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Original Research Article

Treatment of trochanteric fractures by PFN or DHS

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ABSTRACT

Background: Intertrochanteric fracture is one of the common fractures of the hip in the elderly over the age of 50 years. Dynamic hip screw is still considered the gold standard for treating intertrochantric fractures by many. Not many studies compare the DHS with proximal femoral nail (PFN).
Methods: This prospective study included 32 patients of intertrochanteric fractures in which 16 patients were treated by PFN and rest 16 by DHS. All patients were operated under image intensifier control. Average age of the patients was 65 years (20-80) years.
Results: In our series the patients with DHS has increased intra operative blood loss (160 ml), longer duration of surgery (54.6 min) and required longer time for mobilization (15 weeks) while patients who underwent PFN had lower intra op blood loss (95 ml), shorter duration of surgery (41.2 min). The Salvati and Wilson hip scoring is better in PFN group.
Conclusions: PFN produces better results than DHS in terms of shorter duration of surgery, early weight bearing, lower infection rate and less blood loss.

Keywords: Dynamic hip screw, Intertrochanteric fractures, Proximal femoral nail, Salvati and Wilson hip score

INTRODUCTION

Intertrochanteric fracture is one of the common fractures of the hip in the elderly over the age of 50 years.[1] 90% of the fractures occurs due to low energy fall from a standing height. Increase in the incidence of trochanteric fractures may be due to increase in life expectancy of population and increase in high energy trauma which victimizes more number of young adults.

Intertrochanteric fractures are treated by operative or non-operative methods. Non operative treatment with prolonged bed rest and traction leads to shortening, varus deformity and malrotation along with other complications associated with prolonged immobilization. Operative treatment prevents malreduction, malunion and allows early mobilization and rehabilitation.[3] Surgery has become the treatment of choice for all trochanteric fractures.

Different methods are available for stable internal fixation of intertrochanteric fractures. Implants can be divided into two groups- extamedullrary and intramedullary device. The DHS is an extramedullary device consisting of a lag screw inserted in the femoral head and attached to a barelled side plate fixing to the femur.[5] PFN is an intramedullary device inserted from the tip of the trochanter distally and secured via cross screw passed up the neck of femur.[6] DHS is a standard implant in the treatment of trochanteric fractures. Gradually PFN for fixation of trochanteric fractures is gaining popularity. PFN is biomechanically superior. Biological advantages include, a closed method, less soft tissue dissection, less blood loss, preservation of fracture hematoma which all

facilitate fracture healing. Mechanical advantages include a load shearing device, stable on loading, less deforming force across the fracture as it decreases the lever arm.[7]But there is still a controversy regarding the treatment of unstable I/T fractures.

The aim of our study is to compare the result, functional outcome and complications of the PFN and DHS in the treatment of unstable intertrochanteric fractures.

METHODS

This prospective study was conducted in the PG Dept. of Orthopaedics, Vimsar, Burla from August 2014 to July 2017. The study population was thirty two patients. The patients were selected randomly into 2 groups PFN (n=16) and DHS (n=16).

Inclusion criteria

Inclusion criteria were I/T fracture in either sex, age >20 year and <80 years, fractures <3 weeks from the day of injury.

Exclusion criteria

Exclusion criteria were age <20 years, compound fractures, pathological fractures, sub trochanteric extension of fractures, multiple injury.

Preoperatively all the patients were evaluated carefully includes detailed history, the cause of fracture and other associated diseases. The radiograph of the pelvis with both hips AP view and cross table lateral view of the affected hip were taken. The fractures were classified using Boyd and Griffin classification.[2]

Skin traction was applied to all the cases initially. Implants either DHS or PFN were randomly selected.

Under anaesthetia the patient was put to the fracture table. Closed reduction was done by longitudinal traction and evaluated under C-arm image intensifier. The part was prepared with 10% betadine solution and properly drapped. Standard lateral approach to the proximal femur was used in all cases of DHS while all cases of PFN fixation were operated through minimally invasive approach with an incision over the tip of trochanter. After fixation wound was closed in layers and sterile dressing was done. Post op i.v. antibiotic given for 5 days and then changed to oral antibiotic. Patients were encouraged to activity mobilize the knee, ankle and hip from the 2nd postoperative day. Sutures were removed after 12 days. Patients were followed up clinically, radiographically at regular intervals monthly for 3 months and then every 3 monthly. Functional outcome of the patient were assessed using Salvati and Wilson scoring system. Results were recorded in relation to duration of surgery, amount of blood loss, intra operative complication, rate of union, functional return, mortality, infection and implant failure.

Table 1: Salvati and Wilson hip function scoring system (maximum score=40).

Score	Pain	Walking	Muscle power and motion	Function
0	Constant and unbearable, frequent strong analgesia	Bedridden	Ankylosing and deformity	Bedridden
2	Constant but bearable, occasional strong analgesia	Wheelchair	Ankylosing with good functional position	House‑bound
4	Nil or little at rest, pain with activities	Walking frame	Poor muscle power, flexion <60, abduction <10	Limited housework
6	Little pain at rest, pain on activity	One stick, limited distances up to 400 yards	Fair muscle power, flexion 60–90, abduction 10–20	Most housework can stop freely
8	Occasional slight pain	One stick, long distances	Good muscle power, flexion >90, abduction >20	Very little restriction
10	No pain	Unaided and unrestricted	Normal muscle power, full range of movement	Normal activities

RESULTS

In our study of 32 cases of trochanteric fractures of femur were evaluated. Ages of the patients are between 20 to 80 years. Mean age of the patients was 65 years (Table 1). Most of the cases affected non dominant side. Mean operative time in DHS 54.6 min and PFN 41.2 min respectively. Intra operative blood loss in DHS more than PFN. Limb shortening average in DHS 1-1.5 cm but in PFN .5 -1.0 cm (Table 3). Average union time more in DHS than PFN. Wilson and Salvati hip score in DHS 26.7 but in PFN is 33.4.

Table 2: Demographic data of our series.

Total patients	32
Male	16
Female	16
Age (years)	20-80 (mean 65 yrs)
Trivial trauma	22
RTA	10
Side	
Left	20
Right	12

Table 3: Comparison of PFN vs. DHS in our series.

Results of parameter (avg.)	PFN (Mean)	DHS (Mean)
Operative time(min)	41.2	54.6
Intraoperative blood loss (ml)	95 ml	160 ml
Length of incision	6 cms	12 cms
Postoperative infection		
Superficial	1	3
Deep	0	2
Limb shortening	0.5 -1.0 cms	1-1.5 cms
Hospital stay	4-8 day	8-12 day
Union time	9.8 weeks	13.5 weeks
Full weight bearing	12 wks	15 wks
Fluroscopic time (mins)	1.25	0.81
Wilson and Salvati hip score	33.4	26.7
Peri implant fracture	0	1
Varus angulation	0	1

DISCUSSION

In this study of 32 cases of trochanteric fractures of the femur were evaluated. Most patients were found to be elderly with an average age of 65 yrs, which may be attributed to osteoporosis with increasing age (Table 2). Trivial trauma of domestic fall was the commonest cause of fracture attributed to 68.75%. Studies suggest that these fractures are more common in females due to postmenopausal osteoporosis as reported by David, but in our study equal number of male and female patients were affected probably due to outdoor activities in our rural set up.[3] The most common mode of trauma is fall in the older age group and road traffic accidents in younger patients. In our study, we found that the surgery time was considerably lower in the PFN group primarily because it is a closed procedure, and less dissection was required as compared to DHS fixation. In a study by Klinger et al similar results were obtained with mean surgical time of 43 minute versus 61 min in PFN and DHS group, respectively (Table 3).[4] Probably due to more soft tissue dissection and long exposure time, 13.3% of cases presented with wound infection in DHS group, compared to none in the PFN group. However, the closed nature of the procedure in PFN caused a significantly increased fluoroscopic exposure during surgery. Xu et al reported similar results in their comparative study, that is, exposure time was more in the PFN group.[5] The amount of exposure, however, significantly reduced as the surgeon gained experience in the procedure. Two patients (12.5%) in DHS group had lag screw cut through leading to implant failure (Table 3). This was associated with varus angulation and nonunion at the fracture site. Baumagaertner et al reported the incidence of fixation failure to be as high as 20% in unstable fracture patterns.[6] Osteoporosis was found to be the most important predisposing factor for this complication.

No significant difference was found between union time of the two groups, but the PFN group united slightly earlier (mean 9.8 weeks) than the DHS group (mean 13.5 weeks) (Figure 1, 2, 6). This might be because patients in the PFN group were able to commence mobilization earlier which improved microcirculation at the fracture site. Range of stay of the patient in our hospital was 1-2weeks. In the postoperative period, depending on the pain and tolerance of the patient, they were made to stand with support on the 4th or 5th postoperative day. They were gradually mobilized over the next 2–3 days until they could do the non-weight bearing ambulation with a walker.

Figure 1: Radiographs of case 1. A= Pre-op X-ray of I/T fracture right trochanter, B= Post–op X-ray with PFN, C= Post-op X-ray with PFN 2 month old with varus fixation.

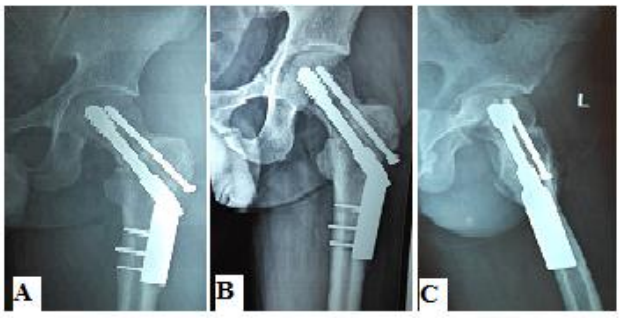

Figure 2: Radiographs of case 2. A, B= I/T fracture left hip with DHS AP view, C= I/T fracture with DHS lateral view showing union at 3 month follow up.

Figure 3: Radiographs of case 3. A= Unstable I/T fracture right hip, B= Immediate post op I/T fracture with PFN with varus fixation.

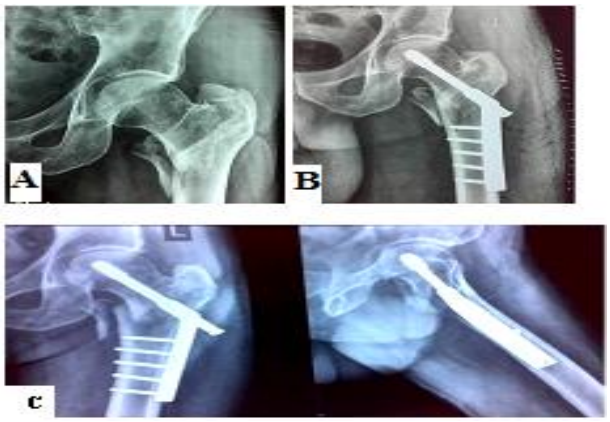

Figure 4: Radiographs of case 4. A= I/T fracture left hip, B= I/T fracture treated with DHS AP view, C= I/T fracture treated with DHS both AP and lat view showing union at 2 month follow up.

Figure 5: Radiographs of case 5. A= Pre op X-ray pelvis with both hip AP view showing I/T fracture right hip, B= I/T fracture treated by DHS, AP and lateral view showing union at 3 months follow up.

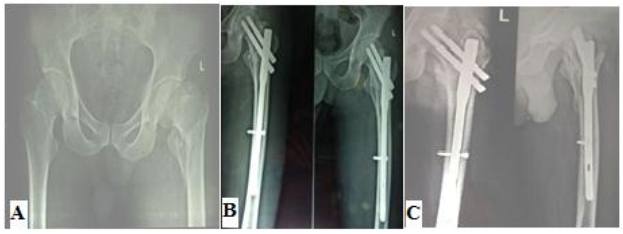

Figure 6: Radiographs of case 6. A= X-ray showing pelvis with both hip AP view, B= X-ray left hip AP and lateral view with PFN immediate post op, C= X-ray left hip AP and lateral view with PFN 3 month postop.

The patients with PFN had earlier full weight bearing without support at an early post op period than the DHS group patients. The result concurred with studies by Klinger et al and Xu et al who also advocated immediate weight bearing on the 1st postoperative day.[4,5] This was not possible in our series because none of the patients had stable fracture patterns. Earlier weight bearing was possible in the PFN group mainly due to it being an intramedullary device which acts as a load sharing rather than a load-bearing device and counteracts the varus force of hip adductors by abutting to the lateral cortex of femur. Moreover, there were less soft tissue dissection during surgery which led to earlier healing. As the surgical wound in fractures treated by PFN is small, the mean blood loss was relatively small compared to those treated by DHS (Figure 6). The average blood loss in patients operated with PFN was 95 ml rather than 160 ml in DHS. Taeger et al showed a 43% increased blood loss in a reduction of complex unstable fractures compared to stable ones.[7]

The functional hip score was significantly better in the PFN group (mean 33.4) than with the DHS group (mean 26.7). The better PFN scores could be attributed to lesser postoperative pain in the patients due to lesser soft tissue dissection and early resumption of mobilization. The poor result in DHS group could also be attributed to other associated factors like development of postoperative infection and unstable fixation with screw cutouts.

CONCLUSION

For the management of unstable trochanteric femoral fractures, PFN produces better results than DHS in terms of shorter operative time, earlier weight bearing, lower infection rates, and less blood loss.

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