A Prospective Comparative Study of outcome of Management of unstable Intertrochanteric Fractures of Femur with Dynamic Hip Screw (DHS) and Proximal Femoral Nail Antirotation (PFNA)

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ABSTRACT

Introduction: Unstable intertrochanteric fracture is common fracture. Dynamic Hip Screw (DHS) is standard treatment method. Now newer methods such as Proximal Femoral Nailing Antirotation (PFNA) and other Proximal Femoral Nails having advantage of central device came. Present study was carried out to determine outcome of unstable intertrochanteric fractures with dynamic hip screw (DHS) and proximal femoral nailing antirotation (PFNA).

Material and Methods: This comparative study was carried out on patients admitted in SMS Medical College and attached Hospitals Jaipur between June 2016 to July 2017. Total 40 patients having unstable intertrochanteric fractures were allocated randomly in two treatment groups. 20 patients were treated by DHS and 20 patients were treated by PFNA. We looked for length of incision, duration of surgery, blood loss, fluoroscopy timing, union time, any complications and functional outcome.

Result: The smaller incision, relatively less blood loss, shorter operative times, less limb shortening and a better overall functional outcome with the PFNA indicate that the PFNA has advantage over the DHS. There was no statistically difference between union time of fractures in both groups.

Conclusion: PFNA has advantage over the DHS in fixation of unstable intertochanteric fractures in terms of smaller incision, relatively less blood loss, shorter operative time, less limb shortening and a better overall functional outcome.

Keywords: Dynamic Hip Screw, Proximal Femoral Nail Antirotation, Intertrochanteric Fractures

INTRODUCTION

Trochanteric fractures are common injuries sustained in elderly. Trivial fall being most common mechanism of injury[1]. The goal of treatment is restoration of patient to previous status as early as possible. Internal fixation of these fractures was needed to reduce complications of recumbency[2].

The type of implant used has an important influence on complications of fixation. Sliding devices like the DHS being common. However, if patient bears weight early in comminuted fractures, this may lead to implant failure. Intramedullary devices like the proximal femoral nail antirotation have been reported to have an advantage in unstable fractures as their placement allowed the implant to lie closure to the mechanical axis of bone, so decrease the lever arm and bending moment on the implant. They are inserted faster, with less operative blood loss and allow early weight bearing with less shortening on long term follow up.

This study was done to compare the treatment of unstable intertrochanteric fractures of the femur with the dynamic hip screw (DHS) and proximal femoral nail antirotation(PFNA) devices, with respect to fluoroscopic time, blood loss, duration of surgery, fracture union and functional outcome.

MATERIAL AND METHODS

This study was conducted in the biggest Medical College of Rajasthan and its attached Hospitals catering largest number of orthopedics cases. Patients of unstable intertrochanteric fractures admitted in SMS medical college and its attached hospitals Jaipur between June 2016 to July 2017 were considered for the study. Total 40 patients who met the eligibility criteria out of all 175 patients reported during study period were randomly allocated into two groups using sealed envelope method. Blinding was not done as all the study variables were objective finding.

Inclusion criteria

All adult patients (above 18 years of age) with fresh unstable intertrochanteric fractures (type 3 and 4 as per Jensen and Michelson's modification[3] of Evans classification) attending SMS medical college and its attached hospitals and who were able to walk prior to the fracture were included in the study.

Exclusion criteria

Patients with pathological fractures, patients with bilateral fractures, active infection, unstable medical illness and non-traumatic disorder were excluded from the study. Stable fractures (Type1 and type 2) and open fractures were also excluded. Patients who were unable to walk prior to the fracture were excluded.

The patients were evaluated as per the history and mode of

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injury. Necessary investigations were done. Anterioposterior and lateral radiographs of the affected hip were taken. The patients were then put on skin traction. The fractures were classified as per Jensen and Michealsens[3] modification of Evans classification of intertrochanteric fractures. Type 3 and 4 were included in study as these were unstable fractures. Patients were taken up for surgery as soon as possible in routine operation theatre. The fractures were fixed with dynamic hip screw fixation / proximal femoral nailing antirotation. Of the 40 patients in the study, 20 were treated with dynamic hip screw fixation (DHS) and 20 with proximal femoral nailing (PFN A2). Allocation of the fractures to each treatment group was done by random selection.

Group I (DHS)

20 Patients were treated by dynamic hip screw (DHS) by standard technique. FIG 1- Dynamic Hip Screw

Group II (PFNA)

20 Patients were treated by proximal femoral nail (PFNA) by standard technique. FIG 2 - Proximal Femoral Nail Antirotation (PFNA) Adequate blood transfusion and supportive measures were given depending on the preoperative condition of the patient and blood loss during surgery. Type of surgery and detail were noted. Primary study outcomes such as length of incision, blood loss, duration of surgery, and fluoroscopy time were recorded during operation. The immediate post-operative x-rays were evaluated. All patients received injectable antibiotics (cephalosporin's) given one hour before surgery and continued post operatively for 3 days. Oral cephalosporins were continued for next 7 days. Analgesic was initially given in intravenous/intramuscular route for two post-operative days and then orally till pain subsides. Patients were allowed to sit up in bed on the second post operative day. Static quadriceps exercises were started on the second post-operative day. Sutures were removed after 10 days. Patients were mobilized non-weight bearing as soon as the pain or general condition permitted. Weight bearing was started depending upon the stability of the fracture and adequacy of fixation.

All the cases were again evaluated through clinical and radiological methods at 6 weeks, 12 weeks, 6 months and 1 year. Check x-rays were taken at every visit to assess fracture union. The fracture union was considered as malunion if varus angulations was greater than 10 degrees.

Evaluation at the final follow up for functional outcome

The final functional outcome was assessed based on Harris Hip score[4] (HHS) as follows:

Excellent: HHS between 90-100,
Good: HHS between 80-89,
Fair: HHS between 70-79,
Poor: HHS less than 70

STATISTICAL ANALYSIS

Continuous data were summarized in form of mean and standard deviation, difference in means
of two groups were analysed using student's 't' test. Continuous data were expressed in form of percentage. Difference in proportions were analyzed using chi-square test. Level of significance
was kept 95% for all statistical analysis.

RESULTS

The age of patients ranged from 42- 86years with average being 63.5 years. 60% of the patients were female in this series. Left side is involved in 62.5% of the patient. The most common mode of injury was trivial fall in 32(80%) patients.

Intraoperative and post operative variables

Test applied: Unpaired t test Patient treated with PFNA required a significantly smaller skin incision. Proximal Femoral Nailing antirotation required mean significantly less operative time(68.4 minutes) compared the Dynamic Hip Screw fixation (88minutes). PFNA had significantly less intraoperative blood loss (120ml) as compared DHS (380ml). Dynamic hip screw fixation required less fluoroscopic time (65seconds) as compared to proximal femoral nail fixation (72.37seconds) but it was statistically insignificant. There was significantly better mean post operative range of motion in PFNA than DHS with 84.25 degree mean in DHS group and 96.26 degree mean in PFN group. Significantly less limb shortening was seen in the PFNA group as compared to the DHS group with a mean of 1.5 cms in the DHS group and 0.6cms in the PFNA group. All the fracture united at a mean of 11.07 weeks. There was no significant difference in time

Figure-1: Dynamic Hip Screw

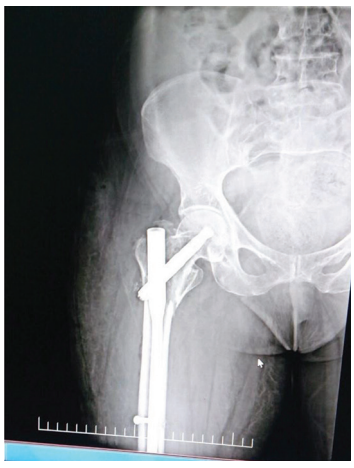

Figure-2: Proximal Femoral Nail Antirotation (PFNA)

Variables*	Method of fixation		(t)	P value
	PFNA(Number=20)	DHS(Number=20)		
Length of incision (Cms)	8.2±0.8	16.5±1.8	18.844	<0.001
Flouroscopy time (second)	72.37±9.49	65±3.75	03.230	0.003
Blood loss (ml)	120±32.32	380±65.05	16.008	<0.001
Duration of Surgery (minutes)	68.4±8.45	88±9.47	06.906	<0.001
Range of motion at final follow up	96.26±0.98	84.25± 0.27	52.838	<0.001
Shortening in cms	0.60± 0.56	1.50±0.74	04.337	<0.001
Time of union in weeks	11.15±1.406	11±1.69	00.305	0.762

Table-1: Intraoperative and post operative variables

Harris Hip Score[4]	Method of fixation		Total
	PFNA	DHS	
Excellent (90-100)	4 (20%)	3 (15%)	07 (17.5%)
Good (80-89)	15(75%)	07 (35%)	22 (55%)
Fair (70-79)	1 (5%)	06 (30%)	07 (17.5%)
Poor (less than70)	0	4 (20%)	4 (10%)
Total	20 (100%)	20 (100%)	20 (100%)

Table-2: Final results

taken to unite the fracture (table-1).

PFNA had significantly less complications 1 (5%) as compared to DHS 5 (25%). Malunion was seen in 5 (25%) of the patients in DHS group while there was 1 (5%) malunion in the PFNA group. Wound infection was seen in 2 (10%) patients in the DHS group and in 1 (5%) patients in the PFN group.

Excellent to good results were seen in 95% of patient in PFNA group and 50% of the patients in

DHS group.These were stastically significant (Test applied: Chi-square test, X2 = 10.623 with 3 degree of freedom P= 0.018(S) table-2).

DISCUSSION

The goal of the study was to compare the functional outcome of patient with unstable intertrochanteric fractures treated by two different fixation devices, dynamic hip screw (DHS) and proximal femoral nail (PFNA). Our study consist of 40 patient with unstable intertrochanteric fractures out of which 20 patient was treated with DHS and 20 with PFNA.

The age of the patient ranged from 42 to 86 years with an average of 63.5 years. Commonest mode of injury is trivial fall which was noted in 32(80%) patients.

In our study there were 16 (40%) males and 24 (60%) female showing female are more prone to this fractures. Sex distribution in our study correlated with that of other studies such as Dahl and colleagues[5], in their study 67% of patients were females, explained by the fact that female are more prone for the osteoporosis after menopause.

The mean length of incision in the DHS group was16.05 cm as compared to mean of only 8.1 cm in the PFNA group. The smaller incision in the PFN group means that there was less intra operative blood loss. This was comparable to the study conducted by Baumgaertner et al[6].

The mean duration of surgery in the DHS group was 88.25 minutes. The mean duration of surgery in the PFNA group was 68.4 minutes. The difference in the operative time in both groups was found to be highly significant and we attributed this difference to the smaller incisions in the PFNA group. Baumgaertner et al[6] also found that the surgical times were 23% less in PFN group in their series. Saudan and colleagues[7] found that there was no significant difference between the operative times in the two groups in their series. The fluoroscopy time in the PFNA group (average 72.37 seconds) was higher as compared to that of the DHS group (average 65 seconds) but it was stastically insignificant. This was similar to the series by Sauden et al[7] who also found no difference between the fluoroscopy times in both the groups. However in their study Baumgaertner and associates[6] found a significant difference in the fluoroscopic times in their series, with 70% higher times for the PFN group.

The DHS patients had significantly more blood loss intra-operative compared to PFNA group (average380 /120ml). This is similar to the series by Baumgaertner and associates[6] who also found a significant difference in the intra operative blood loss in their series, with 44% less blood loss in PFN.

There was no significant difference between groups with regards to time of fracture union as fracture united at mean 11 weeks in case of DHS and 11.15 weeks in case of PFN. There was statistically significant difference between the two groups regarding malunion. 5 patients (25%) in the DHS group had malunion whereas 1 patient (5%) in the PFNA group had malunion. In our series 2 patients of the DHS group had wound infection as compared to 1 patients in the PFNA group, which was not statistically significant.

In this study the average limb shortening of patient in DHS group was1.5cm as compared to 0.6cm in PFNA group which was statistically significant. This could be due to sliding of the lag screw in the DHS group, allowing greater fracture impaction, as compared to the PFNA[8].

The average range of motion the hip joint was 84.25 degree in the DHS group and 96.26 degree in the PFNA group at final follow up. Hence in our study the patients in the PFNA group regained a significantly better range of motion as compared to those in the DHS group (P=<0.001). This is contrary to the results put forth by Saudan and colleagues[7] as they found no statistically difference between the two groups.

The overall functional outcome of patient treated with PFNA was significantly better compared to DHS (P=0.018). In PFNA group 95% were with excellent and good results as compared with the DHS group which has 50% with excellent and good result. This suggests that use of PFN may be favored in unstable intertrochanteric fractures when

compared to DHS.

CONCLUSION

Smaller incision, relatively less blood loss, shorter operative times, less limb shortening, and a better overall functional outcome with the PFNA indicate that PFNA has advantage over DHS. However PFNA has disadvantage of having more fluoroscopy timing as compared to DHS. There was no statistical difference between two regarding time of union of fractures.

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