



## A Comparative Study of Short Proximal Femoral Nail and Dynamic Hip Screw in Treatment of Intertrochanteric Fractures

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### Abstract

**Background:** This article is on study of evaluation of effectiveness, advantages and disadvantages of PFN and DHS in the management of intertrochanteric fractures.

**Materials and Methods:** These is a prospective study which was carried out from February 2015 to February 2016 in government medical college Thiruvananthapuram. In this study period 48 cases of intertrochanteric fractures were studied, out of which 24 cases were operated by PFN and 24 cases were operated by DHS. The results were evaluated and compared.

**Results:** Harris hip score was used to asses the functional outcome of hip. Calculated at 2 week, 6 week, 3 months, 6 months and 1 year follow up. By 1 year follow up 62.5% cases operated by PFN had excellent score, 33.3% patients had good and 4.2% had fair score. The cases operated by DHS 54.5% had excellent score , 33.3 % cases had good and 12.5% patients had fair score

**Conclusion:** In our study we concluded that there is no much difference in functional outcome of intertrochanteric fractures treated by DHS and PFN in our settings during one year follow up. PFN is used mainly in unstable fracture and DHS in stable intertrochanteric fractures. Surgical exposure is minimal in PFN so minimal blood loss and wound complication. Early mobilization is better by PFN.

**Key Words:** Intertrochanteric fractures, short proximal femoral nail, dynamic hip screw, modified Harris hip score.

### Introduction

Incidence of intertrochanteric fractures increases significantly during recent years due to rising age of population and sedentary life style. They are most frequently operated fracture types, have the highest post operative fatality rate of surgically treated fractures. intertrochanteric fractures occur

predominantly in elderly patients with osteoporosis<sup>1</sup> In young patients its usually associated with high energy trauma.

Clinical presentation depends on type, severity, etiology. Displaced fractures are symptomatic, patient cannot walk and exhibit classical shortening and externally rotated limb, other hand

undisplaced fractures minimal pain and ambulant and may present with no. deformity<sup>1</sup>. older patient with intertrochanteric fractures may have associated with other osteoporotic fractures like distal radius, proximal humerus. In young patients usually results from high velocity injuries and associated with chest, head, neck, abdomen injuries. intertrochanteric fractures can be managed by conservative or operative .conservative treatment rarely used now due to high mortality and complication

The goal of treatment in intertrochanteric fractures are to restore mobility safely and efficiently while minimizing the risk of medical complications and technical failures and to restore the patient to preoperative status<sup>1</sup>.

DHS is the commonly used device for fixing IT fractures. Latest implant for management of IT fracture is PFN<sup>1</sup>. Which has advantages like Being intramedullary load transfer is more efficient, less transfer of stress and less implant failure, controlled impaction is maintained, less shortening and deformity, less soft tissue dissection and less blood loss

In view of these conditions, this study is taken up to compare the result of DHS and short PFN in treatment of intertrochanteric fractures

### Materials and Method

The study was a prospective case series study involving 48 patients of different intertrochanteric fractures from February 2015 to February 2016 in department of orthopedic trivandrum. 24 treated with DHS and 24 patients treated with Short PFN All the cases were treated initially with emergency care as per ATLS principle in casualty itself and then once the patient is stabilized, investigated thoroughly, pre operative planning was done. A case documentation form was used for intra-operative data including age, gender, mechanism of injury, type of fracture, side of injury, associated injury.

Patients with Pathological fractures, polytrauma, pediatric age group and those not will to participate were excluded from study. Sample size

24 each calculated based on previous studies using formula

$$N = \frac{\{z_{1-\alpha/2}\sqrt{2p(1-p)} + z_{1-\beta}\sqrt{p_1(1-p_1) + p_2(1-p_2)}\}^2}{(p_1 - p_2)^2}$$

### Management of patients:

As soon as the patient with suspected intertrochanteric fracture was seen, necessary clinical and radiological evaluation done and admitted to the ward after necessary resuscitation and splintage using skin traction. All the patients were evaluated for associated medical problems and referred to respective departments and necessary treatments was given. Associated injuries were evaluated and treated simultaneously. All these patients were operated electively after anesthesia fitness.

### Operative Technique

#### Proximal femoral nail<sup>2</sup> -

The patient was placed in supine position on fracture table with adduction of the affected limb by 10 to 15<sup>0</sup> and closed reduction of the fracture was done by traction and gentle rotation. In Trochanteric fractures we fixed the fracture percutaneously using two “k”wires which pass along the anterior cortex of greater trochanter and neck of femur into the head of femur. 5 cms lateral longitudinal incision taken proximal from the tip of the greater trochanter .Tip of the greater trochanter is exposed. In AP view on C-arm, the entry point is on the tip or slightly lateral to the tip of the greater trochanter .In lateral view, guide wire position confirmed in the center of the medullary cavity. Over the guide wire, a cannulated rigid reamer is inserted through the protection sleeve and manual reaming of femur was done. After confirming satisfactory fracture reduction an appropriate size nail was inserted. A 2.8 mm guide wire was inserted through the drill sleeve after a stab incision with its position in the caudal area of the femoral head for neck screw. The final position of this guide wire should be in the lower half of the neck in AP view and in the center of the neck in lateral view. A second 2.8

mm guide wire is inserted through the drill sleeve above the first one for hip pin. The hip pin is inserted first to prevent the possible rotation of the medial fragment when inserting the neck screw. Drilling is done over the guide wire with 6.5 mm drill bit to a depth up to the length of hip pin previously measured. The same length 65 mm hip pin is inserted with the help of hexagonal cannulated screwdriver. Neck screw is inserted after reaming by 8 mm reamer. Distal locking is usually performed with two cortical screws.

### **Surgical Steps of Dhs Fixation<sup>2</sup>**

The patient was positioned on the fracture table supine. In unstable fracture the varus and rotational deformities corrected, occasionally leaving the distal fragment medially opposed. A lateral approach was used to expose the femur. Vastus lateralis was retracted anteriorly. The use of the angle guide facilitated positioning of the guide pin at the desired angle and made later the application of the side plate easier. The entry point is 2cm distal to the trochanteric flare. After placing the pin centrally or slightly inferiorly in both planes which makes the screw less likely to shift. The triple reamer was set 10mm shorter than the reading of the direct measuring device. The triple reamer was placed over the guide wire and the neck portion was reamed. Generally for osteoporotic bone there was no need to tap. The richard hip screw was inserted over the guide pin utilizing a T-handled wrench that was marked to indicate the proper depth of insertion and the position of the slot in the screw. Once satisfactory position of the screw was achieved, the guide pin was removed, and by means of the barrel guide the appropriate locking side plate was positioned over the screw. The plate was fixed to the shaft with locking screws of appropriate length and the traction was released. Tapping the handle of the wrench against the plate and then tightening the compression screw achieved compression of the fragments

All Patients were discharged from the hospital when the operation site wound healed and patient general condition stable and were followed up at 2 weeks, 6 weeks, 3 months, 6 months and 1 year. At every visit patient was assessed clinically regarding hip and knee function, walking ability, fracture union, deformity and shortening. Modified Harris Hip scoring system was used for evaluation.

### **Results**

We studied 48 patients 24 treated by PFN and 24 treated by DHS in intertrochanterics fractures. The following are the observations made and the available data are analyzed as follows.

The age group in my study between 20 and 90. The mean age of subjects treated by PFN was 56.4, while the mean age of patients treated by DHS was 57.5. Most of the patients are between 50 to 80 in both groups. In 48 patients 27 males (56.3%) and 21 females (43.8%) PFN group include 12(50%) male and 12(50%) female while DHS group include 15 male (62.5%) and 9 females(43.8%). In patients treated with PFN 14 (58.3%) were right sided fracture and 10(41.7%) left sided .in DHS group 15(62.5%) right sided fracture and 9(37.5%) left sided.

Most of them are due to domestic fall and seen in age above 50 years. Road traffic accidents are more in younger age group. Total of 33(68.8%) domestic fall and 15(31.3%) RTA. In our study 25 patients (52.1%) were stable fracture and 23(47%) had unstable fractures based on Evans classification. In patients who were operated by PFN 13(54.2%) unstable and 11(45.8%) stable .In DHS group 14(58.3%) were stable and 10(41.7%) were unstable. Out of 48 cases, 4 (8.4%) patients had associated injury fracture distal end of radius. All the 4 patients were treated conservatively by cast immobilization. In PFN 7(29.2%) needed open reduction were as in DHS 6(25%) needed open reduction. Most of the operations were taken less than 90 minutes.

Out of the 48 total 11(22.2%) had systemic complications. 2 in PFN group and 1 in DHS had urinary tract infection. One patient in DHS had deep vein thrombosis. wound infection 1 in PFN and 3 in DHS, 2 patient in PFN had bedsore and 1 patient in DHS had bedsore. Complications are more in old age patients with other comorbid illness. Total of 9 in 48 had rotational malalignment. 2 with PFN had external rotation deformity. 3 in DHS had varus deformity of hip. 3 cases with DHS and 1 with PFN had shortening. 1 patients with PFN had reverse Z effect.

1 patient with DHS had cortical screw loose and plate projected out of bone. 3 patients had lag screw cut out.

Harris hip score was used to assess the functional outcome of hip. Calculated at 2 week, 6 week, 3 months, 6 months and 1 year follow up. By 1 year follow up 62.5% cases operated by PFN had excellent score, 33.3% patients had good and 4.2% had fair score. The cases operated by DHS 54.5% had excellent score, 33.3 % cases had good and 12.5% patients had fair score . The p value was 0.556, not significant

### Discussion

In our study an attempt was made to compare the results of proximal femoral nail and dynamic hip screw In these type of fractures. The study was conducted on 48 patients (24 cases by PFN and 24 cases by DHS) of proximal femoral fractures attending outpatient/casualty department of Orthopaedics, government medical college thiruvananthapuram.

Most of patients in present study were from age group of 50 to 80 years of age<sup>3</sup>. Mean age in years for group operated by PFN =56.4. Mean age in years for group operated by DHS =57.5. This signifies the fact that patients from these age groups are involved in low energy trauma like domestic fall<sup>(4,5,6)</sup>. Gallagher et al, 1980 reported an eight fold increase in trochanteric fractures in men over age of 80 and women over 50 years of age<sup>(7)</sup>

The reason why trochanteric region is the most common site of senile osteoporosis as the age advances. Hip joint being a major joint in the mechanism of weight bearing, this already weakened part cannot withstand any sudden abnormal stress. The space between bony trabeculae is enlarged and loaded with fat as age advances, while compact tissue is thinned out and calcar is atrophied.

Most of patients from our study were males. Amongst them majority were in 5th-8th decade of life, while young patients were from 2nd to 4th decade of life. Most of the females were in the age group of 5th - 8th decade. Melton J.L., Ilstrup DM, Riggs BL et al (1982) in their study titled 'fifty years trend in Hip fracture incidence' and reported a female to male ratio of 1.8:1<sup>(8)</sup>. H. B. Boyd and L. L. Griffin<sup>(9)</sup> in their study of 300 cases found a marked sex difference. 226 (75.8%) of the patients were females and 74 (24.2%) were males.

Most of our patients were above 50 years and most of them were domestic fall (fall at home) and trivial trauma was main reason behind fracture. most of the are due to osteoporotic fractures. While in young patients they mainly due to road traffic accidents. This may be attributed to the following factors as enumerated by Cummings and Nevitt in 1994<sup>(10)</sup>. Inadequate protective reflexes, to reduce energy of fall below a certain critical threshold. Inadequate local shock absorbers like muscle and fat around hip. inadequate bone strength at the hip on account of osteoporosis or osteomalacia

In patients who were operated by pfn 13(54.2%) unstable and 11(45.8%) stable .In DHS group 14(58.3%) were stable and 10(41.7%) were unstable. most the patients treated with DHS are with stable fractures and most of the patients treated with PFN are unstable according to Evans classification<sup>11,12</sup>

In my study total of 4 patients had associated injury fracture distal end of radius. All are above the age of 50. All the 4 patients are treated conservatively by cast and had good results. In



PFN 7(29.2%) needed open reduction were as in DHS 6(25%) needed open reduction. Open reductions are associated with increased duration of surgery and more blood loss. Adequate reduction is important for perfect placement of neck screw and to prevent deformities like rotation and shortening .Complications we had were 3 patients with urinary tract infection, 1 with deep vein thrombosis, 3 with bed sore .which are not depend on the implant used.

Superficial wound infection was seen in 4 cases in total. 1 case in patient operated by PFN while 3 cases were seen in those operated by DHS. In all these patients treatment of IV Antibiotics was prolonged. A. Bodoky, U. Neff, M. Heberer & F. Harder<sup>(13)</sup> from the department of surgery, Basel university of Switzerland advocated use of two doses of cephalosporin antibiotics preoperatively in patients managed with internal fixation of hip fractures. According to their study antibiotics prophylaxis significantly reduces incidence of wound infection.

Verley GW, Milner SA <sup>(14)</sup>(1995) in their study of 177 patients of proximal femoral fracture, in their surgeries they kept drain in the wound. They found out that those patients which drain was kept showed better wound healing and had a reduced rate of infection

Average time for which patient was admitted in our hospital were 7 to 10 days.

During post operative period as per pain and tolerance of the patient, they were made to mobilize knee and Quadriceps drills, mostly by 2<sup>nd</sup> to 3<sup>rd</sup> post op day. Patients were discharged with instruction to non weight bearing .By 2 weeks based on the post operativexray PFN patients were adviced partial weight bearing, and DHS patients by 5to 6 weeks post op. and then walking with walker on further follow up.

In the series of B. Mall<sup>(15)</sup>(30 patients) average time of ambulation was 14 days.

Average time of union in my study of 48 patients was about 16 weeks<sup>(16)</sup>

The functional outcome calculated by the Harris Hip Scoring system treated by both the implants ie PFN and DHS was excellent to good and was almost the same. Very few there were fair results by 1 year follow up..The fair result was attributed to other associated factors like other medical illness, implant related complication like cut out of neck screw, reverse Z effect. No poor result in the present study as in all the cases the fracture united by 1 year.

In other studies PFN and DHS equal results in stable trochanteric fractures but in unstable fracvtures PFN was superior to DHS. In my study PFN and DHS had almost similar results ,it may be due to the quality of implant and instrumentation in our setup. The use of PFN is limited in our setup because of the difference in cost of the implant compared to DHS, and most patients are from low socio economic status. So use of PFN is mainly in unstable intertrochanteric fractures

### Conclusion

In the study we aimed to evaluate whether these theoretical advantages could be proved in practice, by a comparison of the results of Proximal Femoral Nail (PFN) and Dynamic Hip Screw (DHS) implants

Most common age group of hip fractures above 50 years .Most common mode of injury is domestic fall. The systemic complication following operation not depend on implant used, it mainly affected by the general condition and other associated illness of patient. There is no much difference in functional outcome in patients treated by dynamic hip screw and proximal femoral nail in 1 year follow up in our settings. In our study PFN is used more in unstable and DHS in stable fractures. The use of PFN is limited in our settings because the difference in cost of the implant compared to DHS and most patients are from low socioeconomic status.

With proximal femoral nail smaller exposure is required than for a DHS, it may there for be associated with lesser blood loss, lesser wound

complications but it required better operating skills. Malrotation and deformity after trochanteric fracture fixation is usually a result of improper fixation of fracture fragments in rotation at time of surgery. In fractures managed by closed intramedullary nailing, incidence of malrotation & deformity is found to be lower. The incidence of wound infection was found to be lower with intramedullary implants which resulted in early ambulation of the patients. The learning curve for the treatment of fractures by Dynamic Hip Screw was smaller as compared to Proximal Femoral Nail.

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