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Original Article

Treatment of unstable intertrochanteric fracture femur by proximal femoral nail (PFN) versus cemented bipolar hemiarthroplasty

Orthopedics

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ABSTRACT

Background: Treatment of unstable intertrochanteric fractures in elderly osteoporotic patients is challenging and still controversial. The key point of surgical treatment is to achieve early mobilization with full weight bearing which can be achieved by good anatomical reduction and fixation, or by hip arthroplasty.

Objective: This study aimed to compare the results of using proximal femoral nail (PFN) versus cemented bipolar hemiarthroplasty (BH) in the treatment of unstable intertrochanteric fractures. As regards time to full weight bearing, operative time, blood loss, and post-operative complications.

Methodology: This interventional double-blinded study was conducted on 50 patients with unstable intertrochanteric fractures who were divided into two groups: Group 1 (PFN group): included 25 patients treated with direct or indirect reduction and fixation with PFN, and group 2 (BH group): included 25 patients treated with cemented BH. Clinical and functional evaluation had been achieved by Harris Hip Score (HHS). Both groups were matched regarding age, sex, site of fracture and operative characteristics.

Results: The operative characteristics and the rate of intraoperative complications were similar between both groups. The length of hospital stay / days was nearly the same between both groups. The rate of bed sores and wound infections were non significantly higher in the PFN group. The BH group had a higher rate of full weight bearing with statistical significantly shorter full weight bearing time compared to the PFN group. [(96% vs. 72%) and (8.67 ± 3.03vs. 12.06 ± 3.59) respectively. Patients in BH group had better insignificant Harris Hip Score scores compared to those in PFN group.

Conclusion: The studied BH group had shorter operating times, fewer fluoroscopic assessments, and early ambulation than those who underwent PFN. Therefore, we suggest that BH may help elderly patients with osteoporotic unstable intertrochanteric fractures to recover more quickly.

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Keywords: Cemented bipolar hemiarthroplasty; proximal femoral nail; BH. PFN.

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INTRODUCTION

Elderly individuals frequently experience inter-trochanteric fractures with severe displacement and comminution. those who have unstable intertrochanteric fractures have a high death rate of up to 35% in 1st year following surgery [1].

Internal fixation is the most typical treatment for the intertrochanteric fracture. Internal fixation failure rates for unstable intertrochanteric fractures, nevertheless, varied between 4% to 17% [2].

Osteoporosis may result in sluggish fracture healing, delayed union, or even non-union. Furthermore, postoperative internal fixation failure, cutting out, or breakage. It is suggested that prosthetic substitution as a treatment for intertrochanteric fractures would permit post-operative weight bearing-and prevent excessive collapse at the fracture site [3].

The Singh Index is a simple, semi quantitative evaluation tool for diagnosing osteoporosis using plain radiographs. It is assessed by examining the radiographic patterns and density of proximal femur trabecular bone in the Ward's triangle region (femoral trigone). The Singh Index classifies osteoporosis into six grades. This method is available for routine use and

mass screening because plain films can be obtained at most outpatient clinics [2].

The goal of a therapeutic approach for treating elderly cases with unstable intertrochanteric fractures is to help them walk quickly after surgery, thereby lowering the risk of complications associated with being in bed, while also enhancing their quality of life following injury and lengthening their survival time [4].

In general, intramedullary fixation is advised for the treatment of unstable intertrochanteric fractures [1]. Nevertheless, early ambulation following intra-medullary fixation frequently raises the risk of early or late post-operative complications such as avascular necrosis, cutout, metal failure and nonunion. In elderly osteoporotic cases with intertrochanteric fracture, osteoporosis represents a challenge that may lead to failure of entire treatment strategy [3, 4, 5]. Therefore, bipolar hemiarthroplasty (BH) could be considered if proven to allow early ambulation and lower the post-operative complications. But there are no glaringly evident findings about how much better cemented bipolar hemiarthroplasty is [6].

The Harris Hip Score (HHS) was developed for the assessment of the results of hip surgery. It is a validated tool to measure the functional capacity of an individual and has been the most common scoring technique used traditionally, to assess the condition of a patient with hip pathology, before and after a surgical procedure [7].

The current study aimed compare the results of using proximal femoral nail (PFN) versus cemented bipolar hemiarthroplasty (BH) in treatment of unstable intertrochanteric fractures. regarding time to full weight bearing, operative time, blood loss and post-operative complications.

PATIENTS AND METHODS

The study was approved by ethical committee of faculty of medicine for girls, Cairo, Al-Azhar university, Egypt. Written informed consent was obtained from each patient before participation into the study and they had the right to withdraw any time through the study without any consequences.

This interventional double blinded study was conducted on 50 patients with unstable inter-trochanteric fractures according to Evan classification. the study was carried out in the orthopedic departments of Al-Zahraa University hospital for girls and orthopedic department of Qalyub specialized hospital, from December 2019 to June 2023. They were divided into two groups:

1. **PFN group**: included 25 patients who were treated by direct or indirect reduction and fixation with PFN.
2. **BH group:** included 25 patients treated with cemented BH.

All elderly males or female patients presented by unstable intertrochanteric fracture femur were included while patients with polytrauma, pathological fracture, degenerative arthritis of the acetabulum, comminuted intertrochanteric fracture with subtrochanteric extension, previously operated patients, as well as patients treated by chemotherapy or radiotherapy were excluded.

All studied cases underwent full clinical evaluations that included full medical history, general physical examination, local examination, and radiological assessment to determine their eligibility for the study. Plain X-ray; CT scan were done to classify fracture type. Also Pre-operative laboratory investigations**:** such as CBC, liver function, kidney function, viral markers and coagulation profile were obtained to check for fitness for surgery and perioperative precautions.

The Singh index was used to assess osteoporosis and according to the findings the studied patients were graded, ranging from one (only basic trabecular structures visible, low BMD) to six (trabecular structures visible in all areas of the proximal femur, high BMD).

As a hospital protocol, preoperative antibiotic dose (2g) ceftriaxone was routinely administered two hours before the operation in all cases.

- **Types of operation:** patients in PFN group were subjected to direct or indirect reduction and internal fixation by PFN, while patients in BH group were subjected to cemented BH.
- **Postoperative management:** proper IV antibiotic and analgesics were given for the first 48 hours and continued for two weeks according to patient demand and surgeon decision. Anticoagulant prophylactic dose was routinely prescribed to all patients for two weeks post operatively. Plain X–ray films were obtained in 2 views (poster-anterior and lateral) postoperatively.
- **Follow-up strategy:** Patients were followed up two weeks after surgery and at 1.5, 3, 6, and 12 months for clinical and radiological assessment of implant position, fracture healing and, postoperative complications if present. The follow up includes the following parameters:

Clinical and functional assessment was done using the HHS [7] which is a multidimensional observational assessment based on eight items that address pain, walking function, daily activity, and range of motion. Based on it the studied patients were grading into; poor score (<70), fair score (70-79) good score (80-89) and excellent score (90-100).

Intraoperative complications were recorded and documented while postoperative complications were classified into early complications that occurred within two weeks after surgery, and late complications that occurred after that. Assessment of complication as avascular necrosis (AVN), anemia, infection,

nonunion, metal failure, dislocation, cut-out, pulmonary embolism, peri-prothetic fracture, shortening, and death were reported.

Statistical analysis

The SPSS version 20 was used to conduct the statistical analysis. The data was expressed as mean ±SD for parametric quantitative data and percentages for qualitative data. Chi-square (X^2) test or fisher exact test were used for comparison of qualitative data between the groups. Student t- test was used for comparison of parametric quantitative data between the two groups. For used tests the statistical significance was set at p-value ≤0.05 (95% confidence limit).

RESULTS

PFN group included 25 patients who were treated by reduction and fixation with PFN, their ages ranged from (61-80) years. On the other hand, BH group included 25 patients treated with BH, their ages ranged from (61-77) years. Table (1). The mean age for PFN group was (68.4 years ± 6.2) compared to (69.9 years ±3.9) for BH group with no significant difference between both groups. Both groups were sex matched (table 1).

All patients had fallen on the ground (low injury trauma), with mean follow-up period for PFN group being (19) months and for BH group being (18.8) months.

The side of fractures was equally distributed in both groups. However, the distribution of fracture types was significantly different between groups. Most patients in BH group had A 3.3 fractures (64.0%) followed by fractures A2.3, while fractures A2.2, A2.3, and A3.3 constituted the majority of fracture sites among studied cases in PFN group. Studied cases in BH group had significantly higher Singh's index compared to PFN group (table 2).

In PFN group, the operative times ranged from (70 - 120) minutes with a mean ± SD of (99.8 ± 13.5 minutes), that was significantly shorter than in BH group, ranged from (100-140) minutes with a mean ± SD of (120.8 ± 11.5 minutes) (p 0.001). The mean volume of intraoperative blood loss was significantly higher in BH group than PEF group (456 ml vs. 300 ml). Ten (40%) of patients in BH group required blood transfusion with an average of 500 ml for each, compared to eleven patients (44%) in PFN group. The rate of intraoperative complications was similar in both groups (4%) (table 3).

The mean ± SD of length of hospital stay /days was non-significantly shorter in PFN group compared to BH group (10.7 ± 2.3 vs. 11.4 ± 3.6 respectively). The rates of early postoperative complications were not significantly different between both groups. However, the rate of bed sore, pulmonary embolism, and superficial and deep wound infection were non-significantly higher in PFN group (table 4).

Table (1): Demographic characteristics of the studied groups

Demographic characteristics		PFN group n = 25	BH group n = 25	Stat. tests	p-value
Age/ years	**Mean ± SD**	68.4 ± 6.2	69.9 ± 3.9	t= 1.024	0.311
	Range	61 - 80	61 - 77		
Age groups	**<70 years**	10 (40.0%)	10 (40.0%)	χ^2= 0.0	1.0
	≥70 years	15 (60.0%)	15 (60.0%)		
Sex no (%)	**Female**	16 (64.0%)	15 (60.0%)	χ^2= 0.085	0.771
	Male	9 (36.0%)	10 (40.0%)		

PFN: Proximal femoral nail, BH: Bipolar hemiarthroplasty, χ^2: Chi-square test, t: Student t- test, SD: Standard deviation

Table (2): Preoperative clinical characteristics of the studied groups

Preoperative clinical characteristics		PFN group n = 25 no. (%)	BH group n = 25 no. (%)	Stat. test	p-value
Side of fracture no (%)	**Right**	12 (48.0%)	12 (48.0%)	FE= 0.0	1.00
	Left	13 (52.0%)	13 (52.0%)		
AO Type no (%)	**A2.1**	3 (12.0%)	0 (0%)	FE= 14.11	0.007*
	A2.2	5 (20.0%)	2 (8.0%)		
	A2.3	8 (32.0%)	7 (28.0%)		
	A3.1	4 (16.0%)	0 (0%)		
	A3.3	5 (20.0%)	16 (64.0%)		
Singh's Index no (%)	**II**	7 (28.0%)	0 (0%)	FE= 10.46	0.005*
	III	10 (40.0%)	8 (32.0%)		
	IV	8 (32.0%)	17 (68.0%)		

PFN: Proximal femoral nail, BH: Bipolar hemiarthroplasty, FE: Fisher's Exact test *: Significant p-value (p<0.05)

Table (3): Operative characteristics of the studied groups

Operative characteristics		PFN group n = 25	BH group n = 25	Stat. tests	p-value
Operation time (min)	**Mean ± SD**	99.8 ± 13.5	120.8 ± 11.5	t=5.921	0.001*
	Range	70 – 120	100 – 140		
Blood loss (ml)	**Mean ± SD**	300.0 ± 137	456.0 ±113.9	t=4.378	0.001*
	Range	130 – 600	250 – 700		
Blood transfusion no (%)	**No**	15 (60.0%)	14 (56.0%)	χ^2= 0.082	0.774
	Yes	10 (40.0%)	11 (44.0%)		
Volume of blood transfusion (ml)	**Mean ± SD**	500.0 ± 0.0	500.0 ± 0.0	t= 0.0	NA
	Range	500.0 - 500.0	500.0 - 500.0		
Intra-operative complications no (%)	**No**	24 (96.0%)	24 (96.0%)	FE= 0.0	1.00
	Yes	1 (4.0%)	1 (4.0%)		

PFN: Proximal femoral nail, BH: Bipolar hemiarthroplasty, χ^2: Chi-square test, t: Student t- test, FE: Fisher's Exact test, *: Significant p-value (p<0.05), NA: Not applicable

Table (4): Postoperative hospitalization and complications of the studied groups

Postoperative hospitalization and complications		PFN group n = 25	BH group n = 25	Stat. tests	p-value
Length of hospital stay (days)	**Mean ± SD**	10.7 ± 2.3	11.4 ± 3.6	t= 0.819	0.417
	Range	(6 -15)	5 -18		
Early postoperative complications no (%)	**Bedsore**	6 (24.0%)	4 (16.0%)	FE=0.500	0.480
	Superficial infection	10 (40.0%)	4 (16.0%)	FE=3.571	0.059
	Deep infection	1 (4.0%)	0 (0%)	FE=1.020	0.315
	Pulmonary embolism	1 (4.0%)	0 (0%)	FE=1.020	0.315
	Dislocation	0 (0%)	2 (8.0%)	FE=2.083	0.149

PFN: Proximal femoral nail, BH: Bipolar hemiarthroplasty, t: Student t- test, FE: Fisher's Exact test, *: Significant p-value (p<0.05)

Table (5): Late postoperative complications of the studied groups

Late postoperative complications	PFN group n = 25	BH group n = 25	Stat. tests	p-value
AVN no (%)	2 (8.0%)	0 (0%)	FE=2.083	0.149
Cut-out no (%)	5 (20.0%)	0 (0%)	FE=5.556	0.018*
Z-effect no (%)	1 (4.0%)	0 (0%)	FE=1.020	0.315
Non-union no (%)	8 (32.0%)	0 (0%)	FE=9.524	0.002*
Peri -prothetic fracture no (%)	0(0%)	1 (4.0%)	FE=1.020	0.315
Shortening no (%)	10 (40.0%)	5 (20.0%)	FE=2.381	0.123
Shortening (cm): Mean ± SD Range cm	0.26 ± 0.36 (0 - 1)	0.12 ± 0.26 (0 - 0.80)	t= 1.576	0.121
Union time (weeks): Mean ± SD Range (cm)	10.32 ± 7.4 (12 - 20)	0	t= 6.973	0.001*
Return to hospital	5 (20.0%)	1 (4.0%)	FE=3.030	0.082
Refuse follow up	3 (12.0%)	0 (0%)	FE=3.191	0.074
Death	2 (8.0%)	3 (12.0%)	FE=0.222	0.637
Time to death (months) Mean ± SD Range (cm)	10.5 ± 2.1 (9 - 12)	12 ± 1.0 (11 - 13)	t= 3.224	0.003*

PFN: Proximal femoral nail, BH: Bipolar hemiarthroplasty, AVN: Avascular necrosis, t: Student t- test, SD: Standard deviation, FE: Fisher's Exact test, *: Significant p-value (p<0.05).

Regarding late postoperative complications, peri-prosthetic fracture is significantly reported in BH group only (4.0%). The PFN group had insignificantly less mortality than BH group however, it had significantly shorter time to death / months than BH group (10.5 ± 2.1 vs. 12 ± 1.0) (p=0.003) (table 5). 84% of patients in BH group regained their ability to do activities (ADA) compared to 68% of patients in PFN group this difference was insignificant (p>0.185). Moreover, 96% of patients in BH achieved full weight

bearing (FWB) compared to 72% of patients in PFN group the difference was statistically significant (p <0.049). The mean time / weeks to FWB had been significantly shorter in BH group than PFN group (8.67 ± 3.03 vs. 12.06 ± 3.59) the difference was statistically significant (p <0.003). Studied patients in BH group had better HHS compared to PFN group, about 68% of patients in BH group had good or excellent HHS compared to 60% in PFN group, however the difference was non-statistically significant (p 0.325) (table 6).

- Early postoperative complications in both groups as bed sore and superficial infection were treated appropriately before discharge. However, 2 studied cases in BH group suffered hip dislocation, one in the 6th week spontaneously and the other in the 10th week while attempting to squat. Both underwent closed reduction under general anesthesia.

Table (6): Postoperative functioning of study participants

Postoperative functioning		PFN group n = 25	BH group n = 25	Stat. tests	p-value
ADA no (%)	No	8 (32.0%)	4 (16.0%)	FE= 1.754	0.185
	Yes	17 (68.0%)	21 (84.0%)		
FWB no (%)	No	7 (28.0%)	1 (4.0%)	FE= 5.357	0.021*
	Yes	18 (72.0%)	24 (96.0%)		
FWB time / weeks	Mean ± SD	12.06 ± 3.59	8.67 ± 3.03	t= 3.608	0.001*
	Range	6 - 20	4 - 16		
HHS no (%)	Poor	8 (32.0%)	3 (12.0%)	FE= 3.758	0.289
	Fair	2 (8.0%)	5 (20.0%)		
	Good	9 (36.0%)	11 (44.0%)		
	Excellent	6 (24.0%)	6 (24.0%)		

PFN: Proximal femoral nail, BH: Bipolar hemiarthroplasty, ADA: Ability doing activity, FWB: Full weight bearing, Student t- test, FE: Fisher's Exact test, SD: Standard deviation, *: Significant p-value (p<0.05)

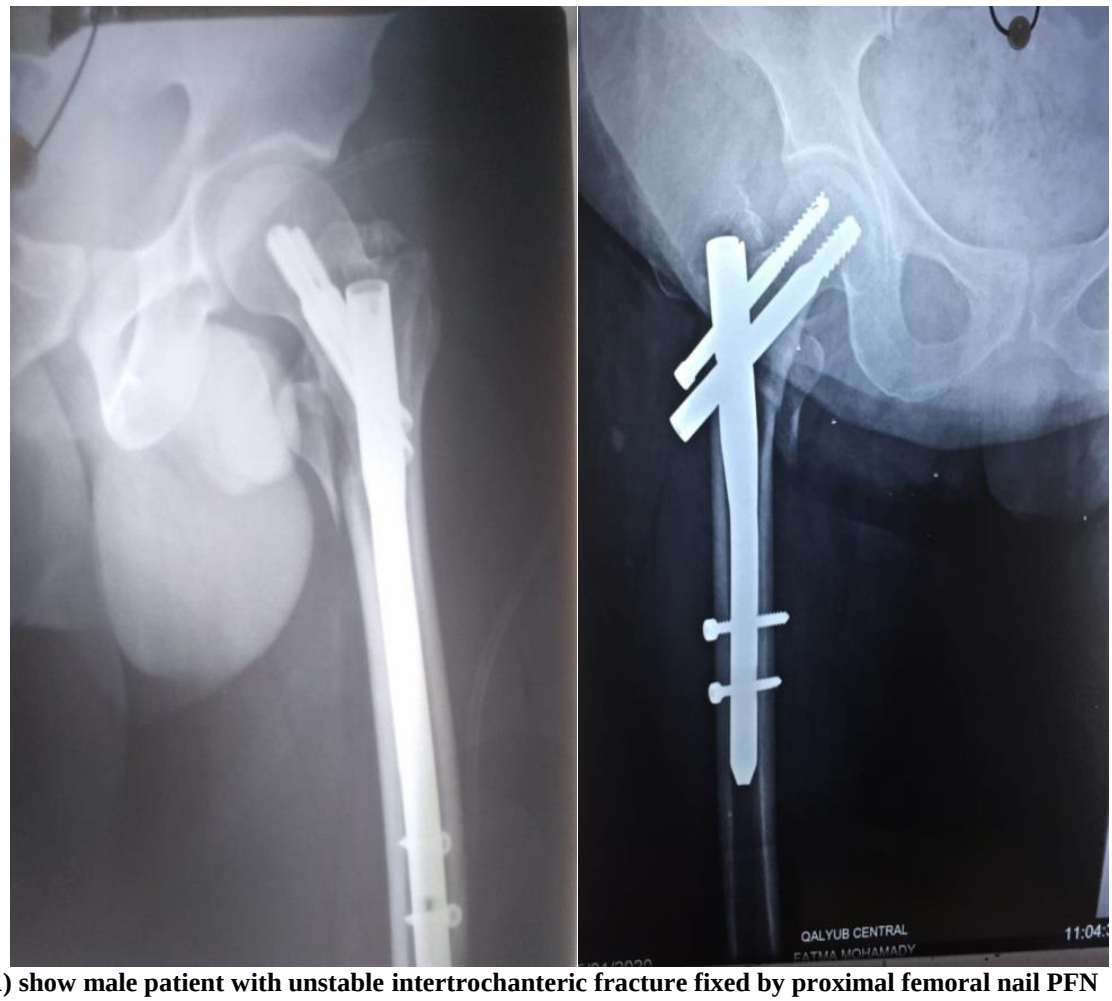

Figure (1) show male patient with unstable intertrochanteric fracture fixed by proximal femoral nail PFN (anteroposterior and lateral view)

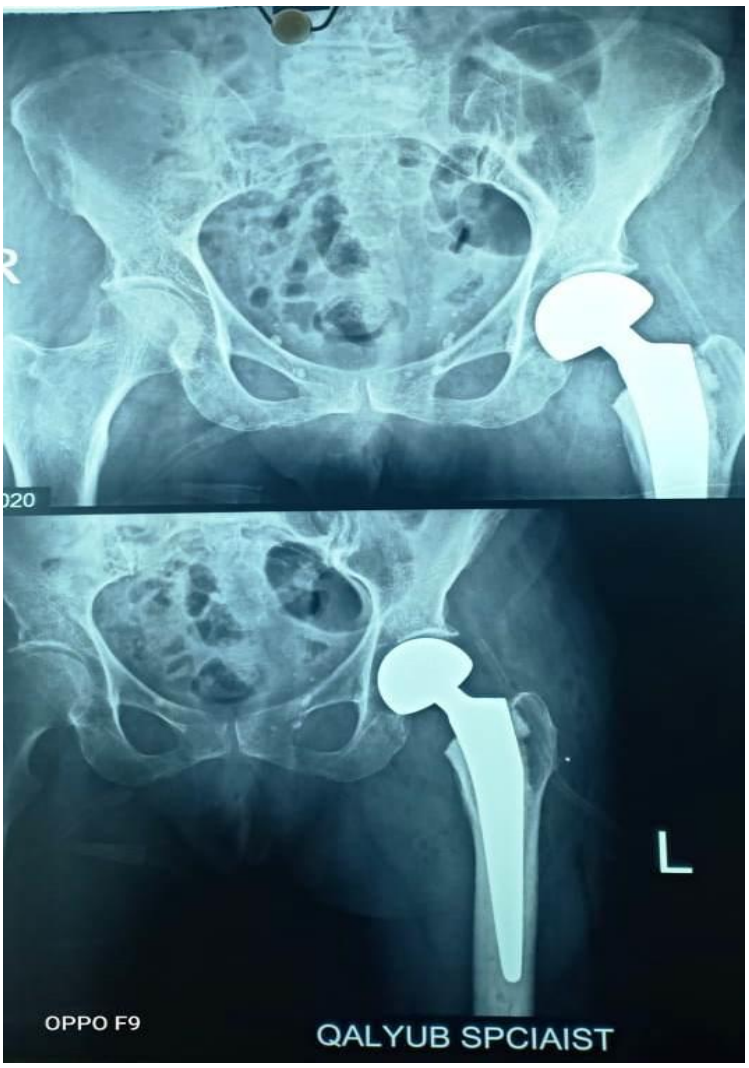

Figure (2): shows female patient with unstable intertrochanteric fracture left femur who underwent replacement by cemented bipolar hemiarthroplasty

DISCUSSION

Elderly people typically suffer from comminuted fractures because of severe osteoporosis and reduced muscle suppleness. Additionally, several systemic disorders as well as physical frailty are common in the aged individuals. Therefore, the chances of treating fractures successfully are quite low if adequate treatment is not developed. As a result, intertrochanteric fractures in elderly individuals are sometimes referred to as end-of-life fractures [8].

The major goal of this kind of fracture treatment is to give lower limbs secure and effective bone support to quickly regain their capacity to walk. For unstable intertrochanteric fractures, intramedullary fixation is currently the recommended treatment. Because of its low invasion approach, PFN demonstrates excellent biomechanical and stable fixation results. moreover, the intramedullary fixation systems are generally favored in cases of osteoporotic fractures. However, when older studied cases with intertrochanteric fractures of 31-A (2.2-2.3) type, important mechanical bone structures at greater and lesser trochanters are destroyed and lost, affecting femoral trochanter's resistance to pressure, tension, rotation, and inversion [9].

In the initial postoperative phase, studied cases with unstable intertrochanteric fractures treated with PFN must walk without bearing any weight. Elderly people have weak upper limb muscles, making it challenging for them to walk, even with the use of double crutches or other walking aids. Additionally, the propensity for prolonged bed rest raises the risk of bed-related problems due to the potential worry of internal fixation loosening. Therefore, PFN is unable to fulfill the primary goal of this type of fracture treatment [10].

On the other hand, BH may rapidly offer mechanical structures surrounding the hip with the proper level of stability. As a result, studied cases may begin walking with weight on a damaged limb soon after the procedure, greatly improving their postoperative experience and achieving the goal of assisting studied cases in fast regaining mobility [11]. Numerous surgeons also strongly endorse cemented bipolar hemiarthroplasty [12, 13, 14]. Kim et al. examined the therapeutic effects of bipolar femoral head prosthesis

and PFN in prospective trials on elderly cases with unstable intertrochanteric fractures. They noted that early mobility recovery for studied cases with joint replacements was possible [10]. Also, Shen et al. published a follow-up study on 20 elderly cases who had bipolar femoral head replacement and recorded that the BH group's average operating time had been shorter with lower death rate and better prognosis [15]. Kayali et al. [16] stated that BH may help individuals with comminuted intertrochanteric fractures and severe osteoporosis. Considering these factors, BH had been advised for elderly individuals with severe osteoporosis, poor prognosis following internal-fixation, short life expectancy, and poor stability of comminuted fractures.

Comparing the efficacy of PFN and BH in the management of elderly patients in the current research, it was found that with unstable intertrochanteric fractures, the BH group required significantly higher intraoperative blood transfusions and intraoperative blood loss than the PFN group. Quantity of postoperative blood loss and transfusions, nevertheless, did not change among both groups, suggesting that perioperative blood loss and transfusion requirements in the BH group were greater than those in the PFN group.

Studied cases in the PFN group, nevertheless, needed numerous intraoperative fluoroscopies. The PFN group underwent more intraoperative fluoroscopies than the BH group, and their surgeries had been longer than the BH group's.

Studied cases in the BH group had been able to move around far more quickly than those in the PFN group. There were obvious differences among 2 groups in categories of postoperative bed-related problems. For instance, the BH group had eleven events while the PFN group had twenty-three. When comparing long-term problems after discharge, the BH group's primary issues had been unequal lower limb length, fracture nonunion, and delayed incision healing, while the PFN group's main issues had been re-fracture, and reoperation.

Within a year following the procedure, the post-operative hip joint HHS showed that the BH group scored better than the PFN group, demonstrating that BH surgery results in early joint mobility function.

After 12 months, there had been no discernible change in scores among the two groups, suggesting that BH and PFN achieve comparable long-term impacts on joint mobility function. According to the findings, studied cases in the PFN group required fewer blood transfusions and less blood loss throughout the peri-operative phase.

In contrast, the BH group's studied cases had shorter operations and required less fluoroscopy during them. Additionally, within a year of the procedure, studied cases in the BH group showed improved hip joint motion in addition to early mobilization.

PFN is a minimally invasive incision that reduces intraoperative bleeding. Yet, repeated fluoroscopy during minimally invasive surgery will prolong the operative time.

Due to the considerable risk of internal fixation failure associated with unstable intertrochanteric fractures and severe osteoporosis, most studied cases choose not to walk, although being advised to do so by their doctors while using 2 crutches [13]. The fundamental goal of postoperative functional exercise for unstable intertrochanteric fractures is to conduct early out-of-bed activities as soon as feasible. however, the affected leg cannot carry complete weight. As a result, studied case walks with crutches or other walking aids and bears weight on one leg. Studied cases with poor body balance or limited upper limb strength cannot perform the exercises in this plan. As a result, several studied cases have PFN surgery and then spend lots of time in bed [17]. Unfortunately, this raises the likelihood of bed-related problems, increases medical expenses, and lengthens hospital stays. Early on after surgery, BH therapy may offer solid load-bearing joints so that studied cases may confidently walk on both lower limbs, considerably easing the burden of postoperative exercise. With the use of tools, the majority of elderly people may get out of bed and walk independently. However, it can be difficult for damaged limbs to quickly regain the ability to support weight after CBH therapy [17].

First, there must be sufficient initial stability for the bond to develop between the prosthesis and bone. Second, it is necessary to perform reduction and fixation on both greater and lesser trochanter fractures. Finally, it is necessary to restore the length of the lower limbs [9].

Joint surgeons must devote lots of time to research and practice to accomplish the three goals. With traditional femoral stem prosthesis, it is challenging to achieve stable adequate interaction between prosthesis and bone. To accomplish an early, firm connection, a prolonged anatomical handle of the medullary cavity is used, which presses the distal end coat of the stem against the distal end of the fracture and isthmus of the medullary cavity.

It benefits from avoiding bone contact at the fracture site and difficulties brought on by bone cement [9]. Yet, this operation results in the destruction of numerous cancellous bones in the proximal femur and some restriction of intraosseous blood flow there. Additionally, there is a chance of future fracture nonunion and stress-induced bone resorption. Additionally, when the initial procedure fails, the likelihood of repeating it may significantly increase. Meanwhile, after the prosthetic test, the early postoperative joint movement must reset greater and lesser trochanter fractures [13].

According to studies, greater trochanter fracture fragment displacement of more than two cm may result in apparent abductor weakness. Greater and lesser trochanter fractures may further lead to increased hip flexion, abduction, external rotational strength, sound reduction and fixation of these fractures need joint surgeons with very good fracture anatomical reduction and fixation skills. Additionally, muscle attachment points shouldn't be excessively dissected to decrease and fix fracture blocks. Winding and fixing should be accomplished using steel wire or a binding band. In this investigation, lesser trochanter fractures had not been treated; only greater trochanter fractures in both groups had been decreased and corrected. External rotation muscles of the hip joint are frequently severed in surgical procedures for lesser trochanter fractures. In turn, this may cause hip external rotator muscle strength to decline after surgery. Additionally, extensive posterior incision stripping may increase the chance of postoperative joint dislocation. one of the most potent hip flexors is the iliopsoas muscle, which is connected to the lesser trochanter. Binding of steel wire in this area typically does not prevent muscle traction, which prevents decrease and fixation [9].

Additionally, severe wire binding may have an impact on the proximal femur's blood supply. Surprisingly, other muscles may be used to make up for hip flexion. Based on the advantages and disadvantages listed above, the lesser trochanter had not been reset and fixed in the current investigation. Comparison investigation revealed that a lesser trochanter was successfully treated without interference by both BH and PFN therapies. Under the same circumstances, variations in other dimensions may be more precisely compared. Lastly, for studied cases with both greater and lesser trochanter fractures, it is more challenging to manage lower leg length throughout the procedure. Therefore, it would be possible to reset and fix the greater trochanter after the femoral stem was in place. For assessment of lower limb length, relative location among the prosthesis' rotational center and greater trochanter apex of the femur is typically employed [16] [17].

Foundation for studied cases' post-operative mobility is equal-length lower limbs. Studied cases with lower limbs that are markedly different in length after surgery frequently has less favorable walking experiences.

The current prospective research many limitations were recorded: First, there weren't enough instances in this research, and there were unequal numbers in each group. Additionally, the analysis did not find any statistically significant differences in postoperative complications, which conflicts with previous researchers' findings. Second, follow-up period had been briefing-just two years. As a result, statistical analysis of long-term postoperative consequences such as traumatic arthritis, osteonecrosis of femoral head, and joint prosthesis wear were not performed.

CONCLUSION

Studied cases who underwent BH had shorter operating times, fewer fluoroscopy assessments, higher blood loss and transfusions than those who underwent PFN. Within a year of surgery, individuals in the BH group had greater joint motion function and were able to move around more quickly. Based on these findings, we suggest that BH may help elderly studied cases with osteoporotic unstable intertrochanteric fractures recover more quickly.

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الملخص العربي

علاج كسور مفصل الفخذ بين المدورين غير المستقرة بواسطة مسمار الفخذ القريب مقابل رأب المفصل ثنائي القطب المعزز

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ملخص البحث

الخلفية: لا يزال علاج كسور بين مدورين الفخذ غير المستقرة في مرضى هشاشة العظام المسنين مثيرا للجدل. النقطة الرئيسية للعلاج الجراحي هي تحقيق الحركة المبكرة مع تحمل الوزن الكامل والذي يمكن تحقيقه عن طريق أعادة الوضع التشريحي جيدا وتثبيت الكسر غير المستقر أو المفتت أو عن طريق رأب مفصل الورك.

الهدف: تقييم علاج كسور ما بين مدورين الفخذ غير المستقرة بواسطة المسمار الفخذي القريب أو رأب المفصل ثنائي القطب الإسمنتي ومقارنة فعالية ومضاعفات كلتا التقنيتين.

الطرق: أجريت هذه الدراسة التداخلية على خمسون مريضا يعانون من كسور بين المدورين غير مستقرة مقسمة إلى مجموعتين:

- **المجموعة الأولى:** شملت خمسة وعشرون مريضا خضعوا للعلاج بطريقة الاختزال والتثبيت بمسمار الفخذي القريب .
- **المجموعة الثانية:** شملت خمسة وعشرون مريضا خضعوا للعلاج بطريقة رأب المفصل ثنائي القطب الإسمنتي .

تم التقييم السريري والوظيفي بواسطة (تقييم هاريس للورك) .

النتائج: كانت كلتا المجموعتين مطابقتين من حيث العمر والجنس وموقع الكسر والخصائص الجراحية. كان (مؤشر سينغ) أعلى بكثير في مجموعة رأب المفصل ثنائي القطب الإسمنتي. كانت الخصائص الجراحية ومعدل المضاعفات أثناء العملية متشابهان بين المجموعتين. كانت مدة الإقامة في المستشفى / الأيام هي نفسها تقريبا بين المجموعتين. كان معدل تقرحات الفراش وعدوى الجرح أعلى بشكل غير ذات دلاله احصائيه في مجموعة المسمار الفخذي القريب، بينما كان خلع الورك أعلى بشكل غير ذات دلاله احصائيه في مجموعة رأب المفصل ثنائي القطب الإسمنتي. كان معدل وقت القطع ونسبة عدم الالتئام و وقت الالتئام أعلى بكثير في المجموعة الأولي عن المجموعة الثانية، بينما كانت المجموعة الثانية لديها معدل أعلى في تحميل الوزن الكامل علي الطرف المصاب مع وقت أقصر لتحمل الوزن الكامل بكثير عند المقارنة مع المجموعة الأولي 96 ٪ مقابل 72 ٪ و (8.67 ± 3.03 مقابل 12.06 ± 3.59) على التوالي. كان لدى المرضى في المجموعة الثانية درجات (تقييم هاريس للورك) أفضل مقارنة بتلك الموجودة في المجموعة الأولي ولكن دون فرق كبير.

الاستنتاجات: من الدراسة الحالية تبين ان المجموعة التي أجري لها رأب المفصل ثنائي القطب الإسمنتي كانت مدة الجراحة أقصر، و نسب تعرض أقل للإشعاع، و قدرة على الحركة فى وقت مبكر من أولئك الذين خضعوا لتثبيت الكسر بواسطة المسمار الفخذي القريب. لذلك، نقترح أن رأب المفصل ثنائي القطب الإسمنتي قد يساعد المرضى المسنين الذين يعانون من كسور هشاشة العظام غير المستقرة بين المدورين على التعافي بسرعة أكبر.

الكلمات المفتاحية: رأب المفصل ثنائي القطب الإسمنتي، المسمار الفخذي القريب.

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