International Journal of Orthopaedics Sciences

E-ISSN: 2395-1958
P-ISSN: 2706-6630
IJOS 2023; 9(4): 73-79

https://www.orthopaper.com
Received: 03-06-2023
Accepted: 07-07-2023

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Comparative study of dynamic hip screw and gamma nail in the treatment of stable intertrochanteric fracture

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DOI: https://doi.org/10.22271/ortho.2023.v9.i4b.3471

Abstract
Background: There are two methods to treat intertrochanteric fracture: conservative or operative way. The internal fixations are usually considered as prior options for treatments that can enable the patient to have postoperative early mobilization, good functional recovery and fewer complications. With the time of invention and advances of internal fixation devices, the diversity of devices brings orthopedic surgeons more choices, such as intramedullary fixation (e.g. gamma nail) or extra medullary fixation e.g. dynamic hip screw (DHS). The aim of this study was to compare the short-term outcomes after gamma nail and DHS fixation of stable intertrochanteric fractures, concentrating especially on the functional aspects.
Methods: This prospective randomised trial was done on 34 patients with stable intertrochanteric fracture in skeletally mature patients (recent closed) within two weeks. Patients were divided into two groups: Group I had 17 cases which were treated by DHS and group II had 17 cases which treated by gamma nail. Randomization was done by systematic random sampling technique of patients, all patients were operated within the first 2 weeks of injury.
Results: In both groups, patients below 65 years show better functional results than those above 65 years, but these results were statistically insignificant where (p= 0.255) for group I and group II (p = 1.000). No statistically significant difference was observed regarding gender, and duration before operation. Group I and Group II both exhibited no statistically significant correlation between functional outcomes and medical comorbidities, and smoking. There was a significant relation between medical comorbidities and time of union in both groups I and II where (P = 0.007). Results were statistically significant in-group I between smoking and time of union where (p = 0.014) for group I, but insignificant in-group II where (P =0.648.
Conclusions: The functional and radiological outcomes of both the gamma III nail and DHS procedures were positive. Both techniques are comparable without significant merits of one technique over the other one. The study has three significance results: More blood loss in DHS group. Medical comorbidities affect time of union. Smoking affects functional results in DHS group.

Keywords: Dynamic Hip Screw, Gamma Nail, Intertrochanteric Fracture

Introduction
Intertrochanteric fractures are one of the elementary orthopedic clinical problems that are commonly resulted from low energy injuries and lead to severe functional socioeconomic problems. These are fractures occurring in the trochanteric area bordered proximally by the neck of femur and distally by the lesser trochanter level. It may extend to the sub trochanteric area forming the trochanteric fracture with sub trochanteric extension variety [1].
The incidence of intertrochanteric fracture is gender-and race dependent and varies from country to country. In the United States, the annual rate of intertrochanteric fracture in elderly females is about 63 pre 100,000, in males 34 per 100,000. Some factors associated with increased susceptibility of intertrochanteric fractures include advancing age, increased number of comorbidities, increased dependency in activities of daily living, and a history of other osteoporosis related fracture [2].
The increasing bone fragility results from osteoporosis and osteomalacia secondary to a lack of

adequate ambulation or antigravity activities, as well as decreased hormone levels e.g. post-menopause, increased levels of demineralizing hormones e.g. hyperthyroidism and hyperparathyroidism, decreased intake of calcium or vitamin D, and other aging processes. A direct impact or a torsional force transmitted through the leg to the intertrochanteric area will cause a fracture when such forces are greater than the strength of the bone in the intertrochanteric area [3].

The intertrochanteric fracture are divided into two main types according to Evans classification (stable and unstable). In stable fracture pattern, the posteromedial cortex remains intact or has minimal comminution, making it possible to obtain a stable reduction. Unstable fracture pattern, on the other hand, are characterized by greater comminution of the posteromedial cortex. The reverse obliquity pattern is inherently unstable because of the tendency for medial displacement of the femoral shaft [4].

Intertrochanteric fracture has many morbidities like bed ridden problems such as bed sores and thrombolytic problems. Also intertrochanteric fracture has some mortality cases specially cases that have other associated fractures [5].

There are two methods to treat this fracture: conservative or operative way. The internal fixations are usually considered as prior options for treatments that can enable the patient to have postoperative early mobilization, good functional recovery and fewer complications. With the time of invention and advances of internal fixation devices, the diversity of devices brings orthopedic surgeons more choices, such as intramedullary fixation (e.g. gamma nail) or extra medullary fixation e.g. dynamic hip screw (DHS) [6].

The aim of this study was to compare the short-term outcomes after gamma nail and DHS fixation of stable intertrochanteric fractures, concentrating especially on the functional aspects.

Patients and Methods

This prospective randomised trial was done on 34 patients with stable intertrochanteric fracture in skeletally mature patients (recent closed) within two weeks at Orthopedic Surgery department, Faculty of Medicine, Tanta University from January 2022 to January 2023.

The study was approved by the Institutional Review Board and an informed consent was obtained from all of the participants.

Exclusion criteria were pathological fracture other than osteoporosis, old, neglected fracture more than two weeks, open fractures, and patients with degenerative arthritis of hip joint.

Patients were divided into two groups

Group I had 17 cases which were treated by DHSgroup II had 17 cases which treated by gamma nail. Randomization was done by systematic random sampling technique of patients, all patients were operated within the first 2 weeks of injury.

Methods of examination

History, individual data, a background of the current symptoms: the mechanism of harm, time passed after present fracture, and state of ambulation and activities before the fracture, past history: Previous medical diseases or comorbidities, previous fractures, and previous surgeries (whether orthopedic or not), smoking habit, and drug intake history.

Clinical examination

Vital signs, other associated injures, examination of other systems, skin condition and pressure sores. Radiological evaluation: Anteroposterior and lateral images of the afflicted hip were acquired and used to determine the kind of fracture and degree of fragment displacement prior to surgery, and CT: when fracture orientation wasn't clearly defined. Laboratory investigations: Complete blood picture, fasting or random blood glucose level, bleeding profile (PT, PTT, and INR), liver processes (SGOT, SGPT), renal processes (Urea and Creatinine), electrolytes in the blood (K, Na), and viral markers (HBV, HCV, HIV).

Preoperative assessment

The AO Classification was used to document the fracture's stability.

Methods of treatment

Preoperative management

After the patient had been initially stabilised, plain X-ray images were taken, including a lateral view of the hip joint and an antero-posterior view of the pelvis with both hip joints in a 15° internal rotation. Each fracture was assigned an AO Classification designation.

Skin traction was used as a splint to stabilise the fracture during the period of first aid management. Stabilization of the overall state as dehydration and anaemia are treated, if necessary, with the proper infusions or blood transfusions.

Broad-spectrum antibiotics administered intravenously in the form of cephalosporin one hour before to surgery make up the perioperative antibiotic prophylaxis.

Group I (DHS) operative method

Patient positioning

The patient's legs were extended on extension rails and he or she was placed in the supine position on a fracture table. Lower limb traction in abduction and internal rotation was used to get proper reduction. When open reduction through the lateral technique was necessary after closed reduction failed, it was performed. Posterior sag, caused by posterior commination, can be corrected manually by applying upward pressure to the buttock. After the patient's fracture was set, he was draped.

Approach

Two finger widths below the greater trochanter, make a straight lateral incision in the skin. From the distal trochanter, a longitudinal incision was made in the iliotibial tract. The vastus lateralis muscle was pulled forward and up. After that, the periosteum is raised.

The proximal femur was approached from the front using Hohmann retractors.

The entry of the guide wire

An angled guide from the DHS was fastened. The subchondral bone was penetrated using a DHS guide wire with a threaded tip. In the posteroinferior quadrants of the femoral head, the guide wire is positioned about 6 mm proximal to Adam's line. The internal fixation was performed with the guide wire still in situ. The image intensifier was utilised to verify the anteroposterior and lateral locations of the guide wire. The DHS measuring tool was put over the guide wire to determine the length of the lag screw. The DHS measuring device's reading was then subtracted by 10 mm, and the triple reamer's setting was modified accordingly.

1. **Using a DHS triple reamer to ream:** To that end, we

fastened the DHS triple reamer. The single-operation cavity reamer had three distinct diameters: the smallest for the screw, the next for the plate cylinder, and the largest for the plate and cylinder interface. There is no way to assemble the three parts of the DHS triple reamer incorrectly.

2. **Tapping:** It was decided to take off the DHS triple reamer. The DHS tap's handle is linked to the tap via a centering sleeve. Only the thick, hard femoral bone, and not the softer, osteoporotic bone, was taped.
3. **Inserting the lag screw:** The lag screw and connection screw were inserted into the femoral head using the long centering sleeve and the DHS wrench. The end of the screw has reached the lateral cortex when the zero marking in the window reaches the upper semicircular edge of the centering sleeve pointing towards the femur. The handle of the screw wrench at the end must be parallel to the femoral shaft. There would be no way to get the DHS plate over the screw.
4. **Attaching the DHS and impacting it:** The lateral cortex of the femoral shaft was reached in order to secure the DHS plate. The guiding wire has been disconnected. The impactor was used to propel the plate. The femoral shaft was screwed into using the DHS plate. DHS compression screw was used to compress the pieces after the traction limb was removed from the traction table.
5. **Closure of the wound:** Closure of wound was done layer by layer and put a suction drain.

GAMMA Group II Surgical Procedure

1. **Positioning:** All patients were placed in the supine posture. The broken side was tractioned and adducted. To facilitate the placement of the image intensifier, the uninjured side was held in extension and modest abduction, and the trunk was angled away from the fracture. The opposite arm was strapped across the opposite chest.
2. **Incision and entry to medullary canal:** By palpating, the greater trochanter's apex was found, and a skin incision of about 3 to 5 centimetres was made 2 centimetres above that apex, in the direction of the iliac crest. It is possible that a longer incision was be necessary for morbidly obese people. The greater trochanter is exposed by making a tiny incision through the fascia lata and cutting the abductor muscle about 1 to 2 centimetres above the end of the bone. A cannulated awl was used to puncture the skull and enter the medullary canal. The image intensifier was used to verify the awl's placement and the entry site. When viewed from above (AP), the tip of the cannulated awl was placed just medial to the tip of the greater trochanter, and when viewed from below (lateral), the tip of the awl was put just medial to the centre of the greater trochanter. Once the guide wire was successfully placed into the medulla of the distal piece, as confirmed by the image intensifier, the awl was withdrawn from the cannula. The femur's medullary canal was reamed to a diameter of 9 mm, then gradually widened by 0.5 mm in order to accommodate the gamma 3 nail. The nail's distal end requires a channel reamed to a width of 12–14 mm (medullary width). The trochanteric and sub trochanteric area must provide 16.5mm of reamer space for the proximal end of the gamma III nail
3. **Introduction of gamma nail:** Gamma nail of appropriate length was chosen. The lag screw hole was aligned with the middle of the femur's head, and the nail was inserted gradually until the proximal end was flush with the greater trochanter's tip.
4. **Proximal locking of the gamma nail:** The nail's position was double-checked to make sure the lag screw would be installed at the anteroposterior and lateral midpoints of the femoral head. There were three different length drill sleeves to use with the angle guide. The proper drill sleeve was threaded into the angle guide attachment once the nail was in the right spot. The drill sleeve was inserted through an incision in the skin all the way to the lateral cortex. Through the guide pin sleeve, a 3 mm tip threaded guide pin was inserted into the femoral head and neck. Both the frontal and the lateral views were used to pinpoint the exact location of the guide pin, and by extension, the lag screw. On both the anterior and posterior views, as well as the lateral, the femoral neck and head should be centred around where the guide pin is placed. Pin placement need to be near the middle one-third of the femoral neck and head. The guiding pin was moved until it was 5 mm from the articular surface of the femoral head after the proper location had been found in both planes. A cannulated and calibrated reamer was used to ream a hole for the lag screw, which was then advanced to within 5 mm of the femoral head's articular surface before the necessary length of 10.5 mm self-tapping lag screw was introduced to a depth of 5–10 mm.
5. **Distal locking of the gamma nail:** One or two distal locking 5 mm cortical screws using a distal target device were introduced.
6. **Application of the set screw of the gamma nail:** The nail was driven through the opening in the post of the targeting device and the set screw was tightened until it engaged the thread on the nail. It was then moved forward until it made full contact in one of the lag screw's grooves, and then spun counter clockwise by a quarter turn to prohibit rotation while still allowing the lag screw to slide through the nail and compress the fracture.
7. **Wounds closure:** Closure of the lag screw and distal locking screws followed skin closure of the proximal wound, which was closed in layers from the ilio-tibial tract to the skin.

Post-operative and follow-up for both groups

Until the fracture had healed sufficiently, full weight bearing was not permitted. Sutures were removed at 2 weeks, then at 6 weeks, 12 weeks, and 6 months patients were checked with x-rays. Union, lag screw location, fracture collapse, and femoral shortening were evaluated using anteroposterior and lateral radiographs. Implant migration, cut-out, loosening, breaking, and screw coming out were among the potential issues checked for. The average duration of a patient's follow-up is six months.

Methods of assessment of the results

Harris hip score for hip pathology was used for clinical data collection and analysis.

Statistical analysis

IBM's statistical analysis programme, SPSS, version 25.0, was used to process the data (Armonk, NY: IBM Corp). Numbers and percentages were used to describe the data's quantitative nature. The data were tested for normality with the Kolmogorov-Smirnov statistic, and the range, mean, standard deviation (SD), and median were used to summarise

the data. The collected results were deemed significant at the 5% level, as indicated by the mean P value.

In this investigation, we employed the following battery of statistical tests: Descriptive Statistics: Mean, Standard Deviation, and Percentage for Quantitative Data and Mean, Standard Deviation, and Percentage for Qualitative Data. The parametric independent sample t-test (t) is used to compare the means of two unrelated groups when the data has a normal distribution.

One common statistical method for comparing findings is the Chi-square test (2). The goal of this test is to establish if a discrepancy between observed and predicted values is random or attributable to a correlation between the variables under consideration. Thus, the chi-square test is a great option for analysing the significance of a link between two category variables.

To test for statistical significance between two categorical variables, statisticians utilise either Fisher's Exact or the Monte Carlo correction. The Mann–Whitney U test is a non-parametric test for determining if the means of two samples drawn from the same population are equal.

To compare two matched groups, a non-parametric method known as the Wilcoxon signed-ranks test is often employed. This test is necessary to determine if there is a statistically significant difference between sets of pairings by calculating and analysing differences between them.

Results

The demographic differences between the two groups under investigation are as follows:

There were 10 females and 7 males in group I while in group II, there were 9 females and 8 males. The mean age was 64.30±3.31 and 64.75±3.51 for group I and II, respectively.

The majority of patients had right sided injury (for group II 70.62%) but for group I (52.94%). Regarding mode of trauma, in group I, 13 patients had simple fall and only four patients had road traffic accident (RTA) while in group II, five patients had RTA and 12 patients had simple fall. Ten patients in group II had DM & HTN compared to 9 patients in group I, and that 8 patients in group I and 7 patients in group II had no major medical history. (Table 1)

Table 1: Baseline characteristics of the included patients

	Group I		Group II	
Side	**No.**	**%**	**No.**	**%**
Right	9	52.94	12	70.6
Left	8	47.05	5	29.4
Mode of trauma				
Simple fall	13	76.5	12	70.6
Road traffic accident	4	23.5	5	29.4
Medical history				
Free medical history	8	47.05	7	41.2
DM & HTN	9	52.95	10	58.8
Not Smoking	10	58.8	9	52.95
Smoking	7	41.2	8	47.05

According to the functional grading, group I had 14 satisfactory results and 3 unsatisfactory results, while group II had 15 satisfactory results and 2 unsatisfactory results. The differences in union time, and all operational parameters were not significant except blood loss parameter where (P. value =<0.004). (Table 2)

Table 2: Comparison between the two groups according to functional outcomes, union time and operative data

	Results	**Group I**		**Group II**		**P-value**
	Functional grading	**No.**	**%**	**No.**	**%**	
Satisfactory	Excellent	5	29.4	5	29.4	1
	Good	9	52.9	10	58.8	
Unsatisfactory	Fair	2	11.8	1	5.9	
	Poor	1	5.9	1	5.9	
	Time of union					
	<12 weeks	13	76.5	14	82.4	0.723
	>or equal 12 weeks	4	23.5	3	17.6	
	Mean ± SD.	10±2		9±2		0.325
Operative parameters	**Blood loss**					
	Less than 500 ml	5	29.4	12	70.6	<0.004*
	More than 500 ml	12	70.6	5	29.4	
	Time passed before operation intervention					
	<2 days	12	70.6	13	76.5	1.000
	>2 days	5	29.4	4	23.5	
						1.000
	Mean ± SD.	3.75±2.45		3.75±2.45		
	Duration of surgery (min)					
	≤ 50 minutes	2	11.8	6	35.3	1.000
	>50 minutes	15	88.2	11	64.7	
	Mean ± SD.	64.75±7.86		63.50±8.13		0.612

In both groups, patients below 65 years show better functional results than those above 65 years, but these results were statistically insignificant where (p= 0.255) for group I and group II (p = 1.000). No statistically significant difference was observed regarding gender, and duration before operation. Group I and Group II both exhibited no statistically significant correlation between functional outcomes and medical comorbidities, and smoking. (Table 3)

Table 3: Comparison between functional outcomes of both groups according to different factors

Age	**Functional grading**				**p**
	Unsatisfactory		**Satisfactory**		
	No.	**%**	**No.**	**%**	

Group I	**N=3**		**N=14**		
<65	0	0	10	71.4	0.255
>or equal 65	3	100	4	28.6	
Group II	N=2		N=15		
<65	1	50	9	60	1
>or equal 65	1	50	6	40	
Gender					
Group I (n =17)	(n =3)		(n = 1 4)		
Male	1	33.3	11	78.6	0.723
Female	2	66.7	3	21.4	
Group II (n =17)	(n =2)		(n = 15)		
Male	1	50.0	12	80.0	
					1.000
Female	1	50.0	3	20.0	
Duration before surgery (days)					
Group I (n =17)	(n = 3)		(n = 14)		
<2	1	33.3	11	78.6	0.723
>2	2	66.7	3	21.4	
Group II (n =17)	(n=2)		(n = 15)		
<2	1	50.0	12	80.0	1.000
>2	1	50.0	3	20.0	
Medical history					
Group I (n =17)	N=3		N=14		
Free	0	0	8	57.1	0.117
DM and HTN	3	100	7	42.9	1
Group II (n =17)	N=2		N=15		
Free	0	0	7	46.7	1
DM and HTN	2	100	8	53.3	1
Group I (n =17)	N=3		N=14		
Smoking	2	66.7	5	35.7	0.014
No Smoking	1	33.3	9	64.3	
Group II (n =17)	N=2		N=15		
Smoking	1	50	7	46.7	1
No Smoking	1	50	8	53.3	

There was a significant relation between medical comorbidities and time of union in both groups I and II where (P = 0.007). Results were statistically significant in-group I between smoking and time of union where (p = 0.014) for group I, but insignificant in-group II where (P =0.648) (Table 4)

Table 4: Comparison between the two groups regarding time of union according to different factors

Time of union	**Medical history**		**P**
	Free	**Positive**	
Group I (n =17)	(n =8)	(n = 9)	
Mean ± SD.	2.27±0.61	2.39±0.49	0.007
Group II (n =17)	(n =7)	(n = 10)	
Mean ± SD.	2.35±0.63	1.95±0.44	0.007
	Smoking	No Smoking	
Group I (n =17)	N=7	N=10	0.014
Mean ± SD.	2.35±0.63	1.95±0.44	
Group II (n =17)	N=8	N=9	0.648
Mean ± SD.	2.27±0.61	2.39±0.49	

Discussion

Orthopedists find it difficult to restore optimal alignment and function after an intertrochanteric femur fracture while simultaneously reducing the risk of sequelae. When compared to non-operative treatment, surgical fixation allows for quicker rehabilitation and more rapid functional recovery. Extramedullary fisxation (using devices like DHS) and intramedullary fixation (using devices like the gamma nail) are the two most common approaches to treating these fractures [7].

The extra medullary load-sharing DHS has found extensive use in these fractures. Because of its biomechanical benefits—including its load-bearing nature, shorter lever arm, axial orientation, and longer implant length - the proximal femoral nail (PFN) was introduced by the AO/ASIF in 1996 and quickly became the implant of choice for intertrochantric fractures [8, 9].

In this study, we compared two different methods for treating intertrochanteric femur fractures (open reduction and internal fixation) in a total of 34 patients. Specifically, 17 patients underwent DHS and the same number underwent gamma nail. Patients' ages ranged from 40 to 70, with a mean of 64.75 years (SD3.51); 41% of the sample was 65 or older. Although intertrochantric femur fractures are the most common type of hip fractures in the senior population, we found no statistically significant association between patient age and outcome (p=0.255 & p=1.000). About half of all hip fractures are caused by this. The ageing of the modern population has led to an increase in the number of cases of osteoporosis, which in turn has led to an increase in the number of intertrochanteric fractures [10].

More than 70% of the individuals in our study with an intertrochanteric femoral fracture experienced a simple fall. In addition, Cummings *et al*. elucidated that 90% of trochanteric fractures in the elderly arise from a simple fall and represent a significant cost on the healthcare system because of their relationship with increased mortality and morbidity. Inadequate protective reflexes, insufficient local shock absorbers (such as muscles and fats around the hip), and insufficient bone strength at the hip as a result of osteoporosis or osteomalacia may all contribute to these findings [11, 12].

In this study, 58 percent of participants had either diabetes or hypertension, and 47 percent were current or former smokers.

The constant pattern of fractures in our analysis may explain why past medical history showed no statistically significant association with functional and anatomical outcome. However, our data showed that smoking significantly affected functional outcome in Group I (DHS). Group I smokers were statistically significantly. Kwiatkowski *et al*. [13] confirmed that smoking hinders bone metabolism and fracture repair, which in turn increases the post-operative incidence of non-union and lengthens the time needed for union.

70% of patients in group I (DHS) united in fewer than 12 weeks, while 81% of patients in group II (gamma nail) united in less than 12 weeks, with a mean value of 10 weeks (SD 2). Neither the functional nor the anatomical outcome were significantly related to the period of union (p=0.549 & p=0.300). The stable fracture patterns observed in our study, along with effective rehabilitation and physiotherapy, may account for these findings.

These results were in agreement with results of Patel, *et al*. [14] whom conducted a study included 50 patients with intertrochanteric fracture of femur from which 50% patients (n=25) operated with DHS and other (n= 25) 50% Compared to patients who underwent PFN surgery, those who underwent DHS surgery had a long time to union (12.4 weeks on average) and a greater rate of mal-union (5 of 25 fractures) than those in the PFN group (2 of 25). There were no statistically significant differences between the groups in terms of the time it took for the fractures to heal, and the same was true when the researchers evaluated the functional result of patients with DHS and PFN fractures and the time it took for the fractures to heal.

Seventy percent of patients in group I (DHS) required one intraoperative transfusion of packed RBCs, while only thirty percent of patients in group II experienced any blood loss during surgery (gamma nail). In addition, our research revealed a noteworthy disparity in blood loss between the two groups. The lengthier incisions and more thorough dissections typical of DHS patients likely accounted for them. These findings corroborated those of Kumar *et al*. (70), who discovered that the DHS group experienced more mean blood loss compared to the PFN group. Myderrizi *et al*. [15] found less blood loss across both groups than we did in our study.

Concerning how long the procedure takes, our research showed that 88% of patients in group I (DHS) needed more than 50 minutes, while only 65% of patients in group II (gamma nail) needed more than 50 minutes. In addition, there was no statistically significant difference in the surgical times between the two groups in our study. Sharma *et al*. discovered that the DHS group needed much more time to close their wounds, likely because of the wider incision and more thorough dissection involved (89). Similar results were also reported by Patel *et al*., who provided additional clarification by noting that the average surgical time for the DHS group was 85.2 minutes, which was significantly longer than the average surgical time for the PFN group (67.2 min).

In this respect, the overall results of our study revealed that the two techniques used DHS and GAMMMA Nail respectively and according to Harris hip score for functional grading had almost the same outcome which more than 80% of cases had satisfactory result for both groups specifically 5 patients excellent functional grading, 9 patient good, 2 fair and one patient poor in group I (DHS). While, in group II (gamma nail) include 5 patients excellent functional grading, 10 patients good, 1 fair and 1 poor. And as regarding found 5 excellent patients, 10 good, 2 fair and no poor cases in group I (DHS), while, in group II (gamma nail) there were 4 excellent patients, 12 good, 1 fair, and no poor cases also. Therefore, no statistically relevant variations in the management of intertrochanteric fractures could be identified between the two groups.

Many investigations, including one by Patel *et al*. [16], have shown that in the case of stable intertrochanteric fractures, PFN and DHS produce comparable functional outcomes (81). This prospective study aimed to compare the efficacy of gamma nail fixation to that of DHS fixation in terms of short-term functional results, reoperation rates, and mortality. The two groups combined for a total of 134 patients. At 4 months, there were no statistically significant differences between the DHS and GN groups in terms of where people were living or whether or not they had returned to their homes before the fracture (78% vs. 73%, P=0.224). There was no difference in the method utilised for walking aid between the DHS and control groups, but after 4 months, the DHS group showed greater improvement in walking ability compared to the pre-fracture state (p=0.042). The DHS group had a decreased frequency of reoperations throughout the first year (8.2% vs. 12.7%, p=0.318). Finally, the researchers found that both procedures are effective in treating trochanteric femoral fractures, despite the results favored DHS fixation in terms of walking ability and mortality.

Comparing the clinical and radiological results of patients with stable intertrochanteric fractures treated with a PFN versus a DHS was the goal of a new study by Sharma *et al*. [17]. The Harris Hip Score was significantly lower in the DHS group after the first month compared to the PFN group. The PFN group had considerably shorter surgery with a smaller incision, resulting in fewer wound-related issues, although the DHS group had higher mean scores than the PFN group at the three- and six-month monthly follow-ups. The PFN is a technically more demanding surgery that leads to more implant failures and re-operations, hence the rate of technical mistakes was significantly greater in the PFN than in the DHS.

Our findings were not consistent with those of Jewell *et al*. [18], who showed drastically differing success rates. Patients with low-quality, osteoporotic bone and unstable fracture patterns were targeted for this study because they believed the gamma III nail would produce a stronger construction than the DHS plate.

In addition, Kumar *et al*. [19] conducted a study on a total of 60 patients with intertrochanteric fractures, randomly assigning half of them to receive treatment with a DHS and the other half to get treatment with a PFN. Patients were monitored for up to 6 months, and the results showed no statistically significant variations in union rates between the two implant groups.

Among the limitations of the study is the that the study included retrospective cases as well as prospective cases, also number of cases was relatively few for the study and follow up period was relatively short. We recommend gamma nail for stable inter trochanteric fractures and osteoporotic bone. We recommend DHS for fracture of obese cases and cases with good lateral wall thickness of proximal femur.

Conclusions

The functional and radiological outcomes of both the gamma III nail and DHS procedures were positive. Both techniques are comparable without significant merits of one technique over the other one. The consistent pattern of fractures in our study population may explain why age, gender have no effect on outcome. The study has three significance results: More

blood loss in DHS group. Medical comorbidities affect time of union. Smoking affects functional results in DHS group. Postoperative rehabilitation, rate of healing of these fractures, and final results were found acceptable when gamma nail was used.

Financial support and sponsorship: Nil.
Conflict of Interest: Nil.

References

1. Ahn J, Bernstein J. Fractures in brief: intertrochanteric hip fractures. Clin Orthop Relat Res. 2010;468:1450-2.
2. Browner BD, Levine AM, Jupiter JB, Trafton PG, Krettek C. Skeletal Trauma In: Browner BD, editor. E-Book: 2-Volume Set. 1st ed: Elsevier Health Sciences; c2008. p. 784-97.
3. Cooper C, Campion G, Melton LJ. 3rd. Hip fractures in the elderly: A world-wide projection. Osteoporos Int. 1992;2:285-9.
4. Evans EM, Wales SS. Trochanteric fractures. J Bone Surg. 1951;33:192-204.
5. Willig R, Keinänen-Kiukaaniemi S, Jalovaara P. Mortality and quality of life after trochanteric hip fracture. Public Health. 2001;115:323-7.
6. Reindl R, Harvey EJ, Berry GK, Rahme E. Intramedullary Versus Extramedullary Fixation for Unstable Intertrochanteric Fractures: A Prospective Randomized Controlled Trial. J Bone Joint Surg Am. 2015;97:1905-12.
7. Parker MJ, Handoll HH. Gamma and other cephalocondylic intramedullary nails versus extramedullary implants for extracapsular hip fractures in adults. Cochrane Database Syst Rev.; c2008. p. 93-112.
8. Pires RE, Santana EO, Jr. Santos LE, Giordano V, Balbachevsky D, Dos Reis FB, *et al*. Failure of fixation of trochanteric femur fractures: Clinical recommendations for avoiding Z-effect and reverse Z-effect type complications. Patient Saf Surg. 2011;5:17-41.
9. Pavelka T, Matejka J, Cervenková H. [Complications of internal fixation by a short proximal femoral nail]. Acta Chir Orthop Traumatol Cech. 2005;72:344-54.
10. Shen L, Zhang Y, Shen Y, Cui Z. Antirotation proximal femoral nail versus dynamic hip screw for intertrochanteric fractures: a meta-analysis of randomized controlled studies. ORTHOP TRAUMATOL-SUR 2013;99:377-83.
11. Dahl E. Mortality and life expectancy after hip fractures. Acta Orthop Scand. 1980;51:163-70.
12. 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;4:67-70.
13. Kwiatkowski TC, Hanley EN, Jr. Ramp WK. Cigarette smoking and its orthopedic consequences. Am J Orthop (Belle Mead NJ). 1996;25:590-7.
14. Herode P, Shrode A, Sadaria M, Jeegar P. Comparison of PFN (Proximal femoral nail) and DHS (Dynamic hip screw) in treatment of Intertrochanteric femur fractures. Surgical Update: Int J surg Orthopedics. 2018;4:37-44.
15. Myderrizi N. Proximal femoral nailing is better choice in treatment of intertrochanteric fracture in elderly people. Int Surg J. 2016;3:781-5.
16. Patel VA, Pushkarna VA, Patel DJ, Divyesh S, Dave B, Bhatt P, *et al*. Is Legacy Technique of Anatomically Bowed Ante Grade Intramedullary Device Fixed at Metaphysis Cancellous Bones & Single Proximal Screw Locking Suffice for Good Outcome in Femoral Fractures? J Med Dent Sci. 2021;9:319-24.
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. Jewell DP, Gheduzzi S, Mitchell MS, Miles AW. Locking plates increase the strength of dynamic hip screws. Injury. 2008;39:209-12.
19. Kumar KCA, Kumar A, Jain S. A comparative study between dynamic hip screw and intramedullary nail fixation in trochanteric fractures. Int J Res Orthop. 2021:794-9.

How to Cite This Article
Romeh MH, Saeid MS, Quolquela MAEM, Negm EE. Comparative study of dynamic hip screw and gamma nail in the treatment of stable intertrochanteric fracture. International Journal of Orthopaedics Sciences 2023; 9(4): 73-79.