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Original Research Article

"Comparison the Clinical and Radiological Outcome of Patients between Dynamic Hip Screw and Trochantric Fixation Nailing Implants Applied in Unstable Intertrochanteric Hip Fracture"

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Abstract:

Introduction: Intertrochanteric fractures in the proximal femur are prevalent in older people with osteoporosis. High morbidity and mortality rates. Radiography and surgery are usually required for diagnosis. Unstable fractures require intramedullary nailing, but stable fractures can be repaired with a sliding hip screw. Anatomic reduction and compression fixation are advised for mild to moderate comminution fractures. Stability is required for fixation. Cement augmentation and osteotomies are surgical alternatives.

Aims and Objectives: This study compared DHS and TFN implants for unstable intertrochanteric hip fractures. These two implants were compared for patient outcomes and fracture healing.

Methods: This comparative study included patients with suspected intertrochanteric fractures from December 2010 to March 2012. The patients were randomly assigned to receive a "dynamic hip screw (DHS)" or a "trochanteric fixation nail (TFN)". This research aimed to evaluate the relative efficacy and safety of different procedures by following patients after surgery to assess their level of function, complications, and pain. The effectiveness of the treatment plan was analysed statistically.

Results: DHS and TFN participants' demographics and clinical features are shown in Table 1. The mean ages and male-to-female ratios of both groups were similar. The "Preoperative Mobility Score (PMS)" and "American Society of Anesthesiologists (ASA)" scores were similar. Fracture features were similar. Operational length, blood loss, open reductions, X-rays, hospital stay, complications, and mobility outcomes were compared in Table 2. These factors differed, suggesting treatment regimens differ.

Conclusion: The study has concluded that DHS and TFN implants for unstable intertrochanteric fractures had similar results, although TFN had certain advantages.

Keywords: dynamic hip screw, trochantric fixation nailing implants, intertrochanteric hip fracture, intramedullary.

Introduction

Intertrochanteric fractures are extracapsular proximal femur fractures within the greater and lesser trochanters. The intertrochanteric region is encircled by thick trabecular bone between the larger and lesser trochanters of the femur. The insertion points of the greater trochanter are located there medius of the the vastus lateralis, piriformis, obturator internus, gluteus, and gluteus minimus. a smaller trochanter receives the iliopsoas, sometimes referred to as the iliacus & psoas major [1]. The posterior part of the femur's neck is reached through the calcar femoral, a straight line on the thick bone that crosses the posteromedial region of the femur shaft. femur. The stability of a fracture is determined by its structure, which makes it crucial. Compared to fractures in the neck of the femur, the large metaphyseal area has a greater union rate with less osteonecrosis because of its enormous blood supply. These fractures can occur in young and old people, although older people with osteoporosis tend to be more prone to do so because of a poor energy mechanism [2]. Women-to-men ratios can vary from 2:1 - 8:1. Additionally, these individuals tend to be older than those who get femoral neck fractures. These fractures often originate in a high-energy mechanism in the younger population. Like other hip fractures, these fractures have high morbidity and death rates. Intertrochanteric fractures make up nearly half of the 280,000 fractures annually. It is predicted to rise by 500,000 by 2040 [3].

Usually, the lower extremity of these people is short and turned externally. To improve preoperative treatment and prepare for postoperative rehab, it is important to get past

medical & social histories. Evaluation of skin conditions (open versus sealed fracture) & neurovascular conditions is crucial. Usually, discomfort makes it impossible to evaluate a range of motion [4]. To identify problems needing time to resolve before surgical stabilisation, basic laboratory tests such as coagulation studies, thorough metabolic panels, and complete blood counts should be performed. To medically optimise surgical candidates for operational repair, early engagement with an interprofessional team involving anaesthesia & internal medicine, and geriatrics is preferable [5].

Plain radiography images were first chosen to check for these fractures. In addition to full-length radiographs of the injured femur, the fractured hip from the lateral, AP, and anteroposterior (AP) views are among the advised views. Although pelvic films are not necessary for the diagnosis, they are helpful for preoperative planning to restore the correct neck-shaft angle. The femur's full-length radiographs help check for femoral shaft abnormalities that can impact the insertion on an intramedullary nail and examine any past implants on the distal femur [6]. CT and MRI are often not required if a physical examination indicates a fracture, although they could be used if the radiographs come back negative. An MRI is recommended if a bigger Concern is raised by intertrochanteric extension and trochanteric femur fracture. In addition, a doctor- A more accurate assessment of the fracture morphology can be made with an aided AP traction picture of the injured hip, whether closed reduction procedures are possible or necessary [7].

Treatment

Only nonambulatory patients, those at high risk for perioperative death, or those who select comfort care should get nonoperative therapy, which is seldom necessary. This kind of treatment is ineffective since it increases the potential for pneumonia, uti, decubiti, and severe vein thrombosis [8].

Because the choice of implant and fracture pattern directly impacts failure rate, the surgical procedure depends upon the fracture pattern & its intrinsic stability. A sliding hip screw would not be used to repair fractures that involve the lateral femoral wall since this is considered a reason for intramedullary nailing [9]. Other unstable fracture patterns that call for intramedullary nailing include fractures having comminution in the reverse obliquity fractures, the posteromedial cortex, an inadequate lateral wall, displacement greater trochanter broken bones, and subtrochanteric enlargement of the fracture. These fractures require urgent, not emergency, surgical care. This enables preoperative optimisation of the numerous comorbidities that patients frequently arrive with to lower morbidity and death [10]. While arthroplasty is an uncommon option, most of these fractures are solved surgically using a sliding, either the intramedullary hip screw or a hip screw. Using a hip screw that slides is indicated in stable fracture patterns with an unbroken lateral wall. This technique provides results similar to intramedullary nails for the right fracture pattern [11]. The dynamic hip screw has two benefits over intramedullary devices: it enables dynamic interfragmentary compression & is less expensive. The open method and higher blood loss are the primary drawbacks. The lateral wall's lack of integrity or the screw's placement— This can lead to and should be carried out when it is less than 25 mm, a tip-apex distance implant failure. Intertrochanteric fractures of a larger range, especially those having more unstable patterns, like a reverse obliquity pattern, can be treated with intramedullary nailing [12]. The less invasive intramedullary hip screw treatment, which minimises blood loss, is one of its claimed benefits. Despite the lack of proof showed addressing stable fracture patterns using an intramedullary hip implant outperformed a sliding hip screw, young surgeons are using it more and more frequently. There is some debate in these fractures about whether to use short or lengthy intramedullary implants. Highly arthroplasty is frequently not seen as a major treatment option for Comminuted fractures, those with a history of degenerative arthritis, people who can recover injectable fixation, and those whose bones are osteoporotic and unlikely to survive internal damage fixing therapy [13].

No one approach of therapy for unstable intertrochanteric fractures of the hip has achieved widespread acceptability, despite a variety of surgical procedures and fixation devices. Although determining whether an injury is stable is crucial, stability should be seen as a relative concept. A thorough examination of the preoperative radiographs, postreduction images, and probing of comminution after surgery should all be done to determine the degree of stability [14]. Anatomic reduction & compression hip screw fixation are likely the best treatments for fractures with mild to moderate posteromedial comminution. The fracture will become stable on its thanks to the collapsing device. However, in highly comminuted fractures, the screw may entirely move before the cortical surfaces between the proximal & distal fragments have formed a secure apposition [15]. If a stable reduction fails to occur surgically, most of these fractures will have fixation failure. Medial displacement osteotomy, valgus osteotomy, and cement augmentation in these high-risk fractures should be considered. No of the reduction method, the proximal fragment needs to be adequately positioned relative to the femoral shaft. Fixation

failure will likely occur if the main fracture pieces are prevented from achieving a stable configuration [16].

Method

Research design

This comparative study focused on patients with suspected intertrochanteric fractures from December 2010 to March 2012. Upon arrival, patients were given cardiopulmonary resuscitation and skin or skeletal traction splints, followed by comprehensive clinical and radiological tests before admission to the ward. Inclusion and exclusion criteria divided the 60 individuals into two groups: those receiving a dynamic hip screw (DHS) and those receiving a trochanteric fixation nail (TFN). The major purpose of this study was to compare DHS with TFN in treating intertrochanteric fractures and to determine whether the method was more effective and safer. Function, problems, and discomfort after surgery were all tracked as indicators of success. This study aimed to determine whether the therapy strategy was more effective by comparing the outcomes of the two groups. It should be noted that while this overview helps get a feel for the research design, a more thorough description would include information about the methods used, the exact parameters of the study, and the results of any statistical analysis.

Inclusion Criteria:

1. 45 years or older
2. Unstable Intertrochanteric hip fractures
3. Mono trauma
4. Medically fit for surgery
5. Less than 2 weeks post-fracture

Exclusion Criteria:

1. Fractures due to malignancy
2. Non-ambulatory pre-fracture
3. Severe dementia
4. Limited life expectancy due to significant medical co-morbidities
5. Medical contraindications to surgery
6. Inability to comply with the rehabilitation of form completion

Statistical analysis

The demographic and clinical characteristics of the DHS and TFN groups were compared by statistical analysis. The t-test analysis showed no statistically significant differences in the median ages, PMS scores, or ASA scores. The sexes, ages, types of fractures, and causes of falls were all analysed using the chi-square test, and the results showed no statistically significant differences. These findings prove that the two groups were comparable in these features, allowing for an accurate comparative analysis.

Ethical approval

Ethical approval was approved for the study by the proper “institutional review board (IRB)” or ethics committee, ensuring the participants' rights and safety would be protected.

Results

Table 1 shows the demographic and clinical features of DHS (dynamic hip screw) and TFN (trochanteric fixation nail) study participants. Both groups had similar mean ages: 64.67 for DHS and 65.26 for TFN. $p = 0.828$. Both groups had slightly larger male-to-female ratios. TFN had a slightly higher mean Preoperative Mobility Score (PMS) than DHS ($p = 0.098$), but the difference was insignificant. The mean American Society of Anesthesiologists (ASA) score, which indicates patient health, was similar between groups ($p = 0.462$). TFN has more 55-64-year-olds than DHS. AO Type 2 fractures were the most prevalent in both groups. The DHS and TFN groups had similar demographic and clinical features, including age, gender, PMS, ASA score, and fracture characteristics, suggesting a similar baseline profile for study participants.

Table 1: Demographic and clinical features of DHS (dynamic hip screw) and TFN

Mean age in years	**DHS (n=30)**	**TFN (n=30)**	**Test of Significance**
	64.67	65.26	t= -0.218, p= 0.828
Gender of pt (Male : Female)	2:1	2.1:0.9	
Mean PMS	7.5	7.97	t= -1.678, p= 0.098
Mean ASA	1.67	1.5	t= 0.740, p= 0.462
AGE GROUP (years)	**DHS (n= 30)**	**TFN (n=30)**	
45-54	07	03	
55-64	06	12	
65-74	11	09	
75-84	05	06	
85-94	01	00	
Sex	**DHS (n=30)**	**TFN (n=30)**	
Male	20	21	

Female	10	09
	DHS(n=30)	**TFN(n=30)**
Trivial fall	20	17
Fall from height	04	08
Road traffic accident	06	05
	DHS(n=30)	**TFN(n=30)**
Right side	05	07
Left side	25	23
	DHS(n=30)	**TFN(n=30)**
AO Type2	27	28
AO Type 3	03	02

A comparison of the DHS (dynamic hip screw) and TFN (trochanteric fixation nail) groups was performed, and the results are shown in Table 2. The mean operational duration in the DHS group was longer (85.50 minutes), and blood loss was greater (221 ml vs 123.83 ml) than in the TFN group. While the TFN group saw fewer open reduction instances, they were exposed to more X-rays. The TFN group had a considerably shorter hospital stay (6.13 days) than the DHS group (10.87 days). Neither group experienced any wound infections or patient deaths. The examination of limb length discrepancy revealed variations between the groups, with the TFN group exhibiting a higher prevalence of discrepancies between 0.5 and 1.5 centimetres. Regarding mobility, the DHS group exhibited improved walking capacity at 16 weeks compared to the TFN group, as measured by the Severe Walking Disability Scale (SWS). The SWS scores at 24 weeks and the time until radiological union did not differ significantly.

Table 2: Comparison of the DHS (dynamic hip screw) and TFN (trochanteric fixation nail) groups

	DHS (n=30)	**TFN(n=30)**	**Test of significance (p value)**
Mean operative time	85.5	60.16	t= 8.1647, p= 0.000
Mean blood loss (in ml)	221	123.83	t= 8.414, p= 0.000
Open reduction	08	02	X^2 = 4.32, df= 1, p<0.05
X ray Exposure (In F sec)	17.5	28.03	t= 6.229, p= 0.000
	DHS (n=30)	**TFN (n=30)**	**Test of significance (p value)**
Hospital stay (in days)	10.87	6.13	t= 20.397, p= 0.0000
Wound infection	Nil	nil	
Death of patient	none	none	
LIMB LENGTH DISCREPENCY	DHS(n=30)	TFN(n=30)	
<0.5cm	0	0	
0.5-1.5cm	20	24	
1.5-2.5 cm	7	5	
>2.5cm	3	1	
	DHS(n=30)	TFN (n=30)	Test of significance (p value)
SWS 16 weeks	14.93	17.33	t= -2.99, p= 0.004
SWS 24 weeks	24.07	25.27	t= -0.95, p= 0.344
Radiological union in wks	14.83	14.73	t= 0.13, p= 0.894

Discussion

This research compares the functional and radiological outcomes of dynamic hip screw (DHS) against shorter proximal femoral nail (PFN) with trochanteric stabilising plates (TSP) in fractures of the trochanter. In comparison to the DHS+TSP group, Hip PFN was associated with a speedier time to union & a quicker recovery to pre-fracture level of activity in unstable trochanteric fractures. The rates of complications compared with one-year mortality, as well as postoperative hip function and walking independence [17].

To compare the outcomes between the use of the Gamma nail, compression hip screw (CHS), dynamic hip screw, and trochanteric stabilising plate (DHS/TSP) in conjunction to treat unstable per- & subtrochanteric fractures sixty months after surgery, one hundred seventy people who have severe trochanteric femoral fractures are still alive. One The remaining eighty-five patients had operations in sequentially using a Gamma glue (n = 50, Gamma group) and a compression kind of hip screw (n = 35, CHS group) and a series of eighty-five patients had been operated on with a dynamic hip screw paired with a longitudinally attached trochanteric stabilising plates (DHS/TSP group) [18]. The categorization of fractures, assessment of fracture reduction, placing of implants, subsequent fracture dislocation, and additional consequences

were all examined in radiographs. Patients' functional status before and after surgery was documented, including a continuous follow-up period of at least six months. The TSP may be helpful in treating these challenging fractures because it prevents medialization from pieces of the distal fracture often connected to the CHS and the issue using femoral shaft fractures that were fixed with a Gamma nail [19].

The current study compares the outcomes of both In order to treat unstable fractures of the trochanteric area of the femur surgically, two osteosynthesis systems were created: the proximal femoral nail (PFN) and an evolving hip screw (DHS) with trochanteric butt-press plate (TBPP). With PFN, shorter hospital stays (20 vs. 24 days) and shorter surgery times (43 vs. 61 min.) were typical. 81% all DHS/TBPP patients and 98% all PFN patients were able to bear their full weight right away following osteosynthesis. The DHS/TBPP osteosynthesis is linked to a greater incidence of complications in unstable trochanteric fractures. As a result, we advise using PFN to treat unstable trochanteric fractures [20].

Over the years, orthopaedic surgeons have faced a particular problem in managing unstable intertrochanteric fractures. For the same, several implants and surgical procedures have been created. After fractures of the lateral wall, and dynamic hip screws (DHS) fixation, were identified as the primary source of femoral medialization. There is less femoral medialization when trochanteric stabilisation plate is supplemented, according to studies. to evaluate the radiological union & hip function following DHS and Trochanteric Stabilisation Plate (TSP) fixation for unstable intertrochanteric fractures. The successful method of stabilising Intertrochanteric fractures that are unstable and have DHS and TSP has good radiological and functional results [21].

Fractures are treated using gamma nails & proximal femoral locking plates (PFLP). The best implant was chosen after a controlled trial. To evaluate and examine the clinical outcomes of PFLPs and gamma nails in patients with shattered lateral walls and unstable intertrochanteric femoral fractures. 36 individuals had shattered lateral walls and unstable intertrochanteric femoral fractures. The study's findings, which show that neither Treatment of unstable intertrochanteric femoral instability with neither the gamma nail or the PFLP was ineffective fracture that had a fractured lateral wall, are summarised as follows: "No variation in hip-functional recovery was discovered between the gamma nail group with the PFLP group." However, in patients receiving PFLP, early weight bearing with bone fractures was discouraged [22].

Orthopedists continue to have difficulties treating intertrochanteric femoral fractures. Fixation failure remains a challenge in the management with unstable intertrochanteric femoral fractures, despite ongoing advancements in technology and devices. The current study's goal aimed to evaluate the clinical efficacy of an innovative locking gamma nail (LGN) intramedullary fixing device in the management of instability intertrochanteric femoral fractures. LGN may be regarded as a novel, less invasive surgical procedure in treating unstable intertrochanteric femur fractures since it is a straightforward, safe therapy with acceptable clinical effectiveness [23].

In the elderly, intertrochanteric fractures are frequent. Intertrochanteric fracture therapy will seek to as closely as feasible quickly return to the status before the injury practical. These types of fractures have traditionally been treated with dynamic hip screws (DHS) and proximal femoral nailing (PFN). The primary objective of this planned study was to examine, Harris hip scoring is used by the functional results of two different fixation systems for intertrochanteric fracture [24]. Its objective is to evaluate the practical outcomes attained by the patient following the surgical repair of intertrochanteric fractures of the hip based on the Harris hip score using the DHS and PFN. According to the study, PFN performed better than DHS in treating intertrochanteric fractures. When contrasted to the DHS group, the PFN group exhibited the largest percentage of participants with outstanding to good results and no subjects with bad results. the PFN at 12 weeks, twenty-four weeks, and at the end of the follow-up group had higher Harris hip scores [25].

Trochanteric fracture therapies aim to reduce morbidity and the likelihood of repeat procedures while restoring early mobility. Both the dynamic relationship between the hip screw and the femoral nail (PFN), which is the most commonly utilised, have advantages and disadvantages. By analysing surgical performance or postoperative results, we sought to compare the relative efficacy of different procedures for trochanteric fractures. PFN(A) required less time to operate and caused less intraoperative blood loss than DHS. For postoperative problems, there was, however, no difference. PFN(A) demonstrated a shorter surgical procedure with fewer intraoperative blood loss than DHS. For postoperative problems, there was, however, no difference [26].

Conclusion

In conclusion, this research compared the effectiveness of the “Dynamic Hip Screw (DHS)” with the “Trochanteric Fixation Nailing (TFN)” implant in treating unstable intertrochanteric fractures. Both groups had similar mean ages and

fracture characteristics. Closed reduction rates were higher and operative times were shorter in the TFN group. The TFN group had a markedly reduced length of stay in the hospital after surgery. Both groups had implant failures, although the numbers were not significantly different. Salvati-Wilson hip scores were similar at 24 weeks, whereas the TFN group had higher functional outcomes at 16 weeks. Although the DHS allowed for more fracture compression throughout follow-up, there was no significant difference in the radiological union between the two groups. The analysis concludes that the cost-effectiveness and proven dependability of DHS warrant its ongoing usage. TFN fixation should be reserved for unstable intertrochanteric and high subtrochanteric fractures because of its benefits of early weight bearing, reduced open reduction, and decreased surgical time. TFN fixation is most successful when performed with meticulous technical precision.

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