National Journal of Clinical Orthopaedics

ISSN (P): 2521-3466
ISSN (E): 2521-3474

www.orthoresearchjournal.com
2022; 6(2): 05-07
Received: 04-02-2022
Accepted: 07-03-2022

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Intertrochanteric fracture PFN vs DHS

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DOI: https://doi.org/10.33545/orthor.2022.v6.i2a.357

Abstract
Background: DHS fixation has remained a well-established gold standard in intertrochanteric fractures of femur for a long time. 1 However, it has shortcomings and pitfalls. In inter-trochanteric fractures of femur, DHS fixation has shown higher failure rates. PFN is a new fixation device proposed for fixation of unstable intertrochanteric fractures. 1 Being intramedullary, it is a biomechanically advantageous device which should allow better fixation of unstable intertrochanteric translating into lesser failure rates of fixation and also permitting early mobilization and faster rehabilitation especially in elderly patients. We present a study comparing outcomes of managing unstable intertrochanteric fractures with PFN and DHS.
Materials and Methods: We evaluated 30 (PFN: 15; DHS: 15) cases of intertrochanteric fractures of femur out of which 26 were unstable and 4 stable type, from January 2017 to December 2018, with minimum 12 months follow up period. Mean age was 60 years for both PFN and DHS group. We studied the surgical complications in both groups and also compared functional and radiographic results of both groups.
Results: There was significantly more clinical shortening in DHS group than in PFN group (average 1-1.9 cm versus 0.5-0.9 cm). There were 3 cases of superficial and 2 cases of deep infection in the DHS group while there was one case of infection in PFN group. There was no case of implant failure in the DHS group compared to one case in PFN group (due to screw breakage). Harris hip score at follow up was fair to excellent in PFN as compared to DHS. This difference was statistically significant.
Discussion: DHS despite remaining a gold standard for fixation of intertrochanteric fractures of femur for a long time, it may not be suitable for certain fracture patterns and in older age groups with more medical co-morbidities and osteoporosis. PFN is a biomechanically sound device for fixation of comminuted intertrochanteric fractures of femur2 which has lesser surgical morbidity and should be especially beneficial in elderly, osteoporotic and medically compromised patients. Its load sharing capability provides a more stable fixation allowing early mobilization and rehabilitation.
Conclusion: PFN is unequivocally a better choice of implant for fixation of unstable intertrochanteric fractures of femur, especially in osteoporotic and medically compromised patients as compared to DHS fixation device.

Keywords: Proximal femoral nail, dynamic hip screw, unstable intertrochanteric fracture, A.O's classification

Introduction
In today's world with better medical facilities and ongoing advances in science and medical field the average life span of people has greatly increased. This has led to increasing geriatric population and their problems. One very common fracture in the older age group is Intertrochanteric fractures of femur. In 1990, of the total world's incidence of hip fracture, Asia alone accounted for 26% of the cases. By 2025 this figure could rise to 37% and upto 45% by 2050. In the elder age group, most of the fractures are osteoporotic, resulting from a trivial fall whereas these injuries in young require high energy trauma. Intertrochanteric fractures have been known since the age of Hippocrates. Sir A Cooper (1822) gave the classification in the form of femoral extracapsular and intracapsular fractures. Since then the management of these fractures had changed from non operative to operative with the advance of science and knowledge of mankind. Non operative treatment needs prolonged bed rest and traction and are mainly reserved for patients who are unfit for surgery due to other medical co-morbidities as it is associated with complications like bed sores, pneumonia, malunion etc. Operative treatment includes reduction of fracture and stable fixation.

Patients could be mobilized and early weight bearing is possible after operative modalities. Implants for stable fixation have also evolved over the time from extramedullary devices like SP Nail, Jewett Nail, DHS to intramedullary devices like PFN, Gamma Nail. Till date, the gold standard treatment is DHS. Whereas unstable intertrochanteric fractures are associated with limb shortening, medialization of distal fragment and implant cut. To overcome these complications intramedullary implants came which had the advantage of shorter lever arm, controlled fracture collapse, lesser dissection of soft tissue, shorter duration of operation and early mobilization. The recent literature has shown a dramatic increase in the number of intramedullary devices being used however this increase has not been backed up by scientific evidence but has been driven by factors like marketing by industry, surgeon preference, and reimbursement.

The controversy still continues over the choice of implant for the management of intertrochanteric fracture, specifically the use of proximal femoral nail (intramedullary device) versus dynamic hip screw (extramedullary plate). Thus, this study will help us to evaluate the use and functional outcome after operative management of these fractures with either implants.

Materials and Methods

This Prospective study was performed on a series of 30 patients treated with THA in a 2 year period (January 2017–December 2018) to compare our results of treatment by dynamic hip screw v/s proximal femoral nail for intertrochanteric fractures of femur OTA/AO 31 A1 & Keshav Goel *et al*. Proximal femoral nail v/s Dynamic hip screw in treatment. Indian Journal of Orthopaedics Surgery, July-September, 2018;4(3):249-255 250 OTA/AO 31 A2. Both the groups were analyzed statistically & compared for:

1. Intraoperative blood loss
2. Radiation Exposure
3. Mobilization after surgery
4. Union
5. Infection
6. Intra Operative Complication
7. Duration of stay at hospital
8. Implant failure

A total of 30 patients were taken up for the study, 15 each with intertrochanteric fractures of femur AO/OTA 31A1 and 31A2 types. An informed consent was taken from the patients and their relatives after explaining to them about the study and its requirements. The inclusion criteria were all skeletally matured medically fit patients with AO31 A1 & AO31 A2 types of femoral intertrochanteric fractures. Patients with reverse obliquity patterns, subtrochanteric extension, compound or pathological fractures, medically unfit for surgery and those who did not give written consent were excluded from the study.

On arrival, the patients were resuscitated depending on their general condition. Fracture was stabilized using skin traction. A thorough preoperative assessment was done. A detailed history to ascertain the cause of fracture was taken. Radiographs were taken and the patients were then classified using Orthopaedic Trauma Association (OTA) classification into AO31A1 and AO31A2 types. All patients were operated on an elective basis.

Prophylactic antibiotics were given half hour prior to surgery to all patients. Spinal or epidural anaesthesia was given. The patients were then placed on the fracture table in supine position and closed reduction of the fracture was done with traction and rotation. The operating surgeon randomly selected implants DHS or PFN for the patients. Post operatively foot end elevation was given overnight. Drain was monitored. Antibiotics were given. Blood transfusion was given depending upon intraoperative blood loss and post operative haemoglobin. Physiotherapy was started on 3rd day. Time duration from surgery to mobilization was noted.

Post-operatively, partial weight bearing with help of walkers was allowed from day 3 to 6 weeks post-op whereas full weight bearing with help of walkers after 6 weeks post-op. Signs of radiological union were assessed. The duration of hospital stay of the patients was noted and they were discharged at variable intervals depending on their general condition and status of the wound. Regular follow up of all the treated patients was done at 6 weeks, 3 months, 6 months and 1 yr postoperatively. On each follow up visit clinical assessment was done using Harris Hip Score, walking ability, shortening, amount of callus formation and fixation defects. After data collection, data entry was done into Microsoft Excel. Quantitative parametric data was represented as Mean, Standard Deviation. Mean comparison between study groups was done using Student's Unpaired 't' test and comparison of non- parametric data was done using chi-square test. P value of less than 0.05 was taken as significant. Data analysis was done with the help of MiniTab Version 17.0. The final data was presented in the form of tables and graph

Discussion and Results: Peritrochanteric hip fractures still are a major orthopaedic challenge, and those that are unstable have the poorest prognosis. Peritrochanteric fractures AO type 31-A2.2–A3.3 are unstable & have poorest prognosis. This extremely unstable fracture results in a severe and prolonged period of postoperative disability. Fracture collapse is one of the postoperative complications reported in association with these fractures. Average age of the patient in this series was 60 yrs. which is significantly lower as compared to various studies published. [Cleveland11(1947)–75 yrs, Boyd & Griffith (1949)–65 yrs, Evans (1949)–62.2 yrs, Females in the present study are of same number as the Males. This finding in the present study doesn't matched to various published reports [Cleveland (1947), Boyd & Griffith (1949), Evans (1949), Sarmiento (1957), 18 patients had trauma due to trivial fall, while 11 out of 30 patients had sustained fracture intertrochanteric femur because of road traffic accidents and 1 sustained after fall from height. 21 patients had sustained fracture on right side and 9 patients had fracture on left side.

According to AO classification in our study we have found A1.2=1, A2.1=1, A2.2=13, A2.3=8, A3.1=7. In our study all the cases with TAD index less than 20 mm was maintained and in 92% cases lag screw was inserted in infero-central quadrant. In our study one case of screw breakage in PFN reported in cases of type A 2.3. Which comes in unstable fracture, no cut out reported in DHS group. 3 patients in our study suffered from Superficial infection 3 in DHS, 0 in PFN, (treated with i/v antibiotics), deep infection 2 in DHS, 1 PFN (6.7%) required debridement 1 week post operatively and i/v antibiotics in all three cases. We had bony union in 98% cases in an average of 12.25 weeks with no iatrogenic femoral fractures in our PFN series. Sliding 10-15mm in DHS and 6- 11mm sliding in PFN series. In our study more shortening was found in cases of DHS series (1 to 1.8 cm) as compare to PFN (0.6 to 0.9). In our study also sliding was 1-1.4 cm in DHS group and PFN group has 0.6 – 1.2 cm sliding and shoe lift was required in 7 cases of DHS for shortening upto 3 cm.

In our study no trochanter stabilizing plate was used and in cases of unstable type that is type A 2.3 to 3.1. PFN has given a better result in terms of functional and anatomical outcomes as compare to DHS.

The PFN is a good minimal invasive implant of unstable proximal femoral fractures, if closed reduction is possible. If open reduction of the fracture becomes necessary and several fragments are found (especially of the greater trochanter), a dynamic hip screw (DHS) with the trochanter stabilizing plate is preferred. PFN has given a better result in terms of functional and anatomical outcomes as compare to DHS.

Intramedullary Nailing is widely used for fixation of such fractures with claims of less operating time, minimized wounds, immediate weight bearing, faster mobilization and less morbidity in terms of prevention of excessive collapse and limb length discrepancy and implant failure. Considering all above studies Intramedullary Fixation Nail appears to be a better option for unstable inter- trochanteric femur fracture.

Conclusion

We conclude that in unstable intertrochanteric fracture PFN helps in achieving biological reduction, imparts stability enabling early mobilization and prevents excessive collapse. This results in faster union and lesser incidence of limb shortening. Thus it helps in achieving overall good functional outcome.

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