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A STUDY TO COMPARE OUTCOME OF PROXIMAL FEMORAL NAILING AND DYNAMIC HIP SCREW FIXATION FOR INTERTROCHANTERIC FRACTURES OF FEMUR

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ABSTRACT

Objective: To compare functional outcome and complications associated with proximal femoral nailing, an intramedullary device with dynamic hip screw, an extra-medullary device in treatment of intertrochanteric fractures of femur. **Methods**: This prospective comparative study included 60 patients of intertrochanteric fractures in which 30 patients were treated by PFN and other by DHS. All patients were operated under image intensifier control. Average follow up of patients was 14months (12 to 20 months). Postoperatively functional and radiological outcome were assessed at regular intervals. Evaluation of the patients was done by using Harris Hip Scoring system. **Results**: Compared to DHS, PFN required less operative time, less blood loss, small incision, reduced hospital stay and early mobilization. However Harris Hip Score at the end of one year is same for both the groups. **Conclusion**: We suggest PFN is implant of choice for management of intertrochanteric fractures. However as DHS is low cost implant and lesser fluoroscopy exposure is required, it still remains to be the gold standard for stable non-osteoporotic intertrochanteric fractures.

KEY WORDS: Intertrochanteric fractures, Dynamic hip screw, proximal femoral nail.

INTRODUCTION

The incidence of intertrochanteric fracture has been rising steadily due to increasing geriatric population as result of increased life span and better health care facilities[1]. In 1990 26% of all hip fractures occurred in Asia where as this figure could rise to 37% in 2025 and 45% in 2050[2]. Because of complex stress configuration in this region and its nonhomogeneous osseous structure and geometry, fractures occur along the path of least resistance through the proximal femur[3].

The various treatment options for intertrochanteric fractures are operative and nonoperative. Non operative treatment for these types of fractures, with prolonged bed rest and traction has been associated with varus deformity and shortening, along with general complications associated with prolonged immobilization. Operative treatment which allows early rehabilitation and mobilization has become treatment of choice for all trochanteric fractures[4, 5].

Introduction of dynamic hip screw revolutionized the management of intertrochanteric fracture by allowing compression at fracture site with few complications. Development of intramedullary devices for management of intertrochanteric fractures were considered superior to conventional dynamic hip screw[6-8]. We conducted this study to compare outcome of proximal femoral nailing and dynamic hip screw fixation in intertrochanteric fracture.

MATERIALS AND METHODS

This prospective study consisted of total 60 patients which included 30 patients in each PFN group and DHS group admitted in BRIMS BIDAR and GURU NANAK HOSPIAL between January 2010 to December 2013. We included all intertrochanteric fractures of either sex, between 20 to 80 years of age and less than 3weeks of duration from injury. Patients with pathological fractures, compound fractures, inability to walk before injury, neurological disorders and multiple injuries excluded from study. Informed written consent was taken and relevant information collected from all patients including history, general and systemic examination. Surgical fitness was obtained before surgery for all patients. Radiological examination done to confirm the diagnosis.

All patients were operated on traction table under image intensifier control. DHS group underwent closed reduction and internal fixation with DHS while PFN group underwent

closed reduction and internal fixation with PFN. The same postoperative protocols were followed for both the groups. Patients were encouraged to mobilize the knee, ankle and static quadriceps exercises from day one after surgery. Depending on condition of the patient non weight bearing walking started from 2nd post operative day. Suture removal was done on 14th post operative day. Patients were followed up clinically and radiologically at a regular monthly interval for first 3 months then for every 3months.

The modified Harris hip score was used to evaluate the patients, which includes pain relief (47), function (44), range of motion (5) and absence of deformity (4). Maximum point possible is 100. Rating of score is done as below; 90-100=excellent, 80-89=good, 70-79=fair and less than 70 as poor.

RESULTS

Table1: Pre operative comparison between PFN and DHS Group

Pro operative measures	PFN (n= 30)	DHS (n=30)
Average age (years)	58	60
Sex (M/F)	8/22	10/20
Modeofinjury 1.Trivial 2.RTA	 26 4	 27 3
Type of fractures 1 Stable 2 Unstable (Fig1and Fig.7)	 10 20	 14 16

Majority of patients were female with average 59 years age, with history of trivial fall. We considered intraoperative parameters like duration of surgery, fluoroscopy time, blood loss and length of incision.

Table 2: Perioperative comparison between PFN and DHS Group

PARAMETERS	PFN (n=30)	DHS (n=30)
Average length of incision (cm)	7.5	15.2
Blood loss (ml)	50	95
Duration of surgery (min)	55	92
Fluoroscopy time (s)	30	17
Average Hospital stay (days)	7 (5 to 10)	12 (8 to 16)
Union rate (weeks)	11	13.2
Shortening (cm)	0.82	1.33
Infection	0	2
Implant failure	1	2
Harris Hip Score 1 month 6month 1 year	 35 84 95	 21 77 94

Intraoperatively we encountered difficulty in fracture reduction in case of comminuted fractures and delay in surgery. In DHS group there were improper insertion of screw superiorly in one case and one case of varus angulation encountered in reverse oblique fracture. In PFN group we failed to put derotation screw in one case. In DHS group there was one case of screw cut out (Fig.4) All PFN cases were locked distally with atleast one locking bolt (Fig.2,5,6,8) and there were no instances of guide wire breakage, fractures of lateral cortex of femur during surgery.

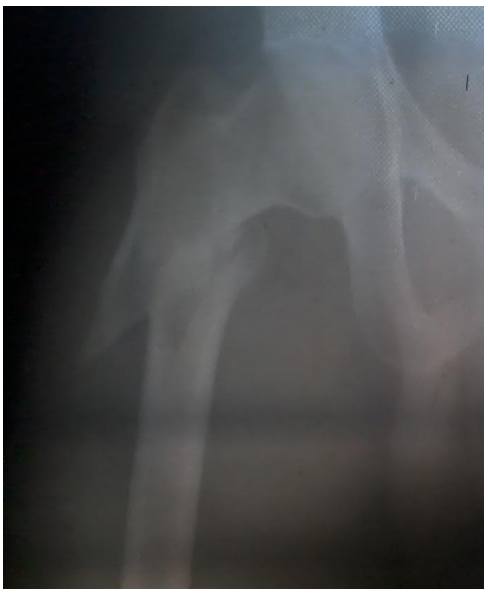

Figure 1: Intertrochanteric fracture

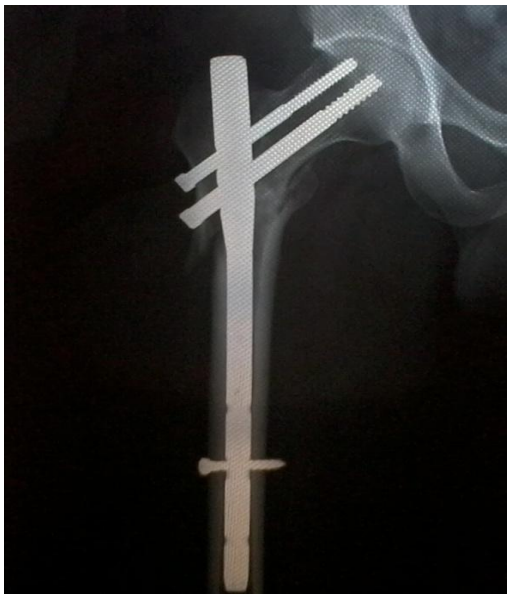

Figure 2: Post-op IT fracture with PFN

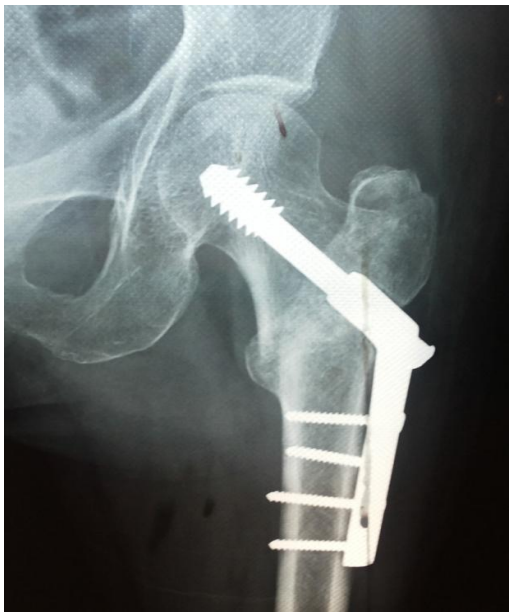

Figure 3: Post-op IT fracture with DHS

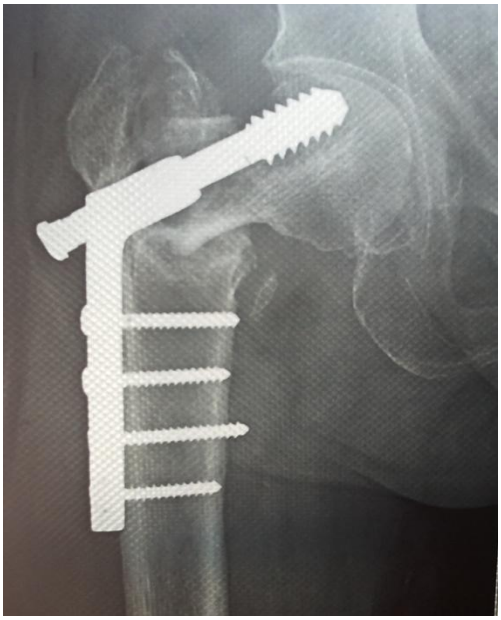

Figure 4: Post-op IT fracture with screw cutout.

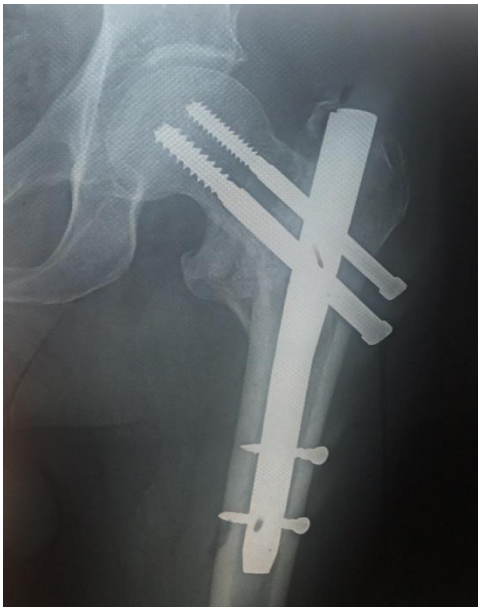

Figure 5: Post-op X-ray with PFN

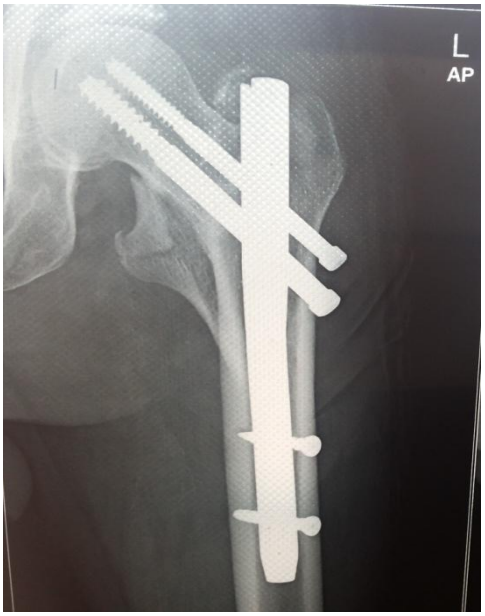

Figure 6: Post-op X-ray with PFN

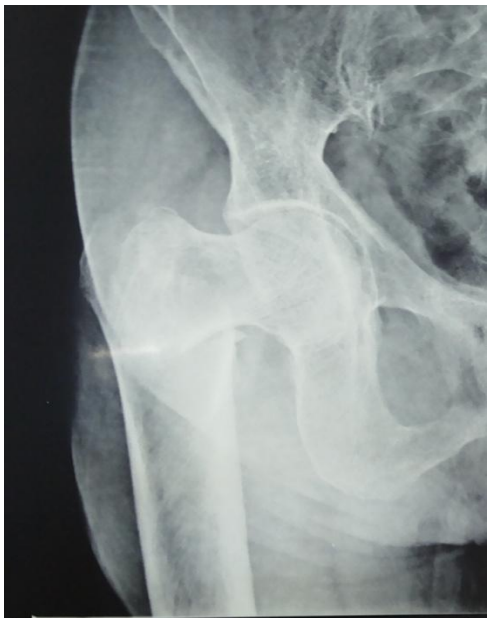

Figure 7: Pre-op IT fracture

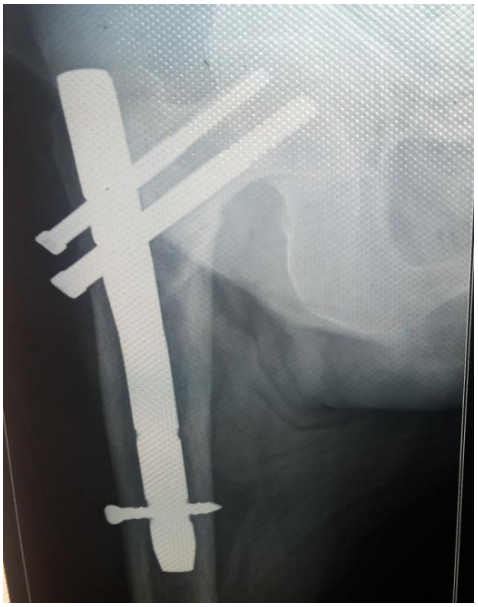

Figure 8: Post-op IT fracture with PFN

We have used criteria for union as presence of bridging callus at fracture site with absence of pain clinically at fracture site (Fig.3). The mean radiological union time for fracture fixed with PFN was 11 weeks while 13.2 weeks for DHS group. No infection noted in PFN group while one superficial and one deep infection noted in DHS group. Superficial infection controlled with antibiotics while deep infection required wound debridement.

DISCUSSION

Trochanteric fractures more commonly occur in elderly patients, and the outcome may be extremely poor if there is a prolonged bed rest. So treatment of choice will be stable fixation and early mobilization. There are two main types of fixation for trochanteric fractures, which are plate fixation and intramedullary devices[9,10]. The development of DHS in the 1960 saw a revolution in the management of intertrochanteric fractures. This device allowed compression at fracture site without complication of screw cut out and implant breakage associated with nail plate.

However extensive surgical dissection, blood loss and surgical time required for this procedure often made it a contraindication in the elderly with comorbidities. The implant also failed to give good results in unstable and osteoporotic bone.In the early 90's intramedullary devices were developed for fixation of intertrochanteric fractures, these devices had numerous biomechanical and biological advantages over the conventional DHS [6-8].

Average age of the patient in PFN group was 58 years (45 to 68 years), with 8 males and 22 females while in DHS group average age was 60 years (48 to 70 years), with 10 males and 20 females. Other study done by T.S.Sethi and Panagopouloas et.al shown similar age group distribution. Gender distribution varied in different study, few studies suggested male are prone to this type of fracture while others suggesting female [9,10].

In our study majority of fractures are due to trivial fall, which is similar to others study done by Hornby et al, Pajarinen et al [11,12]. In our study length of incision used in PFN is smaller than DHS group because PFN is minimally invasive procedure and less number of screws used percutaneously compared to DHS open procedure and more screws used. In our study average blood loss was around 50 ml in PFN and 95 ml in DHS, so comparatively less in PFN group probably because of smaller incision, minimally invasive procedure, and smaller duration associated with PFN.

Mean time taken in PFN surgery was 55min (35 to 80min) comparatively DHS lasted around a mean time of 92min (52 to 127min), so PFN took less time compared to DHS because it requires smaller incision and less number of screws. Duration of hospital stay for PFN group was less compared to DHS because of its minimally invasive nature. In our study we noticed one superficial and one deep infection in DHS, no infection in PFN because of small incision

and less soft tissue dissection. Our series there was one breakage of proximal screws in PFN and 2 cases of screws cut out noted in DHS group.

In our study limb shortening is more in DHS. In DHS we found successive increase in varus angulation with each follow up because sliding nature of the lag screw of the DHS, which lead to compression at the fracture site and gradual shortening of limb. Harris Hip Score at the end of 1 month was less in DHS group compared to PFN. However this difference disappeared in 1 years of follow up between two groups which were comparable to other studies. A randomized postoperative rehabilitation study in 2005 by Pajarinen et.al. comparing peritrochanteric femoral fractures treated with DHS or PFN was done, they suggested use of PFN may allow faster postoperative restoration of walking ability when compared to DHS[8].

CONCLUSION

We found that PFN had more advantages than DHS in management of intertrochanteric fractures in many ways such as small incision, less blood loss, reduced operative time, and reduced hospital stay, less amount of shortening, less infection rate and early mobilization. We suggest PFN is implant of choice for management of intertrochanteric fractures, however as DHS is low cost implant and lesser fluoroscopy exposure is required, it still remains to be the gold standard for stable non-osteoporotic intertrochanteric fractures.

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