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Original Research Article

To Study Outcome of Various Surgical Methods in Intertrochanteric Fractures of the Femur

Alok Sood[1], Vinay Kumar Srivastava[2]

[1]Associate Professor, Department of Orthopaedics, Major SD Singh Medical College, Farrukhabad.
[2]Associate Professor, Department of Psychiatry, Career Institute of Medical Sciences and Hospital, Sitapur-Hardoi by Pass Road, Lucknow.

Corresponding Author: Alok Sood

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ABSTRACT

Background: Trochanteric fractures are one of the most common injuries sustained predominantly in patients over sixty years of age. They are three to four times more common in women who are osteoporotic; trivial fall being the most common mechanism of injury. For many, this fracture is often a terminal event resulting in death due to cardiac, pulmonary or renal complications. Approximately 10 to 30% of patients die within one year of an intertrochanteric fracture. The present study was conducted with the objectives- to compare surgical treatment of intertrochanteric fractures of the femur with the proximal femoral nail and dynamic hip screw device, with respect to duration of surgery, fracture union and functional outcome.
Methodology: The present study was conducted by department of Orthopaedics, Major S.D. Singh Medical College, Farrukhabad. It was a prospective study among Patients admitted to orthopaedics department. The study was conducted from 1st July, 2014 to 30th June, 2015. A sample of size 80 was selected using purposive sampling technique. 40 patients have undergone proximal femoral nailing. 40 patients have undergone dynamic hip screw fixation. The fractures were fixed with either dynamic hip screw fixation or proximal femoral nailing.
Results: The most common age group was in the range of 61-80 years, with the mean age of 59.62±15.61 years in dynamic hip screw device group and 62.81±13.92 years in proximal femoral nail group. Maximum cases were female in both the groups. Malunion was seen in 25% of the patient in DHS group while there was 5% malunion in the PFN group. There was significantly better mean post-operative range of movement in PFN than DHS with 84.25 degree mean in DHS group and 98.75 degree mean in PFN group. Excellent to good results were seen in 95% of patient in PFN group and 50% of patients in DHS group.

Keywords: Dynamic hip screw device (DHS), proximal femoral nail (PFN), Intertrochanteric Fractures, Femur.

INTRODUCTION

Trochanteric fractures are one of the most common injuries sustained predominantly in patients over sixty years of age. They are three to four times more common in women who are osteoporotic; trivial fall being the most common mechanism of injury. [1] For many, this fracture is often a terminal event resulting in death due to cardiac, pulmonary or renal complications. Approximately 10 to 30% of patients die within one year of an intertrochanteric fracture. [2] Little attention was paid to these fractures in the past, as they occur through the cancellous bone with excellent blood supply and they healed

without any active treatment. However conservative treatment usually resulted in malunion with varus and external rotation deformity resulting in a short limb gait and a high rate of mortality due to complications of recumbence and immobilization. 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 increase patient comfort, facilitate nursing care, decrease hospitalization and reduce complications of prolonged recumbency. [3]

The greatest problems for the orthopaedic surgeon treating this fracture are instability and the complications or fixation that results from instability. Stability 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, choice of implant and technique of insertion, contribute to failure of internal fixation.

The type of implant used has an important influence on complications of fixation. Sliding devices like the dynamic hip screw have been extensively used for fixation. However, if the patient bears weight early, especially in comminute fractures, these devices can penetrate the head or neck, bend, break or separate from the shaft.

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. They can also be inserted faster, with less operative blood loss and allow early weight bearing with less resultant shortening on long term follow up.

The present study was conducted with the objectives

- To compare surgical treatment of intertrochanteric fractures of the femur with the proximal femoral nail and dynamic hip screw device, with respect to duration of surgery, fracture union and functional outcome.

METHODOLOGY

The present study was conducted by department of Orthopaedics, Major S.D. Singh Medical College, Farrukhabad. It was a prospective study among Patients admitted to orthopaedics department. The study was conducted from 1st July, 2014 to 30th June, 2015.

The patients were evaluated as per the history, mode of injury. Necessary radiological investigations and haematology profile was done on admission. 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 for any morbidity and mortality.

This was descriptive and comparative study of functional outcome following surgical management of intertrochanteric fractures with either proximal femoral nailing or dynamic hip screw fixation.

A sample of size 80 was selected using purposive sampling technique. 40 patients have undergone proximal femoral nailing. 40 patients have undergone dynamic hip screw fixation.

All patients above 18 years of age with fresh intertrochanteric fracture and who were able to walk prior to the fracture were included in the study.

Patient with pathological fracture, active infection unstable medical illness and non-traumatic disorder were excluded from the study.

The mode of injury was classified under 3 different categories taking into consideration whether the injury was due to a road traffic accident, trivial fall or a fall from height. 13 out of 80 cases mode of injury was due to road traffic accident.

The youngest patient in the series was aged 23 years and the oldest was 86 years. 53 of our patient were older than 60 years.

They pre-injury walking ability was recorded as per the classification of Sahlstrand. [4] Anteroposterior and lateral radiographs of the affected hip were taken. The patients were then put on skin traction over a Bohler- Braun frame. All the patients were initially evaluated as to their general condition; hydration and corrective measures were undertaken. The fractures were classified as per Jensen and Michealsen's modification of Evans classification of intertrochanteric fractures. They I and type II were considered as stable fractures and type III, IV and V were considered as unstable fractures. No open fractures were encountered in this series. Patients were taken up for surgery on next elective OT day. Adequate blood transfusion and other supportive measures were given depending on the preoperative condition of the patient and blood loss during surgery.

The fractures were fixed with either dynamic hip screw fixation or proximal femoral nailing. Allocation of the fractures to each treatment group was done by random selection. Of the 80 patients in the study, 40 were treated with dynamic hip screw fixation and 40 with proximal femoral nailing. The length of the incision, duration of surgery, blood loss and fluoroscopy time was recorded intraoperative.

All patients received injectable antibiotic (cephalosporins) given one hour before surgery and continued post operatively for 2 to 3 days. Oral cephalosporins were continued for next 3 to 4 days. Aminoglycosides were added intraoperatively if the procedure were prolonged. Analgesic was initially given in IV or IM route for 2 to 3 post- operative days and then orally for few days. We did use low molecular weight heparin as an anti deep vein thrombosis prophylaxis only in few of our patients.

There was no defined postoperative patient protocol, but all patients were given peri-operative antibiotics for 24 to 48 hours and deep venous thrombosis prophylaxis. Patients were allowed to sit up in bed on the second post-operative day. Static quadriceps exercises were started on the second and third post-operative day. Sutures were removed after 10 to 14 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, de laying it for patients with unstable or inadequate fixation.

All the patients were followed up a 6 weeks 3 months and 6 months intervals for a period of 6 months and check x-rays were taken to assess fracture union and signs of failure of fixation. Walking ability of each patient was recorded and compared with pre-injury walking ability using the Sahlstrand [5] grading. Post-operative pain was evaluated using the four-point pain score as also used by Saudan. [6] The fracture union was considered as malunion if varus angulation was greater than 10 degrees.

RESULTS

The present study was conducted by the department of orthopaedics, Major S.D. Singh, Medical College, Farrukhabad for a period of one year. Ethical clearance was taken from the institutional Ethical committee. A total of 80 cases were taken for study purpose.

Table-1 shows distribution of study subjects according to age. The most common age group was in the range of 61 - 80 years, with the mean age of 59.62±15.61 years in dynamic hip screw device group and 62.81±13.92 years in proximal femoral nail group.

Table-2 shows distribution of study subjects according to sex. Maximum cases were female in both the groups.

Table 1: Distribution of study subjects according to age

Age (Years)	Method of Fixation		Total
	Dynamic hip screw device (DHS)	proximal femoral nail (PFN)	
2 - 40	7(17.5%)	6(15.0%)	13(16.25%)
41 - 60	8(20.0%)	6(15.0%)	14(17.50%)
61 - 80	20(50.0%)	24(60.0%)	44(55.0%)
81 - 100	5(12.5%)	4(10.0%)	9(11.25%)
Total	**40(100.0%)**	**40(100.0%)**	**80(100.0%)**
Mean±SD	**59.62±15.61**	**62.81±13.92**	**p=0.935 NS**

Table 2: Distribution of study subjects according to sex

Sex (M/F)	Method of Fixation		Total
	Dynamic hip screw device (DHS)	proximal femoral nail (PFN)	
Female	28(70.0%)	26(65.0%)	54(67.5%)
Male	12(30.0%)	14(35.0%)	26(32.5%)
Total	**40(100.0%)**	**40(100.0%)**	**80(100.0%)**

Table 3: Distribution of cases according to post- operative complications

	Method of Fixation		Total
	Dynamic hip screw device (DHS)	proximal femoral nail (PFN)	
Malunion	10(25.0%)	02(5.0%)	12(15.0%)
Wound infection	04(10.0%)	02(5.0%)	06(7.50%)
Screw cutout/ screw back out	02(5.0%)	00(0.0%)	02(2.50%)

Table 3 shows distribution of cases according to post- operative complications. Malunion was seen in 25% of the patient in DHS group while there was 5% malunion in the PFN group. Wound infection was seen in 4 patients in the DHS group and in 2 patients in the PFN group. Two screws back out were seen in DHS.

Table 4: Comparison of post- operative range of movement

	Method	N	Mean (degree)	SD	Z
Range of Motion	DHS	40	84.25	20.53	2.12
	PFN	40	98.75	10.11	p=0.07

Table 4 shows comparison of post-operative range of movement. There was significantly better mean post-operative range of movement in PFN than DHS with 84.25 degree mean in DHS group and 98.75 degree mean in PFN group.

Table 5: Distribution of cases according to functional outcome

	Method of Fixation		Total
	DHS	PFN	
Excellent	6 (15.0%)	8 (20.0%)	14 (17.5%)
Good	14 (35.0%)	30 (75.0%)	44 (55.0%)
Fair	12 (30.0%)	2 (5.0%)	14 (17.5%)
Poor	8 (20.0%)	0 (0.0%)	8 (10.0%)
Total	**40 (100.0%)**	**40 (100.0%)**	**80 (100.0%)**

p=0.012

Table 5 shows distribution of cases according to functional outcome. Excellent to good results were seen in 95% of patient in PFN group and 50% of patients in DHS group.

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 intramedullary proximal femoral nail. Our study consists of 80 patient with 80intertrochanteric fractures out of which 40 was treated with DHS and 40 with PFN.

The age of the patient ranged from 23 to 86 years with the most common age group was in the range of 61-80 years. In case of Dynamic hip Screw fixation it was 59.62±15.61 years and in cases of proximal femoral nailing it was 62.81±13.92. All the fractures that occurred in patients younger than 58 years were either due to a fall from height or a road traffic accident. This supports the view that bone stock plays an important role in the causation of fractures in the elderly, which occur after a trivial fall. No attempt was made to measure the degree of osteoporosis by the Singh index, as it involves a great inter-observer variability and depends on good quality x-rays. In addition, the accuracy of the Singh index has been questioned by authors such as Kootet al. [4] White and colleagues5 did a study of rate of mortality for elderly patients after fracture of the hip in the 1980's and they concluded that the average age for trochanteric fractures is 75.4 years. The

average age in our study nearly correlates to that of White and his colleagues. [5]

In the present study there were 26 males and 54 females showing female preponderance. Dahl and colleagues, [6] in their study 65% of patients were females, explained by the fact that female are more prone for the osteoporosis after menopause. Sex distribution in our study correlates with that of other studies.

The occurrence of femoral shaft fractures does not seem to be a major problem with the PFN due to a narrower distal diameter as compared to other intramedullary nails. [7] Also, rotational control in inherent in the nail design and is not dependent on multiple parts that are likely to increase the risk of mechanical failure. Due to the smaller diameter lag screws in these intramedullary nails, in proximal aspects of the nail do not need to be flared to prevent mechanical failure of the nail and hence requires less reaming of the proximal femur, thereby reducing the risk of iatrogenic proximal femoral fracture. [8] This was similar to the findings of Saudanet al [9] in this study. Other studies have also reported femoral shaft fracture rates of 0-2.1%. [10,11] We did not encounter any intraoperative complication in this study.

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 12.15 weeks in case of PFN. 10 patients (25%) in the DHS group had malunion whereas 2 patients (5%) in the PFN group had malunion. There was statistically significant difference between the two groups regarding malunion.

The average range of motion the hip joint was 84.25 degree in the DHS group and 98.75 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 (p=0.002). This is comparable to the results put forth by Saudan and colleagues. [9]

The overall functional outcome of patient treated PFN was significantly better compared to DHS (p=0.152). However 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 (p=0.198). 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 75% 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 10 of the 40 patients (25%) in the DHS group regained their pre-injury mobility level as compared to 28 of the 40 patients (70%) in the PFN group at the fourth month of follow up. Similar findings were seen in the series by Pajarinen and group. [12] This suggests that the use of PFN may be favoured in stable fractures when compared to DHS. 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.

CONCLUSION

We 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 shorter operative time and a smaller incision, it has distinct advantages over DHS seven in stable intertrochanteric fractures. No single case of plate break out is noted in locking DHS during the study and we can use smaller size plate (two hole or three hole plate) without any significant difference in stability of fixation. And also less blood loss than the conventional DHS plate. Hence, in

our opinion, PFN may be the better fixation device for most intertrochanteric fracture.

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