

ORIGINAL RESEARCH

Comparison of efficacy of dynamic hip screw and proximal femoral nail in patients undergoing treatment for intertrochanteric fractures of femur

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ABSTRACT

Background: The present study was conducted for comparing the efficacy of dynamic hip screw (DHS) and proximal femoral nail (PFN) in patients undergoing treatment for intertrochanteric fractures of femur. **Materials & methods:** The present study included 40 cases of intertrochanteric fractures of skeletally mature adults out of which 20 each were operated upon with DHS and PFN. For both implants, the desired position of the lag screw was in the central femoral neck on the lateral view and in the central inferior femoral neck on the AP view, with the tip between 5 and 10 mm from the subchondral bone. Immediate postoperative radiographs were checked to determine if cortical congruence at the calcar region has been restored. All patients were given antibiotic and thromboembolic prophylaxis. Outcome was evaluated and compared. All the results were analyzed by SPSS software. **Results:** Mean age of the patients of the DHS group and PFN group was 61.25 and 63.88 years respectively. Non-significant results were obtained while comparing the radiological callus formation after 10 weeks and 14 weeks respectively. Significant results were obtained while comparing the mean time of early mobilization till weight bearing in between DHS group and PFN group (P- value < 0.05). Mean toe touch weight bearing in the DHS and the PFN group were found to be 48.1 and 33.8 respectively. Significant results were obtained while comparing the toe touch weight bearing in between the DHS group and the PFN group (P- value < 0.05). **Conclusion:** Proximal Femoral nail gives better results in intertrochanteric fractures.

Key words: Double screw, Helical screw, Femur

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INTRODUCTION

Intertrochanteric (IT) femur fractures comprise approximately 1/2 of all hip fractures caused by a low-energy mechanism such as a fall from standing height. These fragility hip fractures occur in a characteristic population with risk factors including increasing age, female gender, osteoporosis, a history of falls, and gait abnormalities. Surgery is almost always the recommended treatment as the morbidity and mortality associated with nonoperative treatment historically have been high. Patients often have preexisting comorbidities that dictate the ultimate outcome.¹⁻³

Nonunion of intertrochanteric fractures is uncommon because there is excellent blood supply and good cancellous bone in the intertrochanteric region of the femur. Most intertrochanteric fractures treated by

conservative methods or internal fixation heal. Occasionally, nonunion or early failure of fracture fixation occurs, the reasons being delayed treatment, unfavorable fracture patterns, poor bone quality, or suboptimal internal fixation.^{4, 5} Dynamic Hip Screw (DHS) is still considered the gold standard for treating intertrochanteric fractures by many. The advantages and disadvantages of the DHS have been well established in several studies done in the past. Many studies compare the DHS with Gamma nail. Not many studies compare the DHS with Proximal femoral nail (PFN), which is being preferred by many.^{6- 8}Hence; the present study was conducted for comparing the efficacy of dynamic hip screw and proximal femoral nail in patients undergoing treatment for intertrochanteric fractures of femur.

MATERIALS & METHODS

The present study was conducted for comparing the efficacy of dynamic hip screw and proximal femoral nail in patients undergoing treatment for intertrochanteric fractures of femur. The present study included 40 cases of intertrochanteric fractures of skeletally mature adults out of which 20 each were operated upon with DHS and PFN. Inclusion criteria for present study included skeletally mature patients of all age groups having intertrochanteric femur fracture classified as per, AO/OTA classification. Operations were performed on a fracture table under anaesthesia. Closed reduction was performed under C-arm image intensifier, was considered acceptable when anatomic or a slight valgus position was achieved on anteroposterior (AP) radiographic views and slight cervical anteversion was achieved on lateral radiographic views. For both implants, the desired position of the lag screw was in the central femoral neck on the lateral view and in the central inferior femoral neck on the AP view, with the tip between 5 and 10 mm from the subchondral bone. Immediate postoperative radiographs were checked to determine if cortical congruence at the calcar region has been restored. All patients were given antibiotic and thromboembolic prophylaxis. Outcome was evaluated and compared. All the results were analyzed by SPSS software. Chi-square test and Mann Whitney U test were used for assessment of level of significance. P-value of less than 0.05 was taken as significant.

RESULTS

Mean age of the patients of the DHS group and PFN group was 61.25 and 63.88 years respectively. Among the patients of the DHS group, 12 (60%) of the patients were females, while 8 (40%) of the patients were males. Among the patients of the PFN group, 10 (50) of the patients were females while the remaining

10 (50%) were males. Among the patients of the DHS group, fall and RSA were the mode of trauma among 14 (70%) and 6 (30%) patients respectively. In the patients of the PFN group, fall and RSA were responsible for trauma in 11 (55%) and 9 (45%) patients respectively. In the DHS group, no union occurred on radiological examination after 10 weeks in 8 (40%) patients while minimal union occurred in 12 (60%) patients. In the PFN group, no union occurred on radiological examination after 10 weeks in 14 (70%) patients while minimal union occurred in 6 (30%) patients. In the DHS group, union occurred on radiological examination after 14 weeks in 13 (65%) patients while minimal union occurred in 7 (35%) patients. In the PFN group, no union occurred on radiological examination after 14 weeks in 1 (5%) patients while minimal union and complete occurred in 4 (20%) patients and 15 (75%) patients respectively. Non-significant results were obtained while comparing the radiological callus formation after 10 weeks and 14 weeks respectively. Mean duration of surgery in the patients of DHS group and the PFN group were found to be 68.32 and 55.46 minutes respectively. Significant results obtained while comparing the mean duration of surgery in between the subjects of the DHS group and the PFN group. Mean time of early mobilization till weight bearing in the DHS group and the PFN group were found to be 18.43 and 12.32 respectively. Significant results were obtained while comparing the mean time of early mobilization till weight bearing in between DHS group and PFN group (P-value < 0.05). Mean toe touch weight bearing in the DHS and the PFN group were found to be 48.1 and 33.8 respectively. Significant results were obtained while comparing the toe touch weight bearing in between the DHS group and the PFN group (P-value < 0.05).

Table 1: Distribution of patients of DHS group and PFN group according to radiological callus formation after 10 weeks

Radiological callus	DHS		PNF	
	No. of patients	Percentage	No. of patients	Percentage
Minimal union observed	12	60	14	70
No union observed	8	40	6	30
Total	20	100	20	100
p-value	0.112			

Table 2: Distribution of patients of DHS group and PFN group according to radiological callus formation after 14 weeks

Radiological callus	DHS		PNF	
	No. of patients	Percentage	No. of patients	Percentage
Minimal union observed	7	35	4	20
No union observed	0	0	1	5
Union observed	13	65	15	75
Total	20	100	20	100
p-value	0.335			

Table 3: Comparison of mean duration of surgery in between the DHS group and PFN group

Group	Duration of surgery	SD	P- value
DHS	68.32	5.39	0.001 (Significant)
PFN	55.46	5.25	

Table 4: Comparison of time of early mobilization till weight bearing in between the DHS and PFN group

Group	Time of early mobilization till weight bearing	SD	P- value
DHS	18.43	8.31	0.001 (Significant)
PFN	12.32	8.11	

Table 5: Comparison of toe touch weight bearing in between the DHS and PFN group

Group	Toe touch weight bearing	SD	P- value
DHS	48.1	14.9	0.002 (Significant)
PFN	33.8	12.8	

DISCUSSION

Trochanteric fractures are generally associated with bone fragility and caused by a low energy trauma: a significant increase of these fractures is expected on the next decades. Improvements of anaesthesiologic and surgical techniques have increased the rate of success and reduced the elevated risk of death within the first year after fracture, independently from the patients' age and health status. Surgical fixation and early rehabilitation are the goals of an adequate treatment in order to allow a quick recovery for patients.⁹⁻¹¹ Hence; the present study was conducted for comparing the efficacy of dynamic hip screw and proximal femoral nail in patients undergoing treatment for intertrochanteric fractures of femur.

Mean age of the patients of the DHS group and PFN group was 61.25 and 63.88 years respectively. Among the patients of the DHS group, 12 (60%) of the patients were females, while 8 (40%) of the patients were males. Among the patients of the PFN group, 10 (50) of the patients were females while the remaining 10 (50%) were males. Among the patients of the DHS group, fall and RSA were the mode of trauma among 14 (70%) and 6 (30%) patients respectively. In the patients of the PFN group, fall and RSA were responsible for trauma in 11 (55%) and 9 (45%) patients respectively. In the DHS group, no union occurred on radiological examination after 10 weeks in 8 (40%) patients while minimal union occurred in 12 (60%) patients. In the PNF group, no union occurred on radiological examination after 10 weeks in 14 (70%) patients while minimal union occurred in 6 (30%) patients. In the DHS group, union occurred on radiological examination after 14 weeks in 13 (65%) patients while minimal union occurred in 7 (35%) patients. In the PNF group, no union occurred on radiological examination after 14 weeks in 1 (5%) patients while minimal union and complete occurred in 4 (20%) patients and 15 (75%) patients respectively. Non-significant results were obtained while comparing the radiological callus formation after 10 weeks and 14 weeks respectively. In a previous study conducted by Jonnes C et al, authors compared the functional and radiological outcome of PFN with DHS in treatment of Type II

intertrochanteric fractures. PFN is better than DHS in type II intertrochanteric fractures in terms of decreased blood loss, reduced duration of surgery, early weight bearing and mobilization, reduced hospital stay, decreased risk of infection and decreased complications.¹² The records of 227 patients with intertrochanteric fractures treated by intramedullary hip screws were analysed retrospectively in another previous study conducted by Herman A et al. The standard tip apex distance (TAD) measurement above 25 mm did not predict failure. The TAD scale focuses on length measurement and lacks the vector properties of multidirectional measurements.¹³

Mean duration of surgery in the patients of DHS group and the PFN group were found to be 68.32 and 55.46 minutes respectively. Significant results obtained while comparing the mean duration of surgery in between the subjects of the DHS group and the PFN group. Mean time of early mobilization till weight bearing in the DHS group and the PFN group were found to be 18.43 and 12.32 respectively. Significant results were obtained while comparing the mean time of early mobilization till weight bearing in between DHS group and PFN group (P- value < 0.05). Treatment outcome of screw proximal femoral nail (PFN) system was compared with that of a helical PFN in another previous study conducted by Bajpai J et al. Both groups were similar in respect of time of surgery, blood loss and functional assessment and duration of hospitalization. In screw PFN group 2 patients had superficial wound infection, 1 patient had persistent hip pain and 1 patient had shortening >1 cm but <2 cm, while in helical PFN group 1 patient had superficial wound infection. Both screw and helical PFN are very effective implants in osteoporotic and unstable trochanteric fractures even in Indian patients where the bones are narrow and neck diameter is small.¹⁴ A minimally invasive Dynamic Hip Screw (MIDHS) technique was presented in another previous study conducted by Lee et al. One hundred and two patients with intertrochanteric fractures were treated with either a MIDHS or a conventional dynamic hip screw (CDHS). The CDHS group had significantly larger wound incision, greater

haemoglobin level drop, higher pain level, more total analgaesic use and longer hospital stay than the MIDHS group. The hip score, union rate, healing time, adequate reduction and adequate screw position rate was not significantly different between the two groups. In conclusion, either a MIHS or a CDHS in the treatment of intertrochanteric fractures was an effective, simple and safe method.¹⁵

Mean toe touch weight bearing in the DHS and the PFN group were found to be 48.1 and 33.8 respectively. Significant results were obtained while comparing the toe touch weight bearing in between the DHS group and the PFN group (P- value < 0.05). Stern R et al compared femoral head placement, rates of reoperation and cephalic implant cut-out of a screw versus a blade for patients over age 60 with low energy trochanteric fractures treated either with sliding hip screw or cephalomedullary nail. After surgeon selection of either hip screw or nail, hip screw patients were randomised to either a DHS (dynamic hip system screw) or DHS blade (dynamic hip system blade), while nail patients were randomised to either a Gamma3 Trochanteric Nail or a PFNA (proximal femoral nail antirotation). There were 137 patients in the screw group and 132 in the blade group available for follow-up. They did not differ regarding rates of reoperation or cut-out. Both a screw and a blade performed equally well in terms of implant placement in the femoral head and outcome.¹⁶

CONCLUSION

Proximal Femoral nail gives better results in intertrochanteric fractures.

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