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Proximal femoral nailing versus dynamic hip screw device for trochanteric fractures - A comparative study

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Abstract
Intertrochanteric fractures were found to be most common fracture in patients over sixty years of age. As fracture occurs through the cancellous bone with excellent blood supply, they healed with conservative treatment and usually resulted in malunion. The goal of treatment of an intertrochanteric fracture is the restoration of the patient to his or her pre-injury status as early as possible leads to internal fixation of these fractures to increase patient comfort, decrease hospital stay and reduces complications. Sliding devices like the dynamic hip screw have been extensively used for fixation. Intramedullary devices like the proximal femoral nail have been reported to have an advantage in such fractures as their placement allowed the implant to lie closer to the mechanical axis of the extremity. The purpose of the present study is to verify the theoretical advantages of the proximal femoral nail over the dynamic hip screw device
50 patients with intertrochanteric fracture who were available for follow up of for 1 year post operatively were included in this study. The patients were selected for Dynamic hip screw fixation or proximal femoral Nailing randomly. The study period was from April 2015 till March 2016. All the cases were evaluated at 6weeks, 12weeks, 6months and 1 year. Assessment done on the basis of Duration of surgery, Blood loss, early weight bearing, union, deformity and limb length discrepancy.

Keywords: Intertrochanteric fracture, DHS, PFN

Introduction
Trochanteric fractures are one of the most common fractures in patients over sixty years of age. As they occur through the cancellous bone with excellent blood supply ,healed with conservative treatment usually resulted in malunion with varus and external rotation deformity ,shortening of limb .The goal of treatment of an intertrochanteric fracture is the restoration of the patient to his or her pre-injury status as early as possible. This led to internal fixation of these fractures to fasten fracture union, increase patient comfort, decrease hospital stay and reduce complications. Stability after fracture fixation refers to the capacity of the internally fixed fracture to resist muscle and gravitational forces around the hip that tend to force the fracture into a varus position. Intrinsic factors like osteoporosis and comminution of the fracture and extrinsic factors like choice of reduction, type of implant contribute to failure of internal fixation. Sliding devices like the dynamic hip screw have been extensively used for fixation, However if the patient bears weight early, especially in comminuted fractures, these devices can penetrate the head. Intramedullary devices like the proximal femoral nail have been reported to have an advantage in such fractures as their placement allowed the implant to lie closer to the mechanical axis of the extremity, thereby decrease the lever arm and bending moment on the implant, allows early weight bearing with less resultant shortening on long term follow up.

Materials and Methods
The study was conducted in Department of Orthopedics, Rajendra institute of medical science, RANCHI from April 2015 till MARCH 2016 where 50 patients with intertrochanteric fractures were selected. The patients were evaluated preoperatively, necessary investigations was done. Type of surgery and details were noted. The immediate post - operative x-rays were evaluated. All the cases were again evaluated through clinical and radiological methods at 6 weeks, 12 weeks, 6 months and 1 year. 25 fracture fixation done with proximal femoral nailing, 25 fracture fixation done with dynamic hip screw fixation.

The youngest patient in the series was aged 38 years and the oldest was 75 years. Anteroposterior and lateral radiographs of the affected hip were taken. The patients were then put on traction over a Bohler– Braun splint. The fractures were classified as per Boyd and Griffin type of intertrochanteric fractures. Patients were taken up for surgery within 6-7 day after trauma.

All patients were positioned supine on a fracture table. The fracture was reduced and checked by anteroposterior and lateral views on the image intensifier. All fractures were reduced by the closed method. The objective of reduction is to confer weight bearing stability and correct varus and rotational deformities. Duration of surgery, blood loss and fluoroscopy time was recorded intraoperative. All patients received injectable antibiotic given one hour before surgery and continued post operatively for 6 days. Oral antibiotics were continued for next 7 days. Patients were allowed to sit up in bed on the second post-operative day. Static quadriceps exercises where started on the second and third post-operative day. Sutures were removed after 12 days. Patients were mobilized non-weight bearing as soon as the pain or general condition permitted. Weight bearing was commenced depending upon the stability of the fracture and adequacy of fixation, delaying it for patients with unstable or inadequate fixation.

Results and Analysis

Table 1: Age Distribution

Method of Fixation			
Age (in yrs)	**DHS (%)**	**PFN (%)**	**Total (%)**
38-40	2(8)	2(12)	4(8)
41-50	3(12)	5(20)	8(16)
51-60	9(36)	5(20)	14(28)
61-75	11(40)	13(52)	24(48)
Total	25(100)	25(100)	50(100)

Table 2: Sex Distribution

Method of Fixation			
SEX	DHS	PFN	**Total**
Female	15(60)	13(52)	28(50)
Male	10(40)	12(48)	22(50)
Total	25(100)	25(100)	50(100)

Table 3: Side of Injury

	Method of Fixation		**Total**
	DHS	**PFN**	
Left	6(24)	7(28)	13(26)
Right	19(72)	18(72)	37(74)
Total	25(100)	25(100)	50(100)

Table 4: Type of Fracture

Type of Fracture	**Method of Fixation**		**Total**
	DHS	**PFN**	
T1 type	3(12)	0(0)	3(6)
T2 type	12(48)	10(40)	22(44)
T3 type	10(40)	11(44)	21(42)
T4 type	5 (20)	4(16)	9(18)
Total	25(100)	25(100)	50(100)

Based on original text by Clifford R. Wheeless, III, MD, Types 1 and 2 are considered stable and Types 3 and 4 are considered unstable.

Table 5: Complication

Complication	**DHS (%)**	**PFN (%)**	**Total (%)**
1 Malunion	2 (8)	0(0)	2 (4)
2 Wound infection	3(12)	1(4)	4(8)
3 Screw back out	1(4)	0(0)	1(4)

Discussion

The goal of the study was to compare the functional outcome of patient with intertrochanteric fractures treated by two different fixation devices, the extramedullary dynamic hip screw fixation and the intermedullary proximal femoral nail. Our study consists of 50 patient intertrochanteric fractures out of which 25 was treated with DHS and 25 with PFN.

The age of the patient ranged from 38 to 75 years with an average of 61 years. In case of Dynamic hip Screw fixation it was 64 years and in cases of proximal femoral nailing it was 58years.The average age in our study nearly correlates to that of White and his colleagues [13].

In our study there were 22 males and 28 females. Dahl and colleagues [14], in their study 65% of patients were females, explained by the fact that female are more prone for the osteoporosis after menopause.

Our series consisted of 25 stable and 25 unstable intertrochanteric fractures as classified according to Boyd and Griffin classification. The distribution of stable and unstable fractures in both groups was similar. Out of the 25 stable fractures, 18 were in the DHS group and 7 in the PFN group. Out of the 25 unstable fractures, 7 were in the DHS group and 18 in the PFN group. The duration of surgery in the DHS group ranged from 55 minutes to 85 minutes with a mean of 66 minutes. The duration of surgery in the PFN group ranged from 75 minutes to 105 minutes with a mean of 88 minutes. Baumgaertner *et al*. [9] found that the surgical times were 10 per cent higher in the DHS group in their series. Saudan and colleagues [12] found that there was no significant difference between the operative times in the two groups in their series.

The DHS patients had significantly more blood loss intra-operative compared to PFN group. This is similar to the series by Baumgaertner and associates [9] who also found a significant difference in the intra operative blood loss in their series, with 150ml higher for the DHS group.

Complication

Results of treatment of stable and unstable fracture have usually been reported together in the literature, and it is generally accepted that with increasing security of fracture pattern (stable to unstable), there is a higher risk of complication and poor outcome.

The only complications we encountered in this series were malunion, screw back out and wound infection. There was no significant difference between the two groups with regards to time of fracture union as all fracture united at 12 weeks in case of DHS and 12.5 weeks in case of PFN. 4 patients in the DHS group had malunion. In our series 3 patients of the DHS group had wound infections as compared to single patient in the PFN group, which was not statistically significant. In this study the average limb length shortening of patient in DHS group was 1.20cm as compared to 0.57cm in PFN group which was significant. This could be due to sliding of the lag screw in the DHS group, allowing greater fracture impaction, as compared to the PFN. The average range of motion the hip joint was 90 degree in the DHS group and 105 degree in the PFN group at 6 months of follow up. Hence, in our study the patients in the PFN group regained a significantly better range of motion as compared to those in the DHS group. This is

comparable to the results put forth by Saudan and colleagues [12].

When we compared the stable and unstable fractures separately, we found that there was no significant difference in the outcomes of the stable fractures in the two groups. While comparing the unstable fractures in the two groups we found that the functional outcome of the patients in the PFN group was significantly better than the outcome of the patients in the DHS group with good results for 87.5% of the unstable fractures treated with PFN compared to only fair and poor results for 90% of the unstable fractures treated with DHS. In our series, only 14 of the 25 patients (56%) in the DHS group regained their pre-injury mobility level as compared to 21 of the 25 patients (84 %) in the PFN group at the fourth month of follow up. Similar findings were seen in the series by Pajarinen and group [21].There is some amount of shortening seen in the DHS group which can be explained as due to significantly greater impaction of the fracture in the DHS group. Less blood loss and less postoperative pain with the PFN indicate that the PFN has an advantage over the DHS even in the treatment of stable intertrochanteric fractures where the functional outcomes are similar. In addition, with unstable intertrochanteric the PFN has a definite advantage over the DHS in terms of less limb length shortening, earlier restoration of pre-injury walking ability and a better overall functional outcome.

Conclusion

We want to conclude that in stable intertrochanteric fractures, both the PFN and DHS have similar outcomes. However, in unstable intertrochanteric fractures the PFN has significantly better outcomes in terms of earlier restoration of walking ability. In addition, as the PFN requires less blood loss but more expertise as compare to DHS. Hence, in our opinion, PFN may be the better fixation device for most intertrochanteric fracture

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