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Research Article

Proximal femoral nailing is better choice in treatment of intertrochanteric fracture in elderly people

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ABSTRACT

Background: Intertrochanteric fractures are fractures involving proximal end of femur through and in between both trochanters with or without extension into upper femoral shaft. The aim of this study was to compare the results of proximal femoral nail (PFN) and dynamic hip screw (DHS) in treatment of intertrochanteric fractures.
Methods: 63 patients were treated by a dynamic hip screw (DHS) and proximal femoral nail in Service of Trauma in Regional Hospital Durres during 2012-2014. Patients were operated under X-ray intensifier control. Functional outcome, duration of operation, blood loss were studied and statistically evaluated for both of groups.
Results: The average age of our patient is 77.3 (57-95) years. 15/48: male/female. Fractures were classified under AO, 23.8% A1, 58.7% A2 and 17.5% A3. The average operating time for the patients treated with PFN was 49.3 min as compared to 72.3 min in patients treated with DHS. The average of intraoperatory blood loss was respectively 85.4 and 122.2 ml in PFN and DHS group. The patients treated with PFN had better Harris Hip Score in the early period (at 1st and 3rd month) and earlier ambulation, but in the long term (at 6th and 12th months) both the implants had the same functional outcomes.
Conclusions: The current evidence indicates that PFN may be a better choice than DHS in the treatment of intertrochanteric fractures.

Keywords: Intertrochanteric fracture, DHS, PFN

INTRODUCTION

Intertrochanteric fractures are fractures involving proximal end of femur through and in between both trochanters with or without extension into upper femoral shaft. An increasing incidence of intertrochanteric fractures with advancing age is well known. The incidence of intertrochanteric fractures varies from country to country. Gulberg et al has predicted that the total number of hip fractures will reach 2.6 million by 2025 and 4.5 million by 2050. The only treatment option for intertrochanteric fractures is surgery except of severe dementia patients, terminal diseases with less than 6 weeks of life expectancy, unresolved life threatening medical comorbidities.[1]

The conservative option is associated with very high complications rate, as pneumonia and thromboembolism which come from prolonged immobilization and contribute directly to the high mortality rate. Decubitus ulcer, joint contractures, malunion in varus deformity and shortening is common.

The aim of a stable synthesis in an osteoporotic bone has developed several implants from fixed plate and screw, dynamic compression screw to intramedullary implants. Intramedullary devices such as proximal femoral nail (PFN), are more stable under loading with a shorter lever arm, so the distance between the hip joint and the nail is reduced compared with that for a plate, thus diminishing the deforming forces across the implant. Being load sharing devices early ambulation of the patient and weight bearing can be allowed.

The biomechanical advantage of intramedullary devices is important particularly in unstable trochanteric and sub trochanteric fractures.[2,3]

METHODS

63 patients with intertrochanteric fractures, 50-95 years old were included in our study. The exclusion criteria were unfitted patients for the surgery, with compound or pathological fractures, admitted for reoperation.

Implant either DHS or PFN was randomly selected by operating surgeon. They are operated in 12-24 hours from the hospitalization after being carefully evaluated preoperatively to determine the cause of fracture and other diseases.

X-ray or even CT was done to assess the type, pattern, extent and displacement of fracture. The operation under spinal anesthesia is preferred; the method of anesthesia is determined by the anesthetist after consulting the surgeon. The fracture table is essential to achieve reduction and to allow free access for the C-arm in both views. A combination of 2nd generation Cephalosporin and Amino glycoside was administered intravenously 30 minutes prior to the surgery and was used for 48 hours postoperatively.

Surgical techniques

For PFN, reduction was achieved under X-ray control, by closed manipulation and traction under anesthesia. The fixation was done through an intramedullary nail (9-10-11 mm in diameter), a self-tapping femoral neck screw Ø 8.0 mm, 80-115 mm in length, and a self-tapping Hip Pin Ø 6.0 mm for true rotational stability, 10-15 mm shorter than femoral head. The intramedullary nail was fixed distally with one or two distal locking screw Ø 4.5 mm.

Two small incision of 2-3 cm long were made to insert the implant. For DHS, through a lateral femoral incision 6 cm to 8 cm long lateral femoral cortex was exposed and under the X-ray control the reduction was achieved. Through a guide wire inserted into the head of femur, the compression screw was inserted and an angle plate 135 grade with 4-6 holes was fixed to the lateral femoral cortex. An antiderotation screw Ø 6.5 mm was inserted 1 cm proximal to the compression screw if the lateral cortex is intact.

A negative pressure drain was left in all cases; patients were encouraged ankle and calf exercises from day one and mobilized no weight bearing from the second postoperative day depending upon the physical condition of the patient. All drains were removed by 24 hours. The wounds were inspected every three days and sutures were removed on the 14th day.

Patients were followed up at first, third and sixth month until 1 year. Blood loss during the operation and the time of operation was assessed for every patients and x ray during the monthly control were assessed for union and grade of the collapse. Functional results were assessed through Harris hip score in first, third, sixth and one year after the operation.

RESULTS

63 patients more than 55 (57-95) years old (Mean age = 77.3 years), with female to male ratio of 3.2:1 were treated in the service of orthopedic and trauma at regional hospital Durres.

The implant PFN or DHS was selected randomly by the orthopedic surgeon. Most of the fractures were type A2 (58.7%) (Table 1).

Table 1: Type of fractures.

	A1	A2	A3	
PFN	3	11	8	22
DHS	12	26	3	41
Total	15(23.8%)	37(58.7%)	11(17.5%)	63

Mean duration of surgery for PFN was 49.3 min and for DHS was 72.3 min ($p<0.001$) (Figure 1).

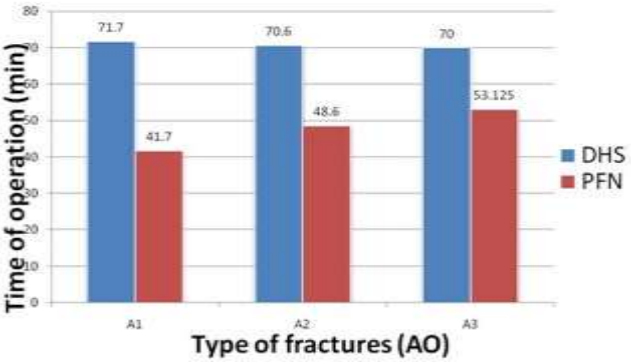

Figure 1: Operative time.

Duration of operation is longer in DHS group and seems to be the same for each AO type but in PFN group it increases with the instability from A1 to A3 type of fractures

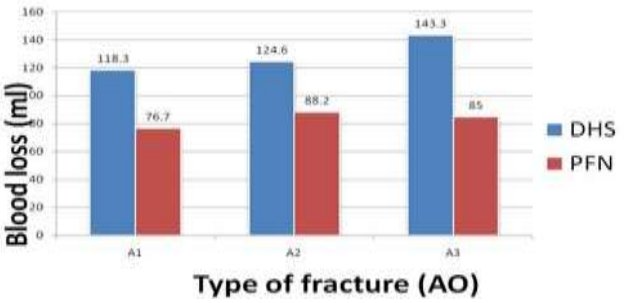

Figure 2: Blood loss intraoperatively.

Blood loss intraoperatively is greater in unstable fractures (A3) but with a statistically difference between DHS and PFN group.

Average amount of blood loss intraoperatory was 85.4±25.7ml in PFN group and 122.2±37.2ml in DHS group (p<0.001) (Figure 2).

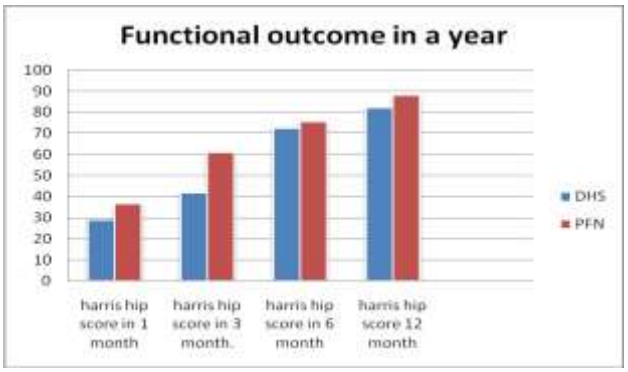

Figure 3: Harris hip score in a year.

PFN outcomes at first and third month are better but at sixth and twelfth month they are similar.

Figure 4: Harris hip score for every AO type.

PFN outcomes for unstable fractures A3 are better also for late results in a year.

The patients treated with PFN had better Harris hip score in the early period (at 1 and 3 months) and earlier ambulation, but in the long term (at 6 and 12 months) both the implants had the same functional outcomes.

Functional result seem to be statistically better for PFN than DHS in 1st and 3rd month, respectively 36.5±4.7 and 61±4.95 for PFN in comparison with 29±3.9 and 41.7±7.1for DHS. (p<0.001) (Figure 3, 4).

DISCUSSION

Internal fixation and early mobilization is an indication for trochanteric fractures of the femur in elderly. It is accepted by all as the only way not only to reduce the complication and mortality rates from prolonged immobilization.

Internal fixation gives also good functional results through avoidance of malunion which can result from conservative treatment. The treatment of choice is still controversial. The development of the DHS was a revolution in the management of unstable fractures.

The device allowed compression of the fracture site without cutting bone out and plate breakage. However the extensive surgical dissection, blood loss and surgical time required for this procedure often made it a contraindication in the elderly with comorbidities.

DHS some time is not able to give good results in extremely unstable and the reverse oblique fracture. The moment arm of PFN is shorter than in DHS, because the load is transmitted to the axis of nail which is more medial.

Table 2: Intraoperative outcomes of the two groups.

Studies	Operation time (min)		Blood loss (mL)	
	PFN	**DHS**	**PFN**	**DHS**
Ranjeetesh et al[5]	55	87	100	250
Pan et al[6]	59.16 ± 16.92	87.35 ± 21.29	273.33 ± 120.8	480.88 ± 177.90
Pajarinen et al[7]	55 (35–200)	45 (20–105)	320 ± 310	357 ± 495
Giraud et al[8]	35	42	410	325
Papasimos et al[9]	71.2 (60–240)	59.2 (40–100)	265	282.4
Khan I et al[10]	NA	NA	200	375
Muzzafar et al[11]	69	77	NA	NA
Liu et al[12]	46.5 ± 20.5	53.4 ± 8.3	136	152
Huang et al[13]	50.5 ± 20.2	52.4 ± 18.3	202.5	225
Parker et al[14]	49 ± 12.7	46 ± 12.3	NA	NA
Our study	49.3± 8.8	70.8±11.06	85.4±25.7	122.2±37.2

DHS implants in comparison with PFN realized the stability of the fracture through the lateral wall of the femur from plates fixated with screws, which are not well fixated in an osteoporotic bone. Biomechanically PFN implants have an advantage to DHS implants.

In our study most of the fractures are in elderly females and the fracture happened at home from a simple fall. Cummings SR et al found that Intertrochanteric fractures are one of the commonest fractures of the hip especially in elderly people usually due to low energy trauma like simple fall with osteoporotic bone.[4]

Mean duration of surgery for PFN and DHS is similar but amount of blood loss was more in DHS group (Table 2).

Khan IA et al compared the outcome of PFN and DHS fixation of unstable proximal femoral fractures in 70 patients.[10]

Operation duration was similar in two groups although blood loss was significantly low in PFN group (PFN-200mls, DHS: 375 mls).

In our study we found an advantage of operation duration time for PFN 49.3±8.8 in comparison with DHS 70.8±11.06. We had also better results in blood loss with an advantage of PFN. Partial weight bearing was started earlier in PFN group than DHS. Full weight bearing was started in all cases only after radiological union.

Our functional results were much better for PFN in first three months but after six months the functional results seem to be similar.

Muzzafar N at al in their study with 80 found that DHS group required a longer operative time and was associated with greater blood loss than PFN. They found that there is no significant difference in functional outcome but they studied only the late result. We found better functional outcome for PFN group in first month and after three months but the results were similar after six months and one year after operation.[11]

Ranjeetesh K at al in their study of 50 patients found that PFN is tolerated better in old patients with osteoporotic bone and has an advantage in surgery time and a shorter radiation exposure to DHS. The patients treated with PFN started early ambulation as they had better harris hip score in the early period (at 1 and 3 months). In the long term both the implant had almost similar functional outcomes.[5]

Huang X et al in their meta-analysis of 1348 fractures found that PFN fixation shows the same effectiveness as DHS fixation in the parameters measured.[15]

Parker et al in their meta-analysis study of 600 fractures found both implants produced comparable results but there was a tendency to better return of mobility for those treated with the intramedullary nail.[14]

Zhang K et al in their meta-analysis of six studies with 669 fractures found that the PFN group had significantly less operative time (WMD: - 21.15, 95% CI: - 34.91 - 7.39, P=0.003), intraoperative blood loss (WMD: - 139.81, 95% CI: -210.39 -69.22, P=0.0001), and length of incision (WMD: -6.97, 95% CI: -9.19 - 4.74, P<0.00001) than the DHS group. No significant differences were found between the 2 groups regarding postoperative infection rate, lag screw cut-out rate, or reoperation rate.[16]

CONCLUSION

In our study we have found that PFN group has a better outcome in this unstable and osteoporotic fracture. PFN group has less blood loss and less operating time compared to DHS group. In PFN group patients have started early ambulation compared to DHS group which is lifesaving especially for the elderly people.

PFN may be a better choice than DHS in the treatment of intertrochanteric fractures.

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