2 cases.

Most of the fractures that occurred in the younger age group of patients(less than 60 years) due to the fall from a height or else a road traffic accident, which reflects high-velocity trauma to cause a fracture in younger age group. Keneth J. Kovaland Joseph D. Zuckerman [8] (1996) observed that 90% of hip fractures in the elderly result from a simple fall.

The side of the fracture

We have studied 30 cases of different types of intertrochanteric fractures in our present study. Amongst the15 cases operated by PFN, 6 patients were found to have proximal femoral fractures on the left side while 9 patients were having a fracture on the right side. Amongst the 15 cases operated by DHS, 5 patients were found to have proximal femoral fractures on the left side while 10 patients were having a fracture on the right side.

Fracture Pattern

According to BOYD'S and GRIFFIN'S classification5in our series intertrochanteric grade 3 fractures having 16 cases and grade 4 Fractures having 14 cases. Comminuted fractures require difficulty in reduction. Difficulty in reduction was noted in 4 out of 16 cases of grade 3 and 7 out of 14 cases of grade 4 intertrochanteric fractures.

Duration of Surgery

In the DHS group, the duration of surgery ranged from100 minutes to 130minutes with a mean of 120 minutes. In the PFN group, the duration of surgery ranged from 90 minutes to 120 minutes with a mean of 100 minutes. In both groups, the difference in the operative times was found to be highly significant. Baumgartner *et al*. [9] also found that the surgical times were 10 percent higher in the DHS group in their series

Blood loss

The DHS patients in our study had significantly more intra-operative blood loss (average 356 ml) compared to PFN group (average 216 ml), this is similar to the Series by Baumgaertner and associates9who also found a significant difference in the intra operative blood loss in their series, with 140 ml higher for the DHS group

Fluoroscopy time

The fluoroscopy time in the PFN group (average 90 sec) was significantly higher as compared to that of the DHS group (average 88 sec), this was similar to the series by Baumgaertner and associates [9].

Complication and Outcomes

The PFN AO-ASIF [10] device introduced in early 1997 was designed to reduce the risk of implant related complications. Studies have shown that the screw cut out occurred by varus collapse and concomitant rotation of the femoral head around the neck axis. Therefore in addition to the 8mm load bearing femoral neck screw, the PFN has a 6.5 mm antirotation screw to increase the rotational stability of the neck fragment. An anatomic 6-degree neck valgus bend in the coronal plane, a narrower distal diameter and distal flexibility of the nail minimize the stress concentration and tension in the femoral shaft. This should reduce the risk femoral shaft fractures.

The rate of failure of fixation in our patients lies in the range reported by other authors using other intramedullary nails. Failure of fixation is related to the quality of fracture reduction and positioning of the screws. Open reduction is recommended if closed reduction is not satisfactory.

Some authors have reported that rotational instability of the femoral head-neck fragment (a component of the cut out mechanism) may occur when the screw is not placed centrally in the femoral head. The supero medial quadrant of the femoral head has been identified as a high-risk zone for cutouts. Precise placement of the screw is not always achieved and as much as 21.4% of UN satisfactory positioning of screws has been reported. This problem can be reduced if attention is paid to certain operative techniques. The jig can loosen during maneuvering of the nail in the intramedullary canal. The jig should be tightened again before beginning the screw positioning procedure. The aim of our study was to assess the epidemiology and functional outcomes of peritrochanteric fractures with this newer method of intramedullary fixation with a proximal femoral nail as compared to the proven method of DHS. We

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assessed the results with respect to intraoperative details, postoperative results and functional outcome [2, 3].

In an experimental study, Gotzeetal (1998) compared the load ability of osteosynthesis of unstable intertrochanteric fractures and found that the PFN could bear the highest loads among all the devices.

Menzes *et al* [11] (2005) in a clinical study of 155 consecutive patients treated with a proximal femoral nail, reported the failure of fixation in 2%, femoral shaft fractures in 0.7%. Fixation failures included one cut out, one delayed fracture healing and one lateral displacement of the anti-rotation screw. In our study, there was no case of failure of fixation, 1 case of varus angulation and1 case of lateral cortex fracture.

Friedl *et al* (1994) reported an open reductionin8%ofthe31-A1,13% A2and 52% ofA3 fractures with neck screw cut out rates of upto 10%.While in our study we had an overall 30%(6 out of 20 cases)open reduction due to the complexity of the fracture pattern. Simmermacher *et al* [10] (1999) in a clinical multicenter study reported technical failures of the PFN after poor reduction, malrotation or wrong choice of screws in 5%of cases.

Christian Bold *et al* [12] in his study of 55 patients of proximal femoral fractures with PFN noted 3 cases with Z effect and 2 patients with Reverse Z effect. 2 patients had crew cut out without any relation to the fracture pattern. In our study, there was one case with Z effect. Pavelka *et al* [13] also in his study of 147 patients with proximal femoral fractures treated with PFN noted fracture healing in 95% patients in 6 months, with intraoperative complications like incomplete reduction in 4 cases, fixation in distraction in 2 cases, fracture at the site of distal locking in 2 cases. We had a bony union in 90% of cases in an average of 4 months, with no iatrogenic femoral fractures in our PFN series [14].

Table7: Comparison with other studies

	Boldinetal	Pavelkaetal	Menzesetal	Simmer macheretal	Our study DHS	Our study PFN
Bony union	100%	95%	-%	-%	85%	100%
Delayed union	-%	5%	2%	-%	13.33%	20%
Implant failure	3.6%	4%	0.8%	0.6%	13.33%	0%
Failure of fixation	0%	-%	2%	5%	6.66%	0%
Anatomical reduction	61.8%	95%	80%	86%	78%	92%
Z effect	-	-	-	-	-	6.66%
Non-union	-	-	0.8%	-	-	-

PFN is an novel, modern implant based on the experience of gamma nail

Conclusion

Intertrochanteric fractures of the femur are common in the elderly due to osteoporosis and in young due to high-velocity trauma. As the fracture is more common in the elderly, early reduction and internal fixation increases patient comfort, facilitates nursing care, helps in the early mobilization of the patient and decreases the duration of hospitalization. The anatomical reduction can be achieved by closed manipulation or open methods. As the incidence of Comminution is high, these fractures may require a stable reduction and internal fixation.

Osteosynthesis with PFN offers the advantages of high rotational stability of the head-neck fragment, the possibility of static or dynamic distal locking. Proximal femoral nail has the advantage of collapse at the fracture site and is biomechanically sound.

Because of the increasing occurrence in younger age groups, higher demand is placed on the treating surgeon to restore the near-normal function of the leg. Postoperatively early mobilization can begin as the fixation is rigid and the implant designs are good.

In the light of these results, one can conclude that the proximal femoral nail, despite a few unfavorable results and complications, it is a satisfactory method of treatment in intertrochanteric fractures, with Comminution and instability. The anatomical and functional rates are comparable with that of DHS shorter lever arm created by proximal femoral nailing, which translates to a lower bending moment and a decreased rate of mechanical failure 52. The nails are load sharing implants, whereas extra medullary devices are load bearing.

References

1. Bucholz RW, Heckman JD, Brown CMC. Rockwood and Green‘s -Fractures in Adults, 2, 1827-1844.
2. Kulkarni GS, LimayeR, Kulkarni M. Intertrochanteric Fractures-Current Concept Review Ind. J Orth. 2006;40:16-23.
3. David G, Lavelle. Fractures and dislocations chapter 52 in Campbell S operative Orthopaedics, tenth edition, 3, 2897-2908.
4. The association of age, race, and sex with the location of proximal femoral fractures in elderly BJS. 1993;75(5):752-9.
5. Baumgaertner MR, Curtin SL, Lindskog DM. Intramedullary fixation for the treatment of intertrochanteric hip fractures. Clin Orthop.1998;348:87-94.
6. Lo CW, Paris PW, Holick MF. Indian and Pakistani immigrants have the same capacity as

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Caucasians to produce vitamin D in response to ultraviolet irradiation. Am J Clin. Nutr. 1986;44:683-5.
7. Osteoporosis in Indians N. Malhotra & A. Mithal Indian J Med Res 127; c2008 Mar. p. 263-268.
8. Chauffer, Matthews's, Sonstegard D. Stable fixation of intertrochanteric fractures: A biomechanical evaluation, J Bone Joint Surg. 1974;56A:899.
9. Singh RN, Singh BN. A comparative prospective study of the proximal femoral nail and dynamic hip screw In the treatment of intertrochanteric fracture femur. Journal of Clinical Orthopaedic and Trauma. 2012;3:28-36.
10. Martyn J. Parker a new mobility scores for predicting mortality after hip fracture JBJS. 1993;75(B);797-799.
11. Hardy DCR, Descamps PY, Krallis P. Use of an intramedullary hip screw compared with a compression hip screw with a plate for intertrochanteric femoral fractures, J Bone Joint Surg. 1998;80A:6l8.
12. Philip J. Radford, Maurice need off john k Webb a prospective and randomized comparison of the dynamic hip screw and the gamma locking nail JBJS. 1993;75(B):789-793.
13. Kyle Richard F, Campbell Sara J. Intertrochanteric Fractures, Chapter- 40inMichael W Chapman Operative Orthopaedics, 1, 600-603.
14. Habernek H, Wallner T, Aschauer E, Schmid L. Comparison of Ender's nails, dynamic hip screws, and Gamma nails in the treatment of peritrochanteric femoral fractures, Orthopaedics. 2000;23:121.