

Comparative Prospective Study on Functional Outcomes of Dynamic Hip Screw Versus Proximal Femoral Nailing for Intertrochanteric Fractures of Femur

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ABSTRACT

Introduction

About half of hip fractures in the elderly are caused by intertrochanteric fractures, of which more than 50% are unstable. Restoring mobility safely, effectively, and as close to the patient's pre-operative state as possible are the main objectives of treatment for any intertrochanteric fracture. Over the past 20 years, the dynamic hip screw (DHS) has become widely accepted and is now the gold standard for outcome comparison. Recently, proximal femoral nailing (PFN) is the intramedullary device that has frequently been claimed to have helped with these fractures, hence reducing the lever arm aspect on the implant. The Objectives of the present study is to compare the functional outcomes between dynamic hip screw versus proximal femoral nailing for the treatment of inter-trochanteric fractures of hip.

Methods

The present study was conducted in the department of orthopedics, the study included a total of 80 patients presented with hip fractures based on inclusion and exclusion criteria after taking informed consent. These patients were randomized by simple random sampling into two groups DHS and PFN group. The functional outcomes using HHS was compared between the two groups at 6th, 12th and 24 weeks respectively.

Results

The comparison of mean scores between DHS and PFN group at 6th, 12th and 24 week follow-up shows that the mean scores were statistically significantly better in PFN group at 12 weeks and 24 weeks, there was no significant differences found between the two groups at 6th week, as presented in Table 3. The functional outcomes were evaluated between the two groups, it is found that 12 (30%), 18 (45%), 8 (20%) and 2 (5%) patients had Excellent, Good, Fair and Poor outcomes in DHS group, whereas in PFN group 17 (42.5%), 19 (47.5%), and 4 (10%)

patients had Excellent, Good and Fair outcomes in PFN group and none of them had poor outcome in PFN group as represented in Table 4.

Discussion and Conclusion

It can be inferred from the study that PFN performed better in intertrochanteric fractures than DHS fixation, based on the functional outcome determined by the Harris Hip Score. This was determined by looking at the end result, movement range, and HHS. Comparing the PFN group to the DHS group, the PFN group's subjects had a higher percentage of excellent to good results, and none of them had poor results. At 12 weeks, 24 weeks, and the conclusion of the follow-up, the PFN group's HHS scores were higher. With fewer complications, PFN offers a quicker recovery and a better functional outcome for all kinds of intertrochanteric fractures.

Key-words: dynamic hip-screw, proximal femoral nailing, intertrochanteric fractures, femur and harrison's hip score.

Introduction

About half of hip fractures in the elderly are caused by intertrochanteric fractures, of which more than 50% are unstable [1, 2]. Restoring mobility safely, effectively, and as close to the patient's pre-operative state as possible are the main objectives of treatment for any intertrochanteric fracture. Over the past 20 years, the dynamic hip screw (DHS) has become widely accepted and is now the gold standard for outcome comparison. Although the DHS has been demonstrated to yield positive outcomes, complications are common, especially in cases of unstable intertrochanteric fracture. By shortening the distance between the hip joint and implant, proximal femur nailing fixation has the advantage of producing a more biomechanically stable design [4, 8].

The final result and any complications that may arise from the fracture and its fixation will depend on the type of implant that is used. Sliding plate devices and dynamic hip screws (DHS) are already commonly utilized for fixation. However, the device may have a tendency to pierce or retract if weight bearing is initiated too soon, particularly in the case of complicated and comminuted fractures. Because of its placement near the body's mechanical axis, the proximal femoral nailing (PFN) is the intramedullary device that has frequently been claimed to have helped with these fractures, hence reducing the lever arm aspect on the implant.

The Objectives of the present study is to compare the functional outcomes between dynamic hip screw versus proximal femoral nailing for the treatment of inter-trochanteric fractures of hip.

Materials and Methods

The present study was conducted in the department of orthopedics, Mallareddy Medical College for Women, Suraram, Hyderabad. The present study included a total of 80 patients presented with hip fractures based on inclusion and exclusion criteria after taking informed consent.

Type of the study: Prospective comparative study

Sample size: 80

Sampling method: simple random sampling

Inclusion criteria: The inclusion criteria consist of patients diagnosed with closed intertrochanteric fractures that are less than three weeks duration who were able to walk prior to fracture.

Exclusion criteria: Patients with malignancy, neurological, psychiatric illness, and patients associated with co-morbid conditions like uncontrolled diabetes mellitus, uncontrolled hypertension, hyperthyroidism, patients with active infections of hip joints were excluded from the study.

Data collection and General Physical Examination: A thorough history was taken and a head-to-toe physical examination was performed as soon as the patient was admitted. Radiographs of the patient's pelvis were taken in an AP view, displaying both of their hip joints. The patient's confirmed diagnosis was determined by a clinical and radiological evaluation. Next, skeletal or skin traction was used as a sort of static traction. The patient provided the necessary information, which was entered using the proforma. After giving their written informed permission regarding the procedure's nature and its complications, patients were admitted for surgery. In DHS and PFN groups, the patients were assigned by simple randomization. The chosen patients were admitted as soon as the anaesthetist and, if necessary, the doctor or cardiac specialist gave their consent for surgery.

All patients were prophylactically started on third-generation cephalosporins (inj ceftriaxone 1 g IV, half to one hour prior to the start of surgery. All patients received postoperative injectable antibiotics, intravenous cephalosporins for five days, followed by oral antibiotics until the sutures were removed. Static quadriceps strengthening exercises were started on the second or third postoperative day. The drain if placed was later removed after the third postoperative day. The sutures were removed after 10 to 14 days. The patients were mobilized without support as soon as localized pain or general patient condition permitted. Partial support was started six weeks after clinical and radiological assessment and full support was performed 12 weeks after the assessment. And recalled after six months for the final follow-up and assessment using

Harris hip score (HHS). 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 gives a maximum of 100 points. Pain receives 44 points, function 47 points, range of motion 5 points, and deformity 4 points. A function is subdivided into activities of daily living (14 points) and gait (33 points). The higher the HHS, the less the dysfunction. A total score of <70 scores are considered a poor result; 70-80 is considered fair, 80-90 is good, and 90-100 is excellent.

Statistical Analysis: The data was entered into Microsoft excel sheet and the comparison between the two groups was done by t test and p value of less than 0.05 was considered as statistically significant.

Results

Table 1: Demographic profile of the patients (total no 80)		
	DHS group (no=40)	PFN group (no=40)
Age	62.43 ± 10.87	60.98 ± 11.24
Gender		
Male	18 (45%)	16 (40%)
Female	22 (55%)	24 (60%)
Side		
Left	21 (52.5%)	23 (57.5%)
Right	19 (47.5%)	17 (42.5%)
Mode of injury		
RTA	8 (20%)	7 (17.5%)
Self-injury	6 (15%)	8 (20%)
Other causes	26 (65%)	25 (62.5%)

	DHS group	PFN group
Type 1	12 (30%)	13 (32.5%)
Type 2	16 (40%)	15 (37.5%)
Type 3	7 (17.5%)	6 (15%)
Type 4	5 (12.5%)	6 (15%)

	DHS group	PFN group
6 weeks	35.67 ± 2.89	34.86 ± 3.12
12 weeks	56.68 ± 2.36	64.23 ± 4.36**
24 weeks	85.42 ± 6.98	90.23 ± 7.42*

	DHS group	PFN group
Excellent	12 (30%)	17 (42.5%)
Good	18 (45%)	19 (47.5%)
Fair	8 (20%)	4 (10%)
Poor	2 (5%)	0

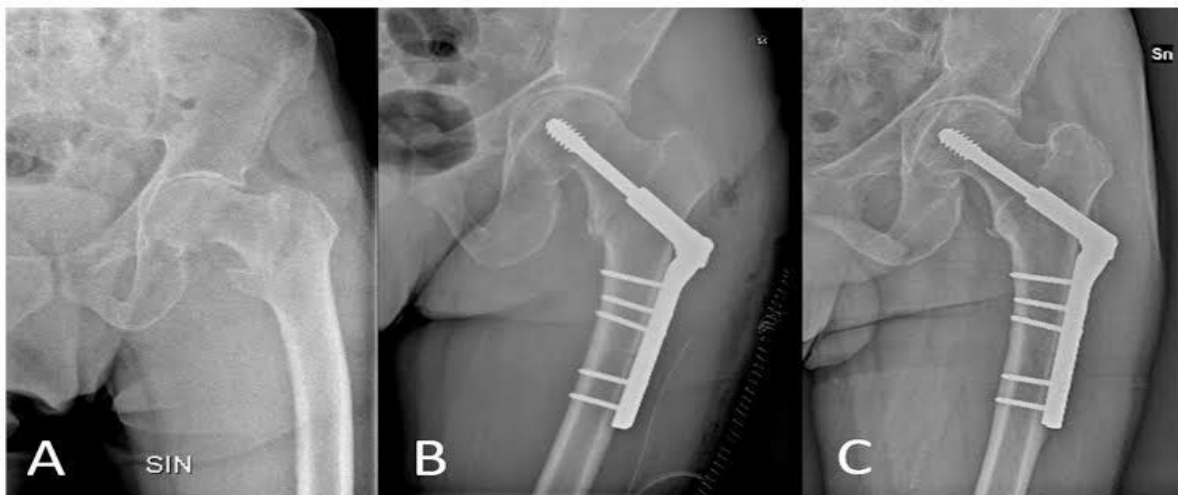


Figure 1: DHS, A: Pre-operative, B: Post-operative and C: Follow-up X-ray



Figure 2: PFN, A: Pre-operative, B: Post-operative and C: Follow-up X-ray



Figure 3: Comparative X-ray of DHS and PFN (a: DHS and b: PFN)

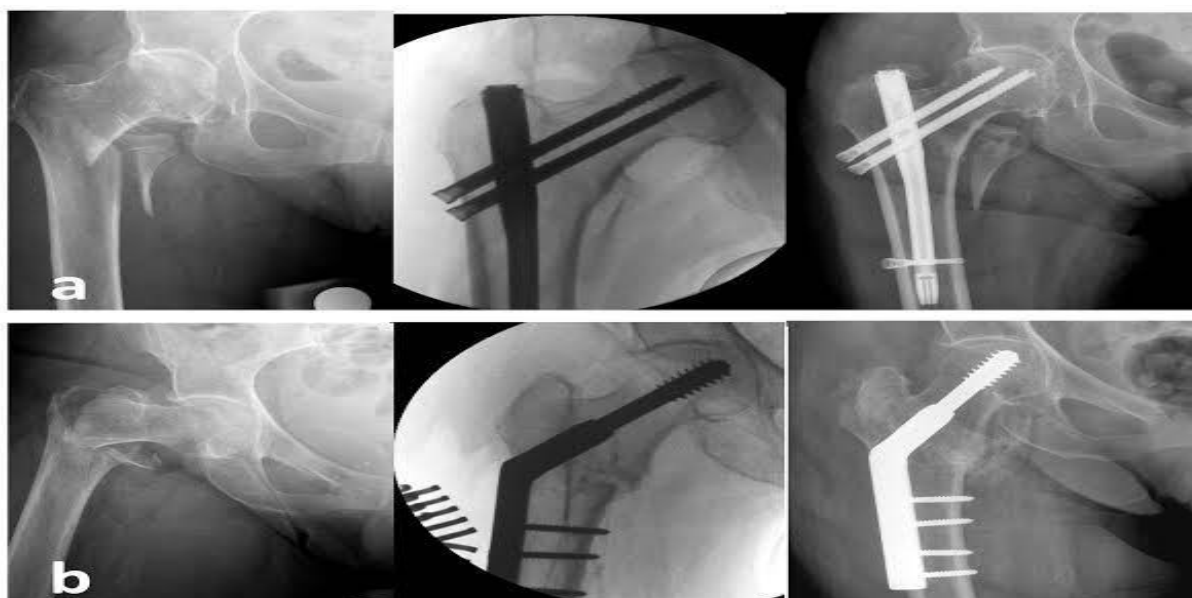


Figure 4: Final Comparative x-ray of PFN and DHS (a: PFN and b: DHS)



Figure 5: Bilateral DHS x-ray

Discussion

In the present study, the demographics profile shows that the mean age of patients in DHS and PFN groups were 62.43 ± 10.87 and 60.98 ± 11.24 years respectively. Number of males and females in DHS and PFN groups were 18 (45%), 22 (55%), 16 (40%) and 24 (60%) respectively. In DHS group 21 (52.5%) and 19 (47.5%) had left leg and right leg intertrochanteric fracture and in PFN group 23 (57.5%) and 17 (42.5%) had left leg and right leg intertrochanteric fracture respectively. 8 (20%), 6 (15%) and 26 (65%) had RTA, self-injury and other causes of injury in DHS group. Similarly, 7 (17.5%), 8 (20%) and 25 (62.5%) had RTA, self-injury and other causes of injury in PFN group as presented in Table 1. Intertrochanteric fractures were classified into type 1-4, in DHS group it is seen that 12 (30%), 16 (40%), 7 (17.5%) and 5 (12.5%) belong to type 1, type 2, type 3 and type 4 respectively. Similarly, in PFN group 13 (32.5%), 15 (37.5%), 6 (15%) and 6 (15%) had type 1, type 2, type 3 and type 4 intertrochanteric fractures respectively, represented in Table 2. The comparison of mean scores between DHS and PFN group at 6th, 12th and 24 week follow-up shows that the mean scores were statistically significantly better in PFN group at 12 weeks and 24 weeks, there was no significant differences found between the two groups at 6th week, as presented in Table 3. The functional outcomes were evaluated between the two groups, it is found that 12 (30%), 18 (45%), 8 (20%) and 2 (5%) patients had Excellent, Good, Fair and Poor outcomes in DHS group, where as in PFN group 17 (42.5%), 19 (47.5%), and 4 (10%) patients had Excellent, Good and Fair outcomes in PFN group and none of them had poor outcome in PFN group as represented in Table 4.

Orthopedicians have acknowledged that femur fractures in the intertrochanteric region pose a significant challenge in terms of both achieving fracture union and quickly

restoring optimal function with minimal complications. The goal of fracture management has therefore shifted to being able to mobilize patients as soon as possible, to recover quickly, and to get them back to their pre-morbid homes and workplaces as a functionally and psychologically independent unit. Internal fixation is a type of surgical or operational treatment that is now the gold standard for treating almost all fractures in the intertrochanteric region because it allows for very early rehabilitation and provides the best functional recovery prospects. With so many different kinds of implants on the market, i. E. The most widely used (and still gold standard) device among fixed nail plate devices, sliding nails or screw plates, and intramedullary devices is the compression hip-screw; however, surgical methods for closed intramedullary nailing have become increasingly popular recently.

Conclusion

It can be inferred from the study that PFN performed better in intertrochanteric fractures than DHS fixation, based on the functional outcome determined by the Harris Hip Score. This was determined by looking at the end result, movement range, and HHS. Comparing the PFN group to the DHS group, the PFN group's subjects had a higher percentage of excellent to good results, and none of them had poor results. At 12 weeks, 24 weeks, and the conclusion of the follow-up, the PFN group's HHS scores were higher. With fewer complications, PFN offers a quicker recovery and a better functional outcome for all kinds of intertrochanteric fractures.

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