



ORIGINAL RESEARCH PAPER

Orthopaedics

TREATMENT OF INTERTROCHANTERIC FRACTURES USING PROXIMAL FEMORAL NAIL VS. DYNAMIC HIP SCREW: A META-ANALYSIS

KEY WORDS: Dynamic hip screw, proximal femoral nailing, intertrochanteric fracture, extramedullary, interamedullary, unstable fracture

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ABSTRACT

The aim of this meta-analysis was to compare the outcomes of Proximal Femoral Nail (PFN) And Dynamic Hip Screw (DHS) in treatment of intertrochanteric fractures.

Method- Relevant randomized or quasi-randomized controlled studies comparing the effects of PFN and DHS were searched. Four eligible studies involving 180 fractures were included. Their methodological quality was assessed and data were extracted independently for meta-analysis.

Results- After excluding non-randomized control trials and retrospective articles, 4 randomized and quasi-randomized controlled trials were included. The number of fractures included in a single study ranged from 30 to 50. There were a total of 180 fractures. The research papers targeted Asian patients. One study reported more female patients compared to male patients, while two studies reported more male patients compared to female patients. One study didn't mention the gender specifically; Totally 91 fractures were managed with PFN and 89 managed with DHS.

Conclusions- The current evidence indicates that PFN may be a better choice than DHS in the treatment of intertrochanteric fractures. However, the PFN is a significantly costlier implant than the DHS with almost similar final outcome.

INTRODUCTION

Intertrochanteric fracture are commonly seen in elderly population, the incidence of intertrochanteric fractures has been increasing significantly due to the rising age of modern human populations.

Once stable reduction has been obtained, implants are chosen. The Dynamic Hip Screw (DHS), used in extra medullary fixation is considered the gold standard for treating intertrochanteric fractures. It allows to secure fixation of the fracture and permits controlled impaction at the fracture site thereby reducing the risk of fixation failure seen in rigid nail-plate.

Proximal Femoral Nails are emerging as an effective internal fixation device. PFN, introduced by the AO/ASIF group in 1997, has become prevalent in treatment of intertrochanteric fractures in recent years because it was improved by addition of an anti-rotation hip screw proximal to the main lag screw. Unstable trochanteric fracture cannot be fixed with DHS as it cuts through due to comminution, here PFNs are the choice of implants.

Our aim was to evaluate clinical results comparing PFN with DHS, including comparison of operative time, intraoperative blood loss, and length of incision, postoperative infection rate, lag screw cut-out rate, and reoperation rate. We hypothesized that PFN would be a superior treatment for intertrochanteric fractures compared with DHS.

AIM

The aim of this meta-analysis was to compare the outcomes of Proximal Femoral Nail (PFN) And Dynamic Hip Screw (DHS) in treatment of intertrochanteric fractures.

MATERIAL AND METHODS

We searched for randomized or quasi-randomized controlled studies comparing the effects of PFN and DHS. We searched

PubMed, BMC, and other online databases for relevant randomised or quasi-randomised studies comparing the DHS and PFN. Data were extracted independently and methodological quality was further assessed. The inclusion and exclusion criteria used in selecting eligible studies were:

- (1) target population – individuals with intertrochanteric fractures, excluding subtrochanteric and pathological fractures;
- (2) intervention – DHS fixation compared with PFN fixation;
- (3) methodological criteria – prospective, randomized, or quasi-randomized controlled trials;
- (4) duplicate or multiple publications of the same study were not included.

Data were collected by screening titles, abstracts, and keywords electronically. Full texts of citations that could possibly be included in the present meta-analysis were retrieved for further analysis. Operative time (min), intraoperative blood loss (ml), length of incision, post-operative infection, and reoperation rate were the main measures in the studies included, which the present meta-analysis evaluated to compare the effects of PFN and DHS. We did not undertake a subgroup analysis for different fracture types because not all of the studies included described the fracture types. We did not include the possibility of publishing bias due to the small number of studies included.

RESULTS

After excluding non-randomized control trials and retrospective articles, 4 randomized and quasi-randomized controlled trials were included. The number of fractures included in a single study ranged from 30 to 50. There were a total of 180 fractures. The research papers targeted Asian patients. One study reported more female patients compared to male patients, while two studies reported more male patients compared to female patients. One study didn't mention the gender specifically; Totally 91 fractures were managed with PFN and 89 managed with DHS.

TABLE – 1 RESULT DETAILS

Studies	Age (yrs)	Gender	Target population	Length of follow-up	Number of fractures		Outcomes*
					PFN	DHS	
1) Type II Intertrochanteric Fractures: Proximal Femoral Nailing (PFN) Versus Dynamic Hip Screw (DHS) Cyril Jonnes, MS, Shishir SM, MS, and Syed Najimudeen, MS	average age = 60 years maximum = 85 years minimum = 28 years	Male- 16 (53%) Female- 14 (47%)	Asia	12 months	15	15	1, 2, 3

2) Treatment of stable intertrochanteric fractures of the femur with proximal femoral nail versus dynamic hip screw: a comparative study Anmol Sharma, AnishaSethi, and Shardaindu Sharma	average age = 60.5 years maximum = 81 years minimum = 40 years	-	Asia	24 months	31	29	1, 2, 3,
3) Comparative prospective study of proximal femoral nail and dynamic hip screw in treatment of intertrochanteric fracture femur Ranjeetesh Kumar, MBBS, R.N. Singh, M.S. Ortho, FRCS, and B.N. Singh, M.S. Ortho, FRCS	average age = 67.5 years maximum = 85 years minimum = 50 years	Male- 20 (40%) Female- 30 (60%)	Asia	12 months	25	25	1, 2, 3
4) Comparative study between DHS and PFN in intertrochanteric fractures of femur Dr. Amandeep Singh Bakshi, Dr. Pardeep Kumar, Dr. BS Brar	average age = 58.58 years (72.5% patients were aged more than 50 years and 27.5% below 50 yrs)	Male- 55% Female- 45%	Asia	6 months	20	20	1,2,3

OPERATIVE TIME

All the studies report a longer duration of surgery in the DHS group.

Study 1 reports longer duration of surgery (105min) with DHS while patients who underwent PFN had shorter duration of surgery (91min).

Study 2 reports Duration of surgery was lesser in PFN group (56.9 min) compared to 69.7 min in DHS which was statistically significant.

Study 3 reports Duration of surgery was more for DHS compared to PFN. The average operating time for the patients treated with PFN was 55 min as compared to 87 min in patients treated with DHS.

Study 4 reports Mean duration of surgery in the patients of DHS group and the PFN group were found to be 63.35 and 54.70 minutes respectively (P- value < 0.05).

INTRAOPERATIVE BLOOD LOSS

All the studies report an increased intraoperative blood loss with DHS.

Study 1 reports increased intraoperative blood loss (159ml) with DHS while patients who underwent PFN had lower intraoperative blood loss (73ml).

Study 2 reports Average blood was significantly more in DHS group (p < 0.01) (221 ml in DHS compared to 109ml in PFN) with 2 patients requiring blood transfusion postoperatively as compared to nil in PFN group.

Study 3 reports The average blood loss to be 100 and 250 ml in PFN and DHS group respectively. 05 out of 25 patients in DHS group required blood transfusion either intra or postoperatively.

Study 4 reports that Mean blood loss among the subjects of the DHS group and the PFN group were found to be 292.50 and 108.50 ml respectively which was significant (P- value < 0.05).

LENGTH OF INCISION

The length of incision was smaller in the PFN group

Study 1 reports that PFN requires a smaller incision (6.1 cm) to access the entry site into the medullary canal compared to DHS which was found to be more than twice the length (17cm). Study 2 reports Mean length of incision was smaller in PFN group (4.9 cm) compared to DHS which was found to be 7.9cm. In studies 3 and 4 the Length of incision wasn't mentioned

POSTOPERATIVE INFECTION RATE

Study 1 reports that there was one case of infection in DHS

group. She was diagnosed to have infected non-union and she underwent implant removal. Deep cultures taken intra-op, showed no growth of organisms.

In studies 2,3 and 4 no postoperative infections were reported

DISCUSSION

PFN, inserted by means of a minimally invasive procedure, allows surgeons to minimize soft tissue dissection, thereby reducing surgical trauma and blood loss. The results of this meta-analysis also demonstrates that operative time, intraoperative blood loss, and length of incision in the PFN group are significantly less than in the DHS group. Therefore, because of its minimal invasiveness, PFN is thought to be as a better choice than DHS in the treatment of elderly patients with intertrochanteric fracture.

There are several limitations in our meta-analysis. Firstly, the number of studies included and the sample size of patients were quite limited. Secondly, we did not undertake a subgroup analysis of different fracture types because not all the studies included described the fracture types. Furthermore, not all the studies included had long enough follow-up periods, which also reduces the power of our research.

CONCLUSIONS

In summary, the current available data indicate that PFN may be a better choice than DHS in the treatment of intertrochanteric fractures in terms of decreased blood loss[1,2,3,4,5,6],, reduced duration of surgery[1,2,3,4,5] early weight bearing and mobilization[1,6], smaller incision [2,3], reduced hospital stay, decreased risk of infection[2] and decreased complications. However, the PFN is a significantly costlier implant than the DHS with almost similar final outcome.

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