Intertrochanteric Fractures of Femur by Proximal Femoral Nailing and Dynamic HIP Screw

Dr Amandeep Kaur [*], Dr.Gagandeep Gupta [**], Dr HS Sandhu [***], DrSahil Saini [****]

[*] Senior Tutor, Department of Anatomy, Guru Gobind Singh Medical College, Faridkot
[**] Associate Prof, Dept of Orthopedics, MMIMSR, Ambala
[***] Prof Dept of Orthopedics, MMIMSR, Ambala
[****] Resident, Dept of Orthopedics, MMIMSR, Ambala

I. INTRODUCTION

Intertrochanteric fractures are one of the most common injuries sustained predominantly in patients over fifty years. They are two to three times more common in osteoporotic women; trivial fall being the most common mode of injury[1]. Earlier,for many, this fracture had high morbidity, resulting in death due to cardiac, pulmonary or renal complications. Approximately 20 to 30% of patients die within one year due to intertrochanteric fracture[2].

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 complication of prolonged recumbency[3].

The type of implant used has an important influence on success of surgery and 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 comminutedfractures, these devices have high rate of failure due to penetration of head.

Intramedullary devices like the proximal femoral nail have been reported to have an advantage in such fractures as their placement is closer to the mechanical axis of the limb, thereby decrease the lever arm and bending moment on the implant. They can also be inserted faster, with less blood loss and allow early weight bearing with less resultant shortening on long term follow up.

The purpose of the present study is to evaluate the surgical management of intertrochanteric fractures of femur by proximal femoral nailing and dynamic hip screwtechnique and also whether it actually alters the eventual functional outcome of the patient.

II. AIM OF THE STUDY

To evaluate the surgical management of intertrochanteric fractures of the femur with the proximal femoral nail and dynamic hip screw device, with respect to:

- Fluoroscopic time
- Duration of surgery
- Blood loss
- Fracture union and
- Functional outcome.

III. MATERIALS AND METHODS

The study was conducted in the department of Orthopedics, Maharishi MarkandeshwarInstitute of Medical sciences and Research, Mullana,(Ambala) . 30 patients diagnosed with Intertrochanteric fractures of femur wereconsidered for study.

IV. INCLUSION CRITERIA

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

V. EXCLUSION CRITERIA

Patientswithpathological fractures.

Patients withactive infections, unstable medical conditions.

An informed consent was taken from the selected patients after explaining the procedure, its outcomes, complications and the prolonged rehabilitation protocol to be followed subsequently. Patients were assessed as per attached proforma. Routine investigations were done. All life threatening injuries were evaluated. Pre-operativeXrays were taken in both AP & Lateral views to classify the fractures according to BOYD & GRIFFIN classification.

VI. FUNCTIONAL ASSESSMENT

The functional outcome was assessed based on the HARRIS HIP SCORE which includes three sections. The statistical data was carried out using Statistical package for social sciences (SPSS Inc.,Chicago, IL). Mean and standard deviation is

calculated for all quantitative variables for description and measures of dispersion.

VII. RESULTS AND ANALYSIS

PRE OPERATIVE VARIABLES

Table – 1Age Distribution

Age (Yrs)	Method of Fixation		Total
	DHS	PFN	
21-40	2	3	5
41-60	6	5	11
61-80	7	7	14
81-100	0	0	0
Total	15	15	30
Mean	59.66±14.64	59.13±14.47	59.35

The most common age group was in the range of 61-80, with a mean of 59.35 yrs.

Table – 2Type of Fracture

Type of Fracture	Method of Fixation		Total
	DHS	PFN	
T1	1(6%)	0 (0%)	1 (3%)
T2	7(46%)	9(60%)	16(53%)
T3	5(33%)	3(20%)	8(26%)
T4	2(13%)	3(20%)	5(16%)
T5	0 (0%)	0(0%)	0(0%)
T6	0(0%)	0(0%)	0 (0%)
Total	15 (100%)	15 (100%)	30 (100%)

p= 0.413 NS

All fractures were classified as per Jensen and Michealsen's41,57 modification of Evans classification.

T1 : type I fracture-stable
T2 : type II fracture-stable
T3 : type III fracture- unstable
T4 : type IV fracture- unstable
T5 : type V fracture- unstable

There were 17 stable fractures and 13 unstable fractures.

VIII. 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 30 patient with intertrochanteric fractures out of which 15 was treated with DHS and 15 with PFN.

The age of the patient ranged from 27 to 80 years with an average of 59.35 years. In case of Dynamic hip Screw fixation it was 59.66 years and in cases of proximal femoral nailing it was 59.13 years.

In our study there were 24 males and 6 females showing male **preponderance.**

Dahl and colleagues65, 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 not correlates with that of other studies.

Commonest mode of injury is trivial fall which was noted in 17, RSA in 9 patients and history of fall from height in 4 patients.

Our series consisted of 17 stable and 13 unstable intertrochanteric fractures as classified according to Jensen and Michealsen's modification of Evans classification. The distribution of stable and unstable fractures in both groups was similar. Out of the 17 stable fractures, 8 were in the DHSgroup and 9 in the PFN group. Out of the 13 unstable fractures, 7 were in the DHS group and 6 in the PFN group.

The preinjury walking ability was similar in both groups of patient with DHS or PFN. 66 percent of patients in the DHS group and 73 percent of the patient in the PFN group were walking without support prior to the injury. 30% of patients in the study had grade 2 walking ability prior to fall. This is explained in the fact that intertrochanteric fracture occurs in elderly patient.

The length of the incision in the DHS group ranged from 13cm to 17cm with a mean of 15.01 cm as compared to mean of only 9.98cm in the PFN group. The smaller incision in the PFN group meant that there was less intra operative blood loss. This was comparable to the study conducted by Baumgaertneret al.35.

The duration of surgery in the DHS group ranged from 90 minutes to 100 minutes with a mean of 94.15 minutes. The duration of surgery in the PFN group ranged from 70 minutes to 80 minutes with a mean of 74.20 minutes. The difference in the operative times in both groups was found to be highly significant and we attributed this difference to the smaller incisions in the PFN group.Baumgaertner et al.35 also found that the surgical times were 10 per cent higher in the DHS group in their series. Saudan and colleagues40 found that there was no significant difference between the operative times in the two groups in their series.

The fluoroscopy time in the PFN group (average 76.66 sec) was significantly higher as compared to that of the DHS group (average 56.13 sec). This was similar to the series by Baumgaertner and associates35 who also found a significant difference in the fluoroscopic times in their series, with 10 per cent higher times for the PFN group. However in their study Saudanet al.40 found no difference between the fluoroscopy times in both the groups.

The DHS patients had significantly more blood loss intra-operative compared to PFN group. This is similar to the series by Baumgaertner and associates35 who also found a significant difference in the intra operative blood loss in their series, with 150ml higher for the DHS group.

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 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 nails75. Also, rotational control is 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, the 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 fracture43. This was similar to the findings of Saudanet al.40 in their study. Other studies have also reported femoral shaft fracture rates of 0-2.1 per cent76,77. 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 12.06 weeks in case of DHS and 12.15 weeks in case of PFN.

3 patients (20 percent) in the DHS group had malunion whereas 1 patient (6%) in the PFN group had malunion. There was statistically significant difference between the two groups regarding malunion.

In our series 2 patients of the DHS group had wound infections as compared to single patient in the PFN group, which was not statistically significant. We attributed the higher number of wound infections in the DHS group to the longer incisions and subsequently more soft tissue handling in this group as compared to the PFN group. However all were only superficial wound infections and healed without any further surgical intervention. Saudan and associates40 also did not find any significant difference between the infection rates in the two groups in their series.

In this study the average limb length shortening of patient in DHS group was 1.22 cm as compared to 0.52 cm 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 PFN78.

One patient (3.33 percent) in our study had a hip screw back out. This was seen in the DHS group involving an unstable intertrochanteric fracture. However these patients were relatively mobile and hence re-operation was not necessary. There was no implant cut out in the PFN group which was similar to the series by Menezes and co-workers75 (0.7 per cent)

In our study we found there was significant difference in the post -operative pain in the two groups. Even though 14 of DHS and 12 of the PFN patient had post -operative pain but 4 out of 14 patients in DHS had severe pain compared to none in PFN patients. It was noted that in PFN patient who had moderate pain had wound infection post operatively.

Saudan and colleagues40 found that the amount of persistent pain was similar in both groups in their series.

IX. 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 even in stable intertrochanteric fractures. Hence, in our opinion, PFN may be the better fixation device for most intertrochanteric fracture

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AUTHORS

First Author – Dr Amandeep Kaur - Senior Tutor, Department of Anatomy, Guru Gobind Singh Medical College, Faridkot
Second Author – Dr.Gagandeep Gupta, Associate Prof, Dept of Orthopedics, MMIMSR, Ambala
Third Author – Dr HS Sandhu, Prof Dept of Orthopedics, MMIMSR, Ambala
Fourth Author – DrSahil Saini, Resident, Dept of Orthopedics, MMIMSR, Ambala