

A Comparative Study of Functional Outcome of Dynamic Hip Screw Plating Versus Proximal Femoral Nailing in Intertrochanteric Fractures of Femur in Adults

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Abstract:

Background and Aim: Intertrochanteric fractures are one of the most common and most devastating injuries in the elderly. In young patients, it generally occurs due to high velocity trauma. The incidence of these fractures has increased with the advancing age. Due to improved treatment, early ambulation is possible and better functional outcome is achieved with reduction in morbidity rates. Aim of the present study is to compare the Functional Outcome of Dynamic Hip Screw Plating Versus Proximal Femoral Nailing in Intertrochanteric Fractures of Femur in Adults.

Material and method: We have followed 50 cases of intertrochanteric fractures treated by early surgical fixation with 14 patients treated with dynamic hip screw plating and 36 patients treated with proximal femoral nailing. Functional outcome and complications were compared between both the groups. Functional outcome was assessed using Harris Hip Score.

Result: Most patients were between the age of 60-69 yrs, Tronzo type 3 was the most common type of fracture classification during the whole study. Out of 14 patients operated with dynamic hip screw plating; 57.14%, 21.43%, 14.27% and 7.14% of patients had excellent, good, fair and poor Harris Hip scores. Out of 36 patients treated with proximal femoral nailing; 72.22%, 16.67%, 8.33% and 2.78% of patients had excellent, good, fair and poor Harris Hip scores. Of all these patients, 5 had limb length discrepancy, 1 had lag screw pullout, 4 had infection, 2 had malunion and 2 had delayed union in terms of complications.

Conclusion: No any device is superior over the other in the treatment of intertrochanteric fractures of femur. As the number of patients involved in our study is less, there is larger confidence interval and the results can be biased and skewed. Overall, larger number of randomized control trials that include patient reported outcomes are needed to more accurately compare the outcomes of patient treated with proximal femoral nailing and dynamic hip screw plating.

Keywords: Intertrochanteric Fracture of Femur, Proximal Femur Nail, Dynamic Hip Screw Plate, Tronzo Classification, Functional Outcome, Harris Hip Score.

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Introduction

Intertrochanteric fractures are a major burden to both the individuals and society, leading to disability or even mortality for the elderly patients and cause huge economic cost. Intertrochanteric fractures are very common in the old age group, but infrequent in the younger age group. In intertrochanteric fractures treated conservatively which healed with vicious callus, coxa-vara deformity is frequently observed, resulting in lower limb shortening and limb flaccidity. [1-3]

As the number of elderly people is increasing world-wide, it has been estimated that the number of hip fractures will rise to 2.6 million by 2025, and to 6.25 million in 2050. Trochanteric fractures comprise approximately 50% of the hip fractures and are often caused by a low-energy fall. The trochanteric bone often retains a good vascular supply after fracture, with a high union rate compared to femoral neck fracture.

However, the mortality after trochanteric fractures still ranges from 12 to 41% within the first 6

months. Treatment of intertrochanteric fracture is by both non operative and operative methods. problems in treating this fracture are the instability and fixation complications that will result from the treatment of the intertrochanteric fractures. Stability is the ability of an internally attached fracture to withstand gravity and muscle forces acting around it and cause the fracture to undergo varus displacement. Other contributing factors that might contribute mostly to fixation failure are some intrinsic factors such as the fracture reduction of the fractures and osteoporosis and some extrinsic contributing factors such as implant of choice and insertion technique. [4]

Non operative methods have a high morbidity rate, and are mainly by skeletal traction and derotation boot. Different devices have been used for the fixation of trochanteric femoral fractures with the following two being the most commonly used: dynamic hip screw (DHS) and proximal femoral nail (PFN). DHS, introduced in the 1970s, could provide both the dynamic and static support to stabilize the fracture. However, complications related to screw displacement are not uncommon such as distal extrusion of the screw and secondary fracture displacement. If weight bearing is started early, especially in the compound and comminuted fractures, the device may have a tendency to penetrate or retract through the head. [5,6]

The proximal femoral nailing (PFN) is the intramedullary device that has commonly been reported to have benefited in such fractures because its placement is close to its mechanical-axis of the body and thus it reduces the lever arm aspect on the implant. [7,8] The PFN was developed by the AO/ASIF in 1996 with an intramedullary device conceptualized as a less invasive alternative especially for the treatment of unstable trochanteric and subtrochanteric femoral fractures. Nowadays, PFN device has been used widely in the clinic and provided by different brands with various length, diameter, neck shaft angle, and number of cephalic screws, ability to control rotation and construction materials. Even though PFN has more theoretical benefit than DHS, there is still on-going controversy whether PFN is a better choice than DHS in the literature especially from clinical studies.

Material and Methods

This is a prospective study of 50 cases of intertrochanteric femur fractures treated by early surgical fixation with dynamic hip screw plating and proximal femoral nailing at C.U. Shah Medical College and Hospital, Surendranagar. This study was done between 2022 to 2023. All cases were followed up for 6 months postoperatively.

Surgical technique: For proximal femoral nailing, lateral approach to femur was used, with incision

made about 5cm above the greater trochanter adequate enough to make entry point. Entry point of the nail is the tip of the greater trochanter. Nowadays a modified medial entry point on the tip of greater trochanter is also used. Another incision of 4cm is put about 5 cm distal to the previous incision for the insertion of the proximal screws followed by nick incision for distal screws as necessary.

Whereas for dynamic hip screw plating, lateral approach to the femur is used. The vastus lateralis is elevated off the intermuscular septum with coagulating the branches of profunda femoris. Entry point of the guide pin is mainly 2cm below the vastus lateralis ridge for the 135 degree angle plate. Guide pin is inserted in the femoral head.

Statistical analysis: The recorded data was compiled and entered in a spread sheet computer program (Microsoft Excel 2007) and then exported to data editor page of SPSS version 15 (SPSS Inc., Chicago, Illinois, USA). Quantitative variables were described as means and standard deviations or median and interquartile range based on their distribution. Qualitative variables were presented as count and percentages. For all tests, confidence level and level of significance were set at 95% and 5% respectively.

Results

We had 36 patients treated with proximal femoral nailing and 14 patients with dynamic hip screw plating. There were total 29 females and 21 males in the study, with 22 having left sided and 28 having right sided fractures. The fractures were classified according to the Tronzo classification (Table A). The average operating time had a non-significant association with whether the proximal femoral nail was used or the dynamic hip screw was used even when considered with the Tronzo classification (Table B). Unlike that the amount of blood loss was lesser in the nailing patients when compared with the plating patients (Table C). As the nailing is done through minimally invasive approach, the fluoroscopic exposures were more when compared with dynamic hip screw plating as this is done under direct vision assisted by IITV imaging (Table D). The functional outcome was assessed using Harris Hip score, the criteria of which have been enlisted in the Table E. Total score of 100 was given; with <70 being poor, 70-80 being fair,

80-90 being good and 90-100 being excellent. The comparison of the Harris Hip scores of the patients treated with dynamic hip screw plating and proximal femoral nailing had a non-significant association (Table F). During the whole study, there were a number of complications in patients treated with both the types of implants, which have been enumerated in the Table G.

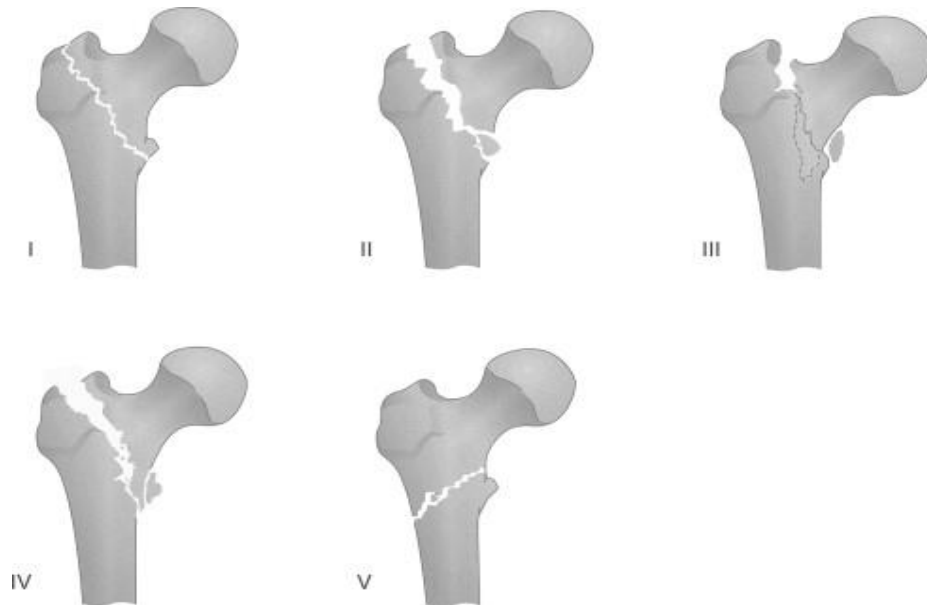


Figure 1: Tronzo classification for intertrochanteric femur fractures

Type 1: Incomplete fracture, Type 2: No posteromedial comminution, lesser trochanter may be fractured, Type3: Posteromedial comminution, the shaft is medially displaced with the neck beak impacted into it Type 3 variant: Type 3 combined with greater trochanter fracture, Type 4: Posteromedial comminution, the shaft is laterally displaced, Type5:Reverseobliquity.

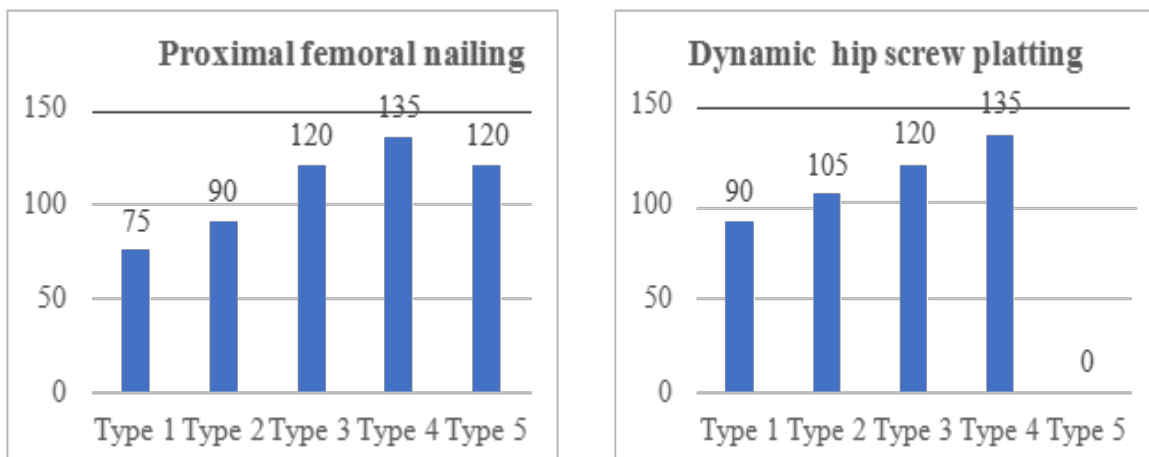


Figure 2: The average operating time for patients treated with proximal femoral nailing and dynamic hip screw plating

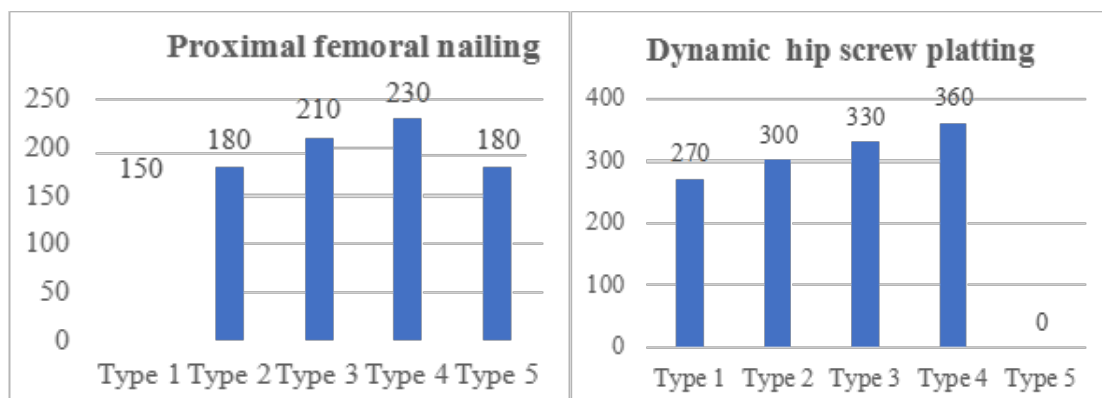


Figure 3: The amount of blood loss in patients of proximal femoral nailing and dynamic hip screw plating

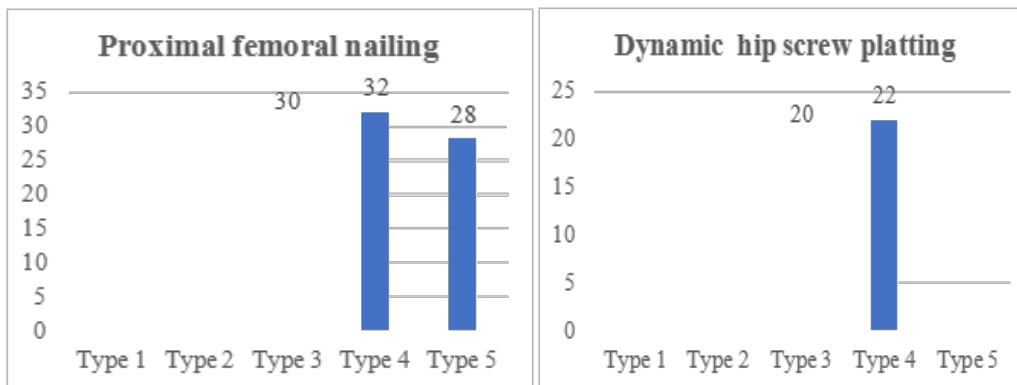


Figure 4: The amount of blood loss in patients of proximal femoral nailing and dynamic hip screw plating: The fluoroscopic exposures in patients of proximal femoral nailing and dynamic hip screw plating

Table 1: Harris hip score

Harris hip score	Grading
Excellent	90-100
Good	80-90
Fair	70-80
Poor	<70

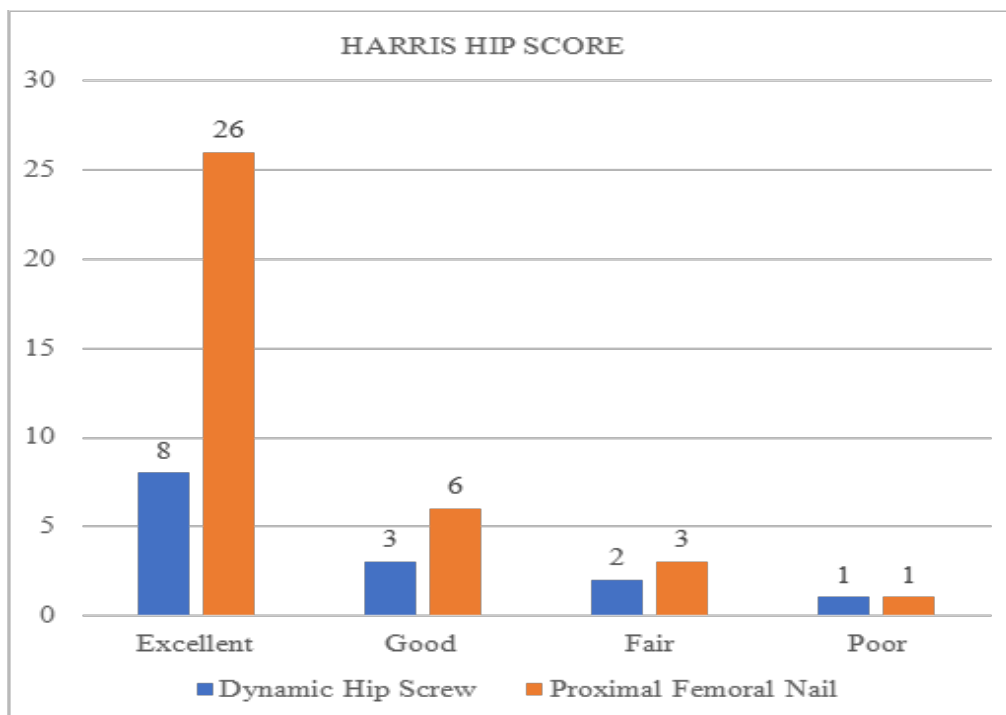


Figure 5: Comparison of Harris hip scores in patients treated with proximal femoral nailing and dynamic hip screw plating

Discussion

Fractures of the intertrochanteric region of the femur have been recognized as a major challenge by the orthopedic community, not just only for achieving fractures union, but for also restoration of optimal function in the least short possible time with very minimal complications. [9,10]Operative/surgical treatment in the form of internal fixation permits very early rehabilitation and offers the best chances of functional recovery,

and hence has become the gold standard treatment of choice for virtually all fractures in the intertrochanteric region. Among the various types of implants available, i.e., fixed nail plate devices, sliding nails or the screw plates, and intramedullary devices, the compression hip-screw is most commonly used (still remains the gold standard) but recently surgical techniques of closed intramedullary nailing have gained very high popularity.

In the 1950s, the management of unstable intertrochanteric fractures was revolutionized by the development of DHS. Dynamic hip screw soon became the implant of choice. This was due to the favorable results and low rate of complications of DHS. DHS provides controlled compression at the fracture site. The use of DHS has been supported by its biomechanical properties which have been assumed to improve the healing of fracture.

Problems with DHS are larger exposure, increased blood loss, excessive collapse with shortening and mechanical failures made it unsuitable for unstable fractures. The common causes of fixation failure are instability, osteoporosis, improper anatomical reduction, failure of the fixation device and

improper placement of the head screw. DHS also needs an intact lateral cortex. In recent years, PFN introduced by the AO/ASIF group in 1998, has gained much popularity for the treatment of trochanteric fractures. The advantage of PFN fixation is that it is a load bearing implant provides a more biomechanically stable construct by reducing the distance between hip joint and implant. Reduced lever arm, less telescoping and prevention of medialization of the shaft are advantages of PFN. [11,12]

Here are Harris hip scores of certain patients in studies done by Kumar et al, Jose et al and Prabhoo et al compared with the present study.

Table 2:

Study	Excellent	Good	Fair	Poor
Kumaretal [13]	35%	55%	7.5%	2.5%
Joseet al [14]	14.29%	37.14%	22.26%	25.71%
Prabhooetal [15]	25%	50%	20%	5%
Present study	57.14%	21.4%	14.28%	7.14%

Dynamic Hip Screw

Table 3:

Study	Excellent	Good	Fair	Poor
Kumaretal [13]	63.3%	30%	6.6%	0
Joseet al [14]	40%	45.71%	2.86%	11.43%
Prabhooetal [15]	35%	60%	5%	0%
Present study	72.22%	16.66%	8.33%	2.77%

Proximal Femoral Nail

Gill et al [16] in his comparative study of 80 patients using the Locking DHS and PFN, noted that in the DHS group, excellent results were seen in six (15%), good results seen in 14 (35.0%), fair results seen in 12 (30.0%), and poor results seen in eight (20.0%).

In the PFN group, excellent results were seen in eight (20.0%), good results seen in 130 (75.0%), fair results seen in two (5.0%), and no poor results were seen. Shakeel et al [17] and Gill et al [16] noted a high incidence of superficial infection in the DHS group which they attributed to the lengthier incision associated with DHS. This is similar to the findings of our study.

Limitations of the study were that long-term complications were not studied, a smaller sample size, factors affecting the outcome were not studied in both groups, e.g., the influence of the surgeon's expertise and the cost of both the procedures were not compared.

Conclusion

No any device is superior over the other in the treatment of intertrochanteric fractures of femur. As the number of patients involved in our study is less, there is larger confidence interval and the

results can be biased and skewed. Overall, larger number of randomized control trials that include patient reported outcomes are needed to more accurately compare the outcomes of patient treated with proximal femoral nailing and dynamic hip screw plating.

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