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**Dr. Reddy Jyothi Krishna**  
Department of Orthopaedics,  
Shri Sathya Sai Medical College  
and Research Institute,  
Ammappettai, Chengalpattu,  
Tamil Nadu, India

**Dr. F Abdul Khader**  
Department of Orthopaedics,  
Shri Sathya Sai Medical College  
and Research Institute,  
Ammappettai, Chengalpattu,  
Tamil Nadu, India

**Dr. Mahendhira Varman**  
Department of Orthopaedics,  
Shri Sathya Sai Medical College  
and Research Institute,  
Ammappettai, Chengalpattu,  
Tamil Nadu, India

## A review of dynamic hip screw vs proximal femoral nail for inter-trochanter-IC fracture of femur

**Dr. Reddy Jyothi Krishna, Dr. F Abdul Khader and Dr. Mahendhira Varman**

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### Abstract

Inter-trochanteric fracture of femur are common in geriatric population. Urbanization & sedentary life style are the primary cause of increased incidence of these fracture's. Distribution of Inter-trochanteric femur fracture's is limited in male population compared to female due to osteoporosis. Aim is to compare inter-trochanteric fracture's treated with DHS (vs) PFN. We performed a narrative review to evaluate the outcome of DH (Dynamic hip) Screw (VS) PF (Proximal femoral) Nail for inter-trochanteric fracture of femur. Extensive electronic search of article's were done in Google scholar, reference checking and PUB-MED for deciding which implant is better. Some studies' reveal PF Nail to be better than DH Screw, while some studies' show vice versa. Both surgeries' are time tested, absolute & require reasonable amount of skill. Final decision depends on operative surgeon's preference to specific technique.

**Keywords:** Proximal femoral nail, dynamic hip screw, intertrochanteric femur fracture

### Introduction

Inter-trochanteric fracture's are that extend atwix LT (lesser trochanter) and GT (greater trochanter). Motor vehicle accident's or fall from height's are the main causalities for inter-trochanteric fracture's in adolescent's. Simple fall causes inter-trochanter-ic fracture in geriatric age group. In Geriatric age group these are worsened by numerous aspect's like reduced vision, unable to do daily activities, fluctuating B.P, low reflexes' and co-existing musculo-skeletal syndromes might be responsible. Circumstances that are responsible to convert fall to fracture are proposed by Cummings and Nevitt <sup>[1]</sup>

- The direct impact must land's near hip.
- Adequate balancing and environment are not in place.
- Less energy was absorbed by surrounding soft tissues like muscle's and ligaments.
- If femur strength is less than Residual fall force.

### Classification

#### Boyd and Griffin classification <sup>[2]</sup>

Sub trochanteric region involvement is the basis for it:

- a. Type I, inter trochanter-ic fracture is straight.
- b. Type II, trochanter-ic region with comminution.
- c. Type III, sub--trochanteric component plus comminution.

Type IV, shaft oblique fracture extending into sub-trochanter-ic region.

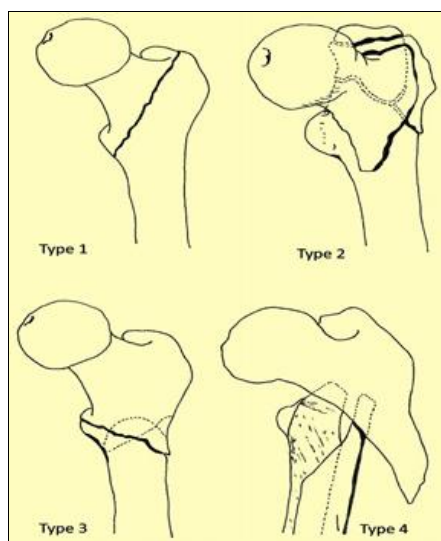
#### Dynamic hip screw, DHS

#### Richards dynamic compression screw

Consisting of non-threaded area of 8.7 mm proximally and 19 mm or 29 mm cannulated threaded area distally, of portion 12.7 mm. There are different screw sizes varying from 50 to 110 mm. Guide wire of size 3.2 mm passes through Richard screw. For sliding effect, lag screw is inserted into the bone.

**Corresponding Author:**  
**Dr. F Abdul Khader**  
Department of Orthopaedics,  
Shri Sathya Sai Medical College  
and Research Institute,  
Ammappettai, Chengalpattu,  
Tamil Nadu, India

The direction of key in the barrel is guided using a groove in Richard screw by which rotation is prevented. 2-20 holed side plates are usually available through which 4.5 mm cortical screws are fixed. Most commonly used plates are 4/5 holed.



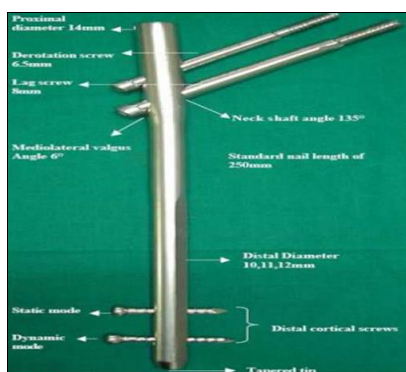
**Fig 1:** Boyd and Griffin classification <sup>[3]</sup>



**Fig 2:** Dynamic hip screw <sup>[4]</sup>

### Proximal femoral nail, PFN

Choice of Nail Used-AISI 316 L stainless steel is used to make the hollow tubular PF nail. The nail length varies from 25 (mm) to 38 (mm). Proximal part diameter (8 cm) is 17 mm and distal part varying from 9 mm to 12 mm. The angulations present for PF nail are 130–135° with anteversion of 10°. The nail has 4° lateral curve. There are two slots proximally for fixation of lag screw and anti-rotation screw. Threaded cap is available for preventing growth in the proximal part of nail. Two holes are present distally for fixing the distal screws. Out of two proximal screws 1<sup>st</sup> one acts as derotation for static locking and 2<sup>nd</sup> acts as Dynamic fixation.



**Fig 3:** Proximal femoral nail, PFN

### Methodology

Extensive search of article's was done electronically using database like PUB-MED, Google-scholar, reference-checking. Since, the type of studies are different and the outcomes are measured using various different methods, a narrative re-view was appropriate for this study. The articles and studies were selected which satisfied the inclusion criteria. Articles include from 2002-2019.

### Results

Obtaining optimum alignment and earliest function with minimal complications for Inter-trochanter-ic fractures is very challenging for orthopaedic community. Conservative treatment shows poor results compared to surgical fixation.

- Gallagher *et al.* (1980), reported that incidence of trochanteric fracture is 8 fold more in men above 80 year and women over 50 years <sup>[5]</sup>. Because of the senile osteoporosis is most common in trochanteric area and hip joint being major weight bearing calcar gets atrophied and trabecular space becomes weak fractures in this area are more common. Average age reported by other works is Cleave land and Thompson (1947)-76.0, Murray and Frew (1949)-62.5, Boyd and Griffin (1949) <sup>[2, 24]</sup> - 69.7, Scott (1951)-73.3, Evans (1951). Males is 62.6 (&) Females-74.3, Wade and Campbell (1959)-72.0, Sarmiento (1963)-71.9, Gupta, RC (1974)-51.2.
- David G. Lovelle came to conclusion that ratio of occurrence trochanteric fracture in women and men is 3:1. Melton J.L., Ilistrup DM, Riggs BL *et al.* found that male to female ratio is 1:1.8 <sup>[6]</sup>. Helfenste in (1947) suggested that, post-menopausal deficiency of the hormones is responsible for stimulation of osteocalcic causing osteoporosis. Activity. St. Urnier K.M., Dresing K (1995) found that incidence per-trochanteric fractures is 10-15 years early in women than men <sup>[7]</sup>. HB Boyd and LL Griffin in their research found out that of 300 cases 75.8% were females and 24.2% are males.
- Cumming and Nevitt in (1994) <sup>[1]</sup> enumerated following factors like inadequate protective reflexes, to reduce energy off all below a certain critical threshold, inadequate local shock absorbers, osteoporosis or osteomalacia causing inadequate strength at the hip are responsible for fracture on trivial fall above age of 50 years and RTA (road traffic accident) for adolescent group. Horn & Wang stated that fracture while bending or twisting is due to failure of stress resisting forces. A direct blow on thigh lateral side of thigh causes contusion, lateral surface of the greater trochanter comminution and valgus deformity <sup>[8]</sup>.
- In research by K.D Harrington, out of 72 cases coxa vara was there in 4 cases and limb shortening at an average of 1.5 cms present in 56 cases <sup>[9]</sup>.
- In case study by Juluru P. Rao out of the 124 cases of intertrochanteric fractures, limb shortening was present in 5 cases of unstable fractures <sup>[10]</sup>.
- In study by B. Mall 14 days was the average ambulation time. In research of Dr. G.S Kulkarni 11 – 12 days after suture removal was the ambulation time <sup>[11, 12]</sup>.
- Radiological union in various studies is Kevin D. Harrington <sup>[13]</sup> 16 weeks, Juluru- P. Rao <sup>[10]</sup> 18 weeks, Luis A. Flores <sup>[14]</sup> 13 weeks, B. Mall <sup>[15]</sup> 14 weeks.
- In study by Dr. G.S Kulkarni patients operated with DHS, 2 cases had deep infections for which implant removal was done. After removal of implants, infected sinuses are healed. Shortening was seen in 15% of cases

by 1-1.5 cms, who are managed by shoe raise after that patient don't have any difficulty in walking <sup>[11, 12]</sup>.

- In study by Qidwai *et al.*, in 2018 showed mean Harris-hip is more in PFN group compared to DHS group <sup>[16]</sup>.
- In study by Ravi Shankar *et al.*, in 2015-showed PFN (91.7%) has good to excellent result compared to DHS (75%) <sup>[17]</sup>.
- Jakkala *et al.* in 2019 <sup>[18]</sup>, Chaitanya *et al.* in 2015 <sup>[19]</sup>, Kumar R *et al.* in 2012 <sup>[20]</sup>, Jose *et al.* in 2017 <sup>[21]</sup>, Yadav *et al.* in 2016 <sup>[22]</sup>, Mundla *et al.* in 2017 <sup>[23]</sup>, Chowdhary *et al.* in 2017 <sup>[24]</sup>, Jonnes *et al.* in 2016 <sup>[25]</sup>, Nuber *et al.* in 2003 <sup>[25]</sup>, Zhang *et al.* in 2014 <sup>[27]</sup>, Avinash Kumar *et al.* in 2018 <sup>[28]</sup>, Saudan *et al.* in 2002 <sup>[29]</sup>, Gupta and Valiseti in 2014 <sup>[30]</sup>, Ahmed *et al.* in 2018 <sup>[31]</sup>, Huang *et al.* in 2013 <sup>[32]</sup>, Bakshi *et al.* in 2017 <sup>[33]</sup>, Bhakat *et al.* in 2013 <sup>[34]</sup>, Veeranghadham *et al.* in 2017 <sup>[35]</sup>, Jangir *et al.* in 2018 <sup>[36]</sup>, Dhakhad *et al.* in 2017 <sup>[37]</sup> all showed PFN is better option than DHS with respect to blood loss, post-operative mobilization, percentage of union, surgery time, Harris-Hip score.

### Conclusion

The assessment and conclusion of the better fixative technique is difficult. Some research shows PF Nail to be better than DH Screw, while other studies' show's DH Screw is superior. Both fixative methods are absolute, time tested (&) need's good skill. There is no much difference in Complication's in these 2 techniques. Choice of implant depends on age, type of fracture and economic--status of patient. It takes long to learn PF Nail technique compared to DH Screw for a surgeon, to be comfortable with that technique. Lastly, it is up to operating surgeon's choice what to use PF nail (or) DH Screw. If operating surgeon is used to do with any of these two, he will get satisfactory Result's.

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