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Original Research

Study of Short-Term Outcome of Proximal Femoral Nailing and Dynamic Hip Screw in Cases of Intertrochanteric Fractures of Femur

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ABSTRACT

Background: The incidence of intertrochanteric fractures has increased significantly during recent years due to the increase in life expectancy of the elderly population. Intertrochanteric fractures can be treated by either extramedullary dynamic hip screw (DHS) or intramedullary proximal femoral nailing (PFN). Present study was aimed to study short term outcome of PFN and DHS in cases of intertrochanteric fractures of femur. **Material and Methods:** This is a prospective study of 50 patients of intertrochanteric fracture, treated with proximal femoral nail and dynamic hip screw. **Results:** In our series of 50 patients, there were 22 female cases and 28 male cases. Minimum age was 20 years, maximum age was 88 years with mean age of 58.96 years. Most of the people were between 40 to 70 years of age. Right side was more common accounted for 54 %. Boyd and griffin type 2 fracture accounted for 86% of cases. Mean duration of hospital stay was 16 days in both proximal femoral nail and dynamic hip screw groups. Mean time of full weight bearing was 9 weeks for PFN and 13.8 weeks for DHS group. Good to excellent results were seen in 96 % of cases in PFN and 92 % of cases in DHS group. **Conclusion:** From the study, we consider PFN as better alternative to DHS in the treatment of intertrochanteric fractures but is technically difficult procedure and requires more expertise compared to DHS. With experience gained from each case, operative time, radiation exposure, blood loss and intra-operative complications can be reduced in cases of PFN.

Keywords: proximal femoral nailing, dynamic hip screw, intertrochanteric fractures, operative time, radiation exposure

INTRODUCTION

Hip fractures are one of the commonest disabilities worldwide in terms of loss in disability-adjusted years for people over 50 years of age.[1] Around 90 percent of hip fractures result owing to a result of simple fall.[2] Exponential lifespan and sedentary lifestyle brought by urbanization has tremendously increased the incidence of hip fractures. Common risk factors include body size characteristics, decreased muscular strength, impaired cognition, inactivity, impaired perception and vision, environmental circumstances, chronic illness and drugs that may contribute to fall, such as hypnotic drugs, opioid analgesics, anti-hypertensives, anti-convulsant, caffeine, sedatives, anti-depressants.[3,4]

The aim of treatment modality is at preventing mal-union and deformity. Both the treatment modalities of conservative and surgical management have found strong advocates. Conservative treatment minimises the technical expertise and equipment which is needed for surgical fixation whereas surgical management provides early ambulation and ability to return to daily routine activity provides an edge over conservative management.[5]

The surgical implants used for the fixation of intertrochanteric fractures have been broadly categorized into extramedullary devices (e.g. DHS) and intramedullary devices (e.g. PFN). The strength of the fracture implant is determined by factors such as the patient's bone quality, fragment geometry, reduction, implant type & implant placement. Present study was aimed to assess the functional outcome of the results of DHS and PFN in the treatment of intertrochanteric fractures.

MATERIAL AND METHODS

Present study was Prospective Interventional Study, conducted in department of Orthopaedics, Saveetha Medical College and Hospital, Chennai, India. Study duration was of 2 years (August 2015-August 2017).

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Study was approved by institutional ethical committee.

Inclusion criteria

- All patients who are clinically and radiologically diagnosed to have intertrochanteric fracture of femur, willing to participate in present study

Exclusion criteria

- Patients not willing to give consent
- Patients not of sound mind
- Compound or pathological fracture
- Admitted for re-operation
- Patients who do not agree for follow up
- Skeletally immature individuals

Study was explained to participants in local language & written informed consent was taken. Patients admitted with intertrochanteric fracture of femur will be examined and investigated with x-ray pelvis with both hips AP and Lateral views (whenever possible). Investigations such as Blood-Haemoglobin %, Total count, Differential count, ESR, Blood grouping & Rh typing, HIV, HbsAg, Blood Urea, serum creatinine, Blood sugar, Urine Albumin, Sugar, ECG & Chest x-ray were done in all patients.

Physician opinion was taken for the fitness of patient before surgery as and when necessary. X-ray were reviewed and classified using Boyd and Griffin classification. All fractures were treated using either Proximal Femoral Nailing or Dynamic Hip Screws. All patients were assessed using the Harris hip score at the follow ups.

Data was collected and compiled using Microsoft Excel, analysed using SPSS 23.0 version. Statistical analysis was done using descriptive statistics.

RESULTS

In the present study of 50 patients of intertrochanteric fractures, 25 cases were treated with PFN and 25 cases with DHS. In our study maximum age was 88 years and minimum age was 20 years. Most of the patients were between 40-70years. Mean age was 58.96 years. Majority of study population were males. Out of the 25 patients who underwent proximal femoral nailing, 14 were male and 11 were female. Out of the 25 patients who underwent dynamic hip screw fixation 14 were male and 11 were female.

Majority of patients had intertrochanteric fractures mainly due to road traffic accidents and that was followed by an accidental fall. In our study, the right side hip was more commonly involved.

Table 1: General characteristics

Characteristics	PFN		DHS	
	Number of cases	Percentage	Number of cases	Percentage
Age Group				
0-20	0	0%	1	4%
21-40	1	4%	5	20%
41-60	14	56%	8	32%
61-80	10	40%	9	36%
80-100	0	0%	2	8%
Gender				
Male	14	56%	14	56%
Female	11	44%	11	44%
Mode of Injury				
Simple fall	11	44%	13	52%
RTA	14	56%	12	48%
Side of Injury				
Right	12	48%	15	60%
Left	13	52%	10	40%

Our study classified, trochanteric fractures according to Boyd and Griffin classification. In our study, majority of the patients had Type II fractures.

Table 2: Type of fractures

Type of fracture	Number of cases		Percentage	
	PFN	DHS	PFN	DHS
Type I	0	5	0%	20%
Type II	23	20	92%	80%
Type III	2	0	8%	0%
Type IV	0	0	0%	0%

All the cases included in our study group were fresh fractures who underwent surgery at the earliest possible in our set up. The delay was due to associated injuries and medical condition of the patient. All the patients were operated at an average interval of 4 days from the day of trauma. Radiographic exposure was more for PFN

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where closed reduction was done and for comminuted fractures with difficult reduction. Exposure was more for initial few cases, as we got experienced radiation exposure was less. Duration of surgery was more for PFN compared to DHS and for initially operated cases. Blood was more for DHS compared to PFN.

Table 3: Intra-operative details

Intra-operative details	PFN	DHS
Mean radiographic exposure (No of times)	58.08	45.16
Mean duration of operation (in minutes)	94.12	83.92
Mean blood loss (in ml)	303.28	336.16

There were few intraoperative complications encountered during DHS fixation. Open reduction was performed in two cases. Difficulties in reduction were encountered in cases that were delayed and in case of comminuted fractures. In 4 of 25 cases there was improper placement of Richard's screw. The screw was placed superiorly. Comparatively DHS fixation was technically easier and had lesser intraoperative complications.

Anti-rotation screw was placed in all cases. In 6 of the cases anatomic reduction could not be achieved as fracture extended to the entry point of the nail, nail opened up fracture and prevented anatomic reduction. We had no difficulties in distal locking but there were iatrogenic fractures of the femur shaft at the insertion of distal screw in one case of PFN. There was one instance of drill bit breakage.

Table 4: Intraoperative Complications

Complications	Number of Cases	Percentage
Intraoperative complication of DHS		
Improper positioning of Richard screw	4	16%
Open Reduction	2	8%
Varus collapse	2	8%
Complication		
Fracture displacement by nail insertion	6	24%
Femur shaft fracture	1	4%
Guide wire breakage	1	4%

Among Delayed complications of DHS, varus malunion was seen with 2 cases. Shortening of more than 1cm was seen in 1 case. There were no cases of non-union and screw cut out.

Among Delayed complications of PFN, there were 2 cases of delayed union in patients where the fracture was severely comminuted. There was 1 case with shortening more than 1cm. There was one case of infection which required implant exit. There were no cases of screw cut out & nail breakage. There was no case of femoral shaft fracture or non-union.

Table 5: Delayed complication

Complications	Number of cases	Percentage
Delayed complications of DHS		
Varus malalignment	2	8%
Shortening of more than 1 cm	1	4%
Delayed complications-PFN		
Delayed-Union	2	8%
Shortening of more than 1 cm	1	4%
Infection	1	4%

DISCUSSION

Intertrochanteric fractures account for approximately half of all hip fractures in the elderly population. Among these 50 to 60% are classified as unstable.[6] Unstable intertrochanteric fractures occur more often with increased age and low bone mineral density and are associated with a high rate of complications.[7]

Various methods of fixation have been proposed for the management of intertrochanteric fractures, such as compression hip screw and slide plate, dynamic compression sliding plate, fixed angle blade plate, intramedullary sliding hip screw, and lately external fixator.[8,9] The treatment of intertrochanteric fracture is still affiliated with some failures. Multiple deforming forces which create a high stress concentration, high incidence of complications reported after surgical treatment, compels the surgeon to give a second thought regarding selection of proper implant.

The dynamic hip screw introduced by Clawson in 1964, remains the implant of choice because of its favourable results and low rate of non-union and failure. It provides controlled collapse at the fracture site. The use of DHS has been supported by its biomechanical properties which have been assumed to improve the healing of fractures.[9]

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The AO ASIF in 1996, therefore developed the Proximal Femoral Nail with an anti-rotation hip pin together with a smaller distal shaft diameter which reduces stress concentration to avoid these failures. From mechanical point of view an intramedullary device inserted by means of minimally invasive procedure seems to be better in elderly patients. Closed reduction preserves the fracture haematoma, an essential element in consolidation process. Intramedullary fixation allows the surgeon to minimize soft tissue dissection, thereby reducing surgical trauma, blood loss, and infection and wound complications.

In our study, intertrochanteric fracture was common due to fall from height, age ranged between 20-88 years, mean age of 56.88 years for DHS and 61.04 years for PFN. Males were common contributing to 56%. Right sided fractures were common accounting for 54%. Type II Boyd and Griffin fractures were common, consisted of 86%. Type I and Type III were 10% and 04% respectively. Mean frequency of radiation exposure were 58.08 and 45.16 times, mean duration of operation 94.12 and 83.92 minutes for proximal femoral nailing and dynamic hip screw respectively. Intraoperatively dynamic hip screw had fewer complications which included improper placement of the screw in 2 cases, Varus angulation in 2 cases and in proximal femoral nail, 2 cases of fracture got displaced by nail insertion, 1 case had drill bit breakage.

Menez and Daneil[10] conducted a study on 155 cases of intertrochanteric fractures treated with PFN, and found 2% failure of fixation and no such complications were reported in our study. A study of 20 patients of unstable intertrochanteric fractures treated with PFN and DHS by Barathi and Arshad[11], found that duration of stay for PFN and DHS were 14 and 22 days, blood loss was 275 and 475ml, persistent hip pain was seen in 3% and 9% respectively. This correlated with our study where the duration of hospital stay was 16 in both the studies, average blood loss was 303 in PFN and 336 in DHS. Persistent hip pain was present in two cases in both the groups.Post operatively, 1 case of PFN had wound infection and none of the DHS cases got infected.

In a study, by Pajarein and Lindal[9], of 108 patients of per trochanteric fractures treated with DHS and PFN, found PFN allowed faster restoration of post-operative walking ability when compared with DHS. In our study mean time for full weight bearing was 13.8 weeks in DHS while that for PFN is 9 weeks. Hospital staywas 16 days in both cases, mean time of full weight were 9 and 13.6 in PFN and DHS. All patients were mobile at the end of 2 weeks with or without walking aid. Excellent results were seen in 68% and 64%, good in 24% and 32% cases of DHS and PFN respectively.

CONCLUSION

From the study, we consider PFN as better alternative to DHS in the treatment of intertrochanteric fractures but is technically difficult procedure and requires more expertise compared to DHS. With experience gained from each case, operative time, radiation exposure, blood loss and intra-operative complications can be reduced in cases of PFN.

Conflict of Interest: None to declare
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