e-ISSN: 0975-1556, p-ISSN:2820-2643

Available online on www.ijpcr.com

International Journal of Pharmaceutical and Clinical Research 2023; 15(8); 295-301

Original Research Article

A Prospective Study Comparing the Outcome of Dynamic Hip Screw and Proximal Femoral Nail in the Treatment of Intertrochanteric Fractures of Femur

Tarun Solanki[1], Avneet Singh Shishodia[2], Maneesh Kumar Maurya[3]

[1]Consultant, Dept. of Orthopedics, KVR Hospital, Kashipur, Uttarakhand, India
[2]Assistant Professor, Dept. of Orthopedics, Rama Medical College and Hospital, Pilkhuwa, Hapur, Uttar Pradesh, India
[3]Consultant, Dept. of Orthopedics, KVR Hospital, Kashipur, Uttarakhand, India

Received: 20-05-2023 / Revised: 21-06-2023 / Accepted: 25-07-2023
Corresponding author: Dr. Avneet Singh Shishodia
Conflict of interest: Nil

Abstract:

Introduction: Fractures involving upper end of femur through and in between both trochanters with or without extension into upper femoral shaft' are intertrochanteric fractures, according to the definition. It is generally recognised that the risk of intertrochanteric fractures rises with ageing. Intertrochanteric fracture incidence varies from nation to nation. According to Gulberg et al.1, there will be 2.6 million hip fractures worldwide by 2025 and 4.5 million by 2050. Asia accounted for 26% of all hip fractures in 1990, but this percentage is expected to increase to 37% in 2025 and 45% in 2050. Although the cause is unknown, there is hope that the risk of hip fractures has started to decline in some parts of the world. The intramedullary hip screw was thought to be preferable for fixing intertrochanteric fractures for the aforementioned causes. However, there is disagreement over which implant should be used in unstable fractures, with emphasis on old age and osteoporotic bone. Our study was aimed at comparing the Outcome of Dynamic Hip Screw and Proximal Femoral Nail in the Treatment of Intertrochanteric Fractures of Femur.

Methodology: The clinical methodology for the study consists of 92 cases of intertrochanteric fractures of femur that meet the inclusion criteria and exclusion criteria, admitted to between November 2019 and July 2021. Study was started after obtaining institutional ethics committee clearance. Patients over the age of years with closed intertrochanteric fractures lasting less than three weeks and who could walk before the fracture meet the inclusion criteria. Malignancy, neurological, psychiatric, and co-morbid diseases such uncontrolled diabetes, uncontrolled hypertension, hyperthyroidism, and individuals with active hip joint infections are all excluded from the study. The majority of participants (56.52%) in the PFN group achieved good results, according to the results. In the DHS group, 43.48% of the individuals achieved favourable results

Result: In Group DHS, the mean six-week score was 33.42 3.13 and in Group PFN, it was 33.22 2.5. Between the two groups, there wasn't a very noticeable difference in the mean six-week comparison. The mean score throughout the course of 12 weeks in Group DHS was 53.55 2.39 and in Group PFN it was 64.16 5.79. The mean comparison of the two groups after 12 weeks showed a significant difference. The mean score after 24 weeks was 85.26 6.43 out of 100 for Group PFN and 82.3 6.58 out of 100 for Group DHS. The mean 24 weeks comparison between the two groups revealed a sizable difference. Group DHS's mean HHS score was 85.3 7.54 out of 100. The average HHS for the PFN group was 87.26 6.32 out of 100. The mean HHS (/100) comparison between the two groups showed a significant difference.

Introduction

Fractures involving upper end of femur through and in between both trochanters with or without extension into upper femoral shaft' are intertrochanteric fractures, according to the definition. It is generally recognised that the risk of intertrochanteric fractures rises with ageing. Intertrochanteric fracture incidence varies from nation to nation. According to Gulberg et al.[1], there will be 2.6 million hip fractures worldwide by 2025 and 4.5 million by 2050. Asia accounted for 26% of all hip fractures in 1990, but this percentage is expected to increase to 37% in 2025 and 45% in 2050.[2] Although the cause is unknown, there is hope that the risk of hip fractures has started to decline in some parts of the world.

From 1997 to 2006, the frequency of hip fractures in Denmark decreased by roughly 20%. According

to Hagino et al., the lifetime risk of hip fracture for people 50 years of age and older was 5.6% for males and 20.0% for women.[3] Hip fracture risk is increased 2e7-fold by any medical condition linked to bone loss, such as D.M., hyperparathyroidism, hyperthyroidism, and Cushing's syndrome. Because of the high cost of post-injury care, they are the most often operated-on fracture type, have the highest postoperative death rate of surgically treated fractures, and are now a significant health resource burden. The necessity for a study to better understand intertrochanteric fractures and the best way to fix them has arisen from the fact that more patients who were previously treated conservatively and who are now candidates for surgery. Operative and nonoperative treatments are available for intertrochanteric fractures.

When operative technique was not sufficiently advanced to perform stable fixation in the early 19th century, nonoperative methods were the treatment of choice. Only nonambulatory or chronic dementia patients with pain that can be managed with analgesics and rest, terminal illnesses with a prognosis of less than six weeks, unresolved medical comorbidities that preclude surgical treatment, active infectious diseases that themselves are contraindicated for implant placement, and incomplete pertrochanteric fractures identified by MRI should be given nonoperative treatment consideration. Within the parameters of pain tolerance, nonoperative treatment options include early mobilisation and reduction via traction.

The rate of complications with the cautious approach is significant. The high mortality rate is mostly attributed to the widespread issues of protracted immobility, decubitus ulcers, urinary tract infections, joint contractures, pneumonia, and thromboembolism. Poor function is caused by the higher prevalence of varus deformity and shortening.

Since the introduction of intramedullary devices with various modifications and fixed nail plates and dynamic hip screws, the surgical management of intertrochanteric fractures has changed. The intramedullary devices have the following notable benefits:

1. The implant itself acts as a brace to prevent the proximal piece from lateral translation.
2. The implant is more capable of withstanding the binding forces thanks to the intramedullary placement of the junction between the nail and lag screw.
3. The intramedullary device has a shorter lever arm and a smaller distance between the weight-bearing axis and the implant.
4. A load-sharing device inserted into the medullary canal carries the bending stress that is supplied to the intramedullary nail and resists it by making contact with the medullary canal.
5. A fixation technique that is more biological is the intramedullary hip screw. The intramedullary hip screw was thought to be preferable for fixing intertrochanteric fractures for the aforementioned causes. However, there is disagreement over which implant should be used in unstable fractures, with emphasis on old age and osteoporotic bone. Our study was aimed at comparing the Outcome of Dynamic Hip Screw and Proximal Femoral Nail in the Treatment of Intertrochanteric Fractures of Femur.

Methods

The clinical methodology for the study consists of 92 cases of intertrochanteric fractures of femur that meet the inclusion criteria and exclusion criteria, admitted to _____ between November 2019 and July 2021. Study was started after obtaining institutional ethics committee clearance. Patients over the age of years with closed intertrochanteric fractures lasting less than three weeks and who could walk before the fracture meet the inclusion criteria. Malignancy, neurological, psychiatric, and co-morbid diseases such uncontrolled diabetes, uncontrolled hypertension, hyperthyroidism, and individuals with active hip joint infections are all excluded from the study.After the patient was admitted, a thorough patient examination and detailed history were obtained. In AP view, radiographs of the patient's pelvis with both hip joints were taken.Clinical and radiological examinations were used to confirm the patient's diagnosis. Then, either skeletal or skin traction was used as static traction. According to the proforma, the patient's necessary information was recorded. After receiving written informed consent about the nature and potential complications of the surgery, patients were taken in for surgery. Based on straightforward randomization, the patients were divided into DHS and PFN groups. Third-generation cephalosporins were prophylactically started in all patients (inj ceftriaxone 1 g IV, 30 minutes to an hour before surgery). All patients received oral antibiotics until the sutures were removed after receiving intravenous cephalosporins for five days as postoperative antibiotics. Starting on the second or third postoperative day, static quadriceps strengthening activities were performed. When the third postoperative day came around, the drain, if used, was later taken out. Ten to fourteen days later, the sutures were taken out. As soon as the localised discomfort or overall patient status allowed, the patients were mobilised without assistance. Six weeks following the clinical and radiological examination, partial support was initiated, and 12 weeks after the assessment, full support was carried out. and contacted again six

months later for the last check-up and Harris hip score (HHS) evaluation.

The final result is based on the HHS, which includes areas like pain, a function of the joint, absence/presence of deformity, and range of movements. The pain domain measures pain severity and its effect on activities and needs for pain medication. The function part of the domain consists of daily activities like (staircase use, using public transportation, sitting, tying/managing shoes and socks) and gait (limp, support needed, and walking distance). Deformity takes these factors into accounts such as hip flexion, adduction, internal rotation, and extremity length discrepancy. Range of motion measures hip flexion, abduction movement, adduction, external and internal rotation. The HHS score has a maximum possible value of 100. Range of motion is given 5 points, deformity 4 points, function 47 points, and pain 44 points. Activities of daily life (14 points) and gait (33 points) are the two divisions within a function. The dysfunction decreases as HHS increases. A total score of less than 70 is seen as a poor performance; 70 to 80 is regarded as acceptable; 80 to 90 is good; and 90 to 100 is regarded as superb. With the use of the SPSS 22 version programme (IBM SPSS Statistics, Somers, NY, USA), data were imported into a Microsoft Excel datasheet and analysed. Frequency and proportional representations were used to display categorical data. For testing the importance of qualitative data, the Chi-square test was employed. Mean and standard deviation were used to depict continuous data. The mean difference between two quantitative variables and two qualitative variables, respectively, were determined using the independent t-test as a measure of significance [3-5]. Data visualisation: MS Word and Excel were used to create numerous graph forms, including bar and line diagrams. Following the guidelines of statistical tests, a P-value (probability that the result is true) of 0.05 was deemed statistically significant. Data analysis was done using statistical tools, MS Excel, and SPSS version 22.

Results

Table 1: Sociodemographic data

Characteristics	**DHS group**	**PFN group**
Mean (SD) age	60.9± 11.69	63 ± 14.98
Gender		
Male	18(39.13%)	24(47.83%)
Female	28(60.87%)	22(52.17%)
Side		
Left	24(52.17%)	18(39.13%)
Right	22(47.83%)	28(60.87%)
Mode of Injury		
RTA	2(4.35%)	12(26.09%)
Self-fall	10(21.74%)	34(73.91%)
Others	34(73.91%)	0(0.00%)
Boyd and Griffin classification		
Type1	12(26.09%)	18(39.13%)
Type2	26(56.52%)	16(34.78%)
Type3	4(8.70%)	10(21.74%)
Type4	4(8.70%)	2(4.35%)

DHS = dynamic hip screw; PFN = proximal femoral nail

There was no significant difference in gender distribution between the two groups (Table 1). There was a significant difference in the mode of injury distribution between the In terms of gender distribution, there was no appreciable variation between the two groups. The distribution of damage modes between the two groups differed significantly from one another. The Boyd and Gryphon classification distribution of the two groups did not significantly differ from one another.

Table 2: Mean score comparison between the DHS and PFN group at the six, 12 and 24-week follow up.

		Group			
		DHS		**PFN**	
		Mean	**SD**	**Mean**	**SD**
Mean score	6 week	33.42	3.13	33.22	2.5
	12 week	53.55	2.39	64.16	5.79
	24 week	85.3	7.54	85.26	6.43

DHS = dynamic hip screw; PFN = proximal femoral nail; SD = standard deviation

In Group DHS, the mean six-week score was 33.42 3.13 and in Group PFN, it was 33.22 2.5. Between the two groups, there wasn't a very noticeable difference in the mean six-week comparison. The

mean score throughout the course of 12 weeks in Group DHS was 53.55 2.39 and in Group PFN it was 64.16 5.79. The mean comparison of the two groups after 12 weeks showed a significant difference. The mean score after 24 weeks was 85.26 6.43 out of 100 for Group PFN and 82.3 6.58 out of 100 for Group DHS. The mean 24 weeks comparison between the two groups revealed a sizable difference. Group DHS's mean HHS score was 85.3 7.54 out of 100. The average HHS for the PFN group was 87.26 6.32 out of 100. The mean HHS (/100) comparison between the two groups showed a significant difference (table 2).

Table 3: Mean score comparison between the DHS and PFN group at the six, 12 and 24-week follow up

		Group			
		DHS		PFN	
		f	%	f	%
Result	Excellent	16	34.78%	26	56.52%
	Good	20	43.48%	16	34.78%
	Fair	8	17.39%	4	8.70%
	Poor	2	4.35%	0	0.0%

DHS = dynamic hip screw; PFN = proximal femoral nail; SD = standard deviation

Functional Outcome

The majority of participants (56.52%) in the PFN group achieved good results, according to the results. In the DHS group, 43.48% of the individuals achieved favourable results. Four cases handled by PFN and eight cases handled by DHS both had fair outcomes. Two patients who received DHS treatment exhibited subpar functional results (Figure 1).

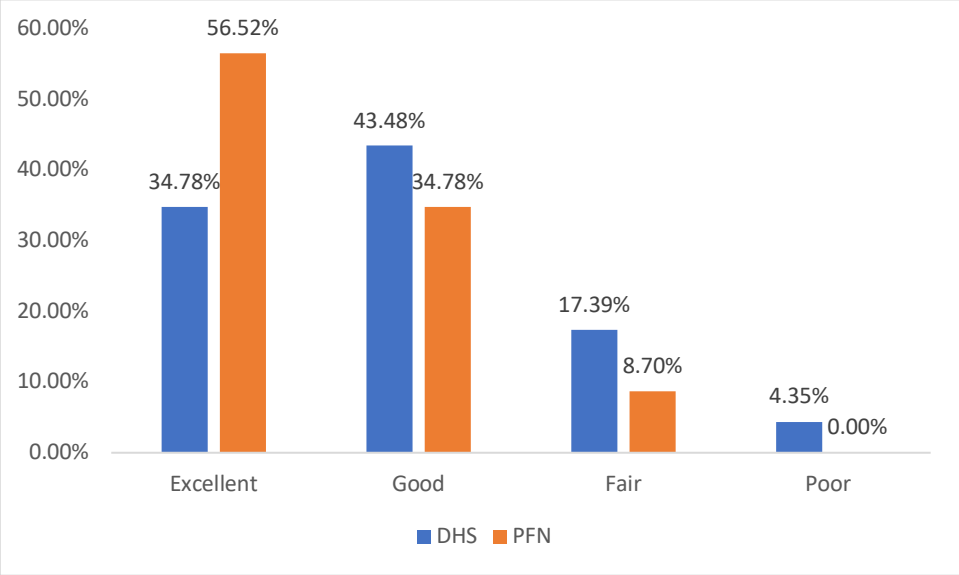

Figure 1: Bar diagram showing the functional outcome of the DHS and the PFN group based on Harris hip score

DHS = dynamic hip screw; PFN = proximal femoral nail radiographs taken before surgery, just after surgery, 12 weeks after surgery, and 24 weeks after surgery in a case fixed with PFN and DHS. In the DHS group, there were four incidences of superficial surgical site infections that responded well to antibiotic treatment based on culture sensitivity. Three individuals who received treatment with shoe raises and gait training for limb length difference of 1-2 cm (four patients in the DHS group and two patients in the PFN group) were identified. In the study, there were no deformities found. In the study, there were no periprosthetic fractures reported.

Discussion

The orthopaedic world has identified fractures of the femur's intertrochanteric zone as a significant issue, not only for achieving fracture union but also for restoring maximal function in the shortest amount of time with the fewest consequences. Accordingly, the goal of fracture management has shifted to very early mobilisation, quick rehabilitation, and quick return of the individuals to pre-morbid home and work-like environment as a functional and psychologically independent unit. Internal fixation is the gold standard treatment of choice for almost all fractures in the intertrochanteric region because it allows for

extremely early rehabilitation and provides the best possibilities for functional recovery. The compression hip-screw is the most widely used (and still the gold standard) among the various types of implants available, including fixed nail plate devices, sliding nails or the screw plates, and intramedullary devices, but recently surgical techniques of closed intramedullary nailing have gained extremely high popularity.

By employing the PFN and the DHS implants and comparing the outcomes in these two groups, this study attempted to assess, evaluate, document, and quantify our performance in the management of such persons.

Profile of subjects in the study

In the study the factors such as age, gender, side of injury, mode of injury, and type of fracture were matched to eliminate selection bias.

Age distribution

The mean age in the current study was 60.9 11.69 for Group DHS and 63 14.98 for Group PFN. This illustrates the prevalence of low-energy trauma in this age group, such as falls (including falls at home). The reason that as people age, the trochanteric area becomes the most typical location for senile osteoporosis. Being a key joint in the weight-bearing mechanism, the hip joint is already vulnerable and cannot withstand any sudden abnormal stress. While unsheathing compact tissue is thinned out and calcar is atrophying, the space between bony trabeculae is enlarged and filled with fat.These patients could regain a full range of motion at a young age with very little productivity loss thanks to the early fixation of such intertrochanteric fractures and early mobilisation. In a research by Amandeep et al. [6] involving 40 patients, the mean age in the DHS group was 60.3, while it was 56.85 in the PFN group. The mean age in the DHS group was 65, whereas the mean age in the PFN group was 70.2 in a research by Kushal et al. [7] involving 52 patients. Statistics from our study are comparable to those from Amandeep et al. [6].

Gender distribution

39.13% of the people in Group DHS were men, and 60.87% were women. Males made up 52.17% and females made up 47.83% of Group PFN. We observed a female prevalence for intertrochanteric fractures as a result. The following explanations for the predominance of women were provided by Cleveland et al. [8]. Females tend to have coxa vara and a slightly broader pelvis. They typically have lower levels of activity and are more vulnerable to senile osteoporosis. Males made approximately 75% of the study group in Pan et al.'s comparative study [9], which they conducted. Shakeel et al.'s [10] analysis of 80 cases revealed that 66% of the research group was made up of men. According to Zhao et al. [11], the male incidence is 40%. Gill et al.'s [12] analysis of 80 cases revealed that only 32% of the study group were men. Our study's findings, which predominately involve women, are similar to those of Gill et al. and Zhao et al. [11].

In Group DHS, 52.17% of participants experienced a left side injury and 47.83% a right side injury. Injury was present in Group PFN in 39.13% of cases on the left side and 60.87% of cases on the right.

Road traffic accidents (RTAs) accounted for 4.35% of injuries in Group DHS, self-falls for 21.74%, and trivial falls for 73.91%. RTA was the mode of injury in 26.09% and self-fall in 73.91% of Group PFN cases. The following elements, as listed by Cummings and Nevitt in 1994 [13], are responsible for this. inability to reduce fall energy below a specific critical threshold due to insufficient shielding reflexes. inadequate local shock absorbers, such as hip-area muscle and fat. inadequate hip bone density brought on by osteoporosis or osteomalacia. Young patients with intertrochanteric or subtrochanteric fractures have typically been injured in car accidents or by falling from a height, demonstrating the necessity of high-velocity trauma to cause fractures in young people. According to Keneth J. Koval and Joseph D. Zuckerman, falls account for 90% of hip fractures in elderly persons. Young individuals frequently get hip fractures as a result of high-energy trauma, such as car accidents or high-speed falls. Mundla et al.'s research of 30 cases found that 23% of cases were caused by RTA, whereas 70% of cases were the result of trivial falls. In a study of 30 instances, Jonnes et al. [15] found that RTA was responsible for 23% of cases, while trivial falls were responsible for 77% of cases. According to Gill et al. [12]'s study of 80 patients, minor falls were the cause of 66% of the cases, while RTA was the cause of the remaining instances.

Type of fracture

Based on the classification created by Boyd and Gryphon, we have categorised intertrochanteric fracture. Group DHS contained 26.09% with Type-1, 56.52% with Type-2, 8.70% with Type-3, and 8.70% with Type-4. Group PFN contained 39.13% Type-1, 34.78% Type-2, 21.74% Type-3, and 4.35% Type-4 individuals. Intertrochanteric fractures are classified as either stable or unstable by Windolf et al. [16] based on the health of the posteromedial cortex. When the posteromedial cortex is intact, a fracture is deemed stable; when the posteromedial cortex is lost, a fracture is deemed unstable. The lesser trochanter makes up the majority of the posteromedial cortex.

In Group DHS, the mean six-week score was 33.42 3.13 and in Group PFN, it was 33.22 2.5. Between

the two groups, there wasn't a very noticeable difference in the mean six-week comparison. The mean score throughout the course of 12 weeks in Group DHS was 53.55 2.39 and in Group PFN it was 64.16 5.79. The mean comparison of the two groups after 12 weeks showed a significant difference. The mean score after 24 weeks was 85.26 6.43 out of 100 for Group PFN and 82.3 6.58 out of 100 for Group DHS. The mean comparison of the two groups after 12 weeks showed a significant difference. The mean score after 24 weeks was 85.26 6.43 out of 100 for Group PFN and 82.3 6.58 out of 100 for Group DHS. The mean 24 weeks comparison between the two groups revealed a sizable difference. The mean HHS in the DHS group in a research by Amandeep et al. [16] was 83.75, and the mean HHS in the PFN group was 84.4. Shakeel et al.'s study of 80 cases indicated that the mean HHS in the DHS group was 73.73 whereas the mean HHS in the PFN group was 83.5. In a study of 60 patients conducted by Sharma et al. [17], the mean HHS in the DHS group was 88.7, and that in the PFN group was 82.2 (Table 5).

Functional outcome

Results in Group DHS were excellent in 34.78% cases, fair in 17.39%, good in 43.48% cases, and bad in 4.35% cases. Results in Group PFN were outstanding in 56.52%, fair in 8.70%, and good in 34.78%. The HHS system determined that both implants, PFN and DHS, had good and nearly identical ranges of motion. Flexion, extension, exterior and internal rotation ranges were generally good, with a few exceptions showing superb ranges. Fair results were quite rare. The fair outcome was attributed to additional contributing circumstances, including the lengthy time between the trauma and surgery as well as the emergence of postoperative infection. In their study of 52 patients, Kushal et al. [7] reported that the DHS group had great results in six cases (23%), good results in five cases (19%), fair results in 13 cases (50%), and bad results in two cases (8%). Fourteen percent of the PFN group had great outcomes, fourteen percent had good results, seven percent had medium results, and one percent had bad results.

In a study including 30 patients, Harish et al. [18] found that the DHS group had no terrible outcomes, six (50%), two (13.33%) good results, two (13.33%) fair results, and no results at all. In the PFN group, eight (72.73%) had excellent results, one (9.1%) had good results, one (9.1%) had fair results, and none had bad results (Table 6).

In their comparison research of 80 patients using the Locking DHS and PFN, Gill et al. [12] found that outstanding outcomes were seen in six (15%), good results in fourteen (35.0%), fair results in twelve (30.0%), and poor results in eight (20%) patients in the DHS group. In the PFN group, eight (20.0%) had excellent results, 130 (75.0%) had good results, two (5.0%) had fair results, and none had bad results (Table 7).

Two incidences of superficial surgical site infections were observed in the current study in both groups, and it is possible that the DHS group's two cases were caused by the longer incision's exposure to open microorganisms during surgery. In the DHS group, there was a significant prevalence of superficial infection, which Shakeel et al. [11] and Gill et al. [12] attributed to the DHS's longer incision. This agrees with the results of our investigation. Three patients (two in the DHS group and one in the PFN group) had limb length discrepancies of 1-2 cm, which is also consistent with the research done by Amandeep et al[6].

References

1. Pajarinen J, Lindahl J, Michelsson O, Savolainen V, Hirvensalo E: Pertrochanteric femoral fractures treated with a dynamic hip screw or a proximal femoral nail. A randomised study comparing post-operative rehabilitation. J Bone Joint Surg Br. 2005; 87:76-81.
2. Kaufer H, Matthews LS, Sonstegard D: Stable fixation of intertrochanteric fractures. J Bone Joint Surg Am. 1974; 56:899-907.
3. Gao H, Bai X, Chen W, et al.: Clinical and functional comparison of dynamic hip screws and intramedullary nails for treating proximal femur metastases in older individuals. Chin J Cancer Res. 2020; 32:395-402.
4. Dakhale GN, Hiware SK, Shinde AT, Mahatme MS: Basic biostatistics for post-graduate students. Indian J Pharmacol. 2012; 44:435-42.
5. Sunder Rao PSS, Richard J: An Introduction to biostatistics. A Manual for Students in Health Sciences. Prentice hall of India, New Delhi; 2006. 160.
6. Bakshi AS, Kumar P, Brar BS: Comparative study between DHS and PFN in intertrochanteric fractures of femur. Int J Orthop Sci. 2018; 4:259-62.
7. Parikh KN, Parmar C, Patel M, et al.: Functional and radiological outcome of proximal femoral nailing versus dynamic hip screw in unstable intertrochanteric femur fractures. Int J Res Orthop. 2018; 4:10-18203.
8. Cleveland M, Bosworth D, Thompson F, et al.: A ten-year analysis of intertrochanteric fractures of the femur. J Bone Joint Surg Am. 1959; 41-A:1399-408.
9. Huang X, Leung F, Xiang Z, Tan PY, Yang J, Wei DQ, Yu X: Proximal femoral nail versus dynamic hip screw fixation for trochanteric fractures: a meta-analysis of randomized controlled trials. Sci World J. 2013; 2013:805.

10. Zhao C, Liu DY, Guo JJ, Li LP, Zheng YF, Yang HB, Sun JH: Comparison of proximal femoral nail and dynamic hip screw for treating intertrochanteric fractures (Article in Chinese). Zhongguo Gu Shang. 2009; 22:535-7.
11. Qidwai SA, Singh R, Mishra AN, et al.: Comparative study of functional outcome of the intertrochanteric fracture of femur managed by dynamic hip screw and proximal femoral nail. Nat J Clin Orthop. 2019; 3:26-30.
12. Gill SPS, Mittal A, Raj M, Singh P, Kumar S, Kumar D: Dynamic hip screw with locked plate VRS proximal femoral nail for the management of intertrochanteric fracture: a comparative study. Int J Orthop Sci. 2017; 3:173-80.
13. Cummings SR, Nevitt MC: Non-skeletal determinants of fractures: the potential importance of the mechanics of falls. Study of Osteoporotic Fractures Research Group. Osteoporos Int. 1994; 4 Suppl 1:67-70.
14. Mundla MKR, Shaik MR, Buchupalli SR, et al.: A prospective comparative study between proximal femoral nail and dynamic hip screw treatment in trochanteric fractures of femur. Int J Res Orthop. 2018; 4:58-64.
15. Jonnes C, Sm S, Najimudeen S: Type II intertrochanteric fractures: proximal femoral nailing (PFN) versus dynamic hip screw (DHS). Arch Bone Jt Surg. 2016; 4:23-8.
16. Windolf J, Hollander DA, Hakimi M, et al.: Pitfalls and complications in the use of the proximal femoral nail. Langenbecks Arch Surg. 2005; 390:59-65.
17. Sharma A, Sethi A, Sharma S: Treatment of stable intertrochanteric fractures of the femur with proximal femoral nail versus dynamic hip screw: a comparative study. Rev Bras Ortop. 2018, 53:477-81.
18. Harish K, Paleti ST, Kumar RN: A comparative study between DHS and PFN for the treatment of IT fractures. Nat J Clin Orthop. 2019; 3:01-7.