



E-ISSN: 2395-1958
P-ISSN: 2706-6630
IJOS 2021; 7(1): 632-635
© 2021 IJOS
www.orthopaper.com
Received: 16-10-2020
Accepted: 20-12-2020

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

DOI: <https://doi.org/10.22271/ortho.2021.v7.i1d.2487>

Abstract

Inter-trochanteric fractures of femur are common in the geriatric population. Urbanization & sedentary lifestyle are the primary cause of increased incidence of these fracture's. The distribution of Inter-trochanteric femur fractures is limited in the male population compared to females 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 the femur. Extensive electronic search of articles 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 a reasonable amount of skill. The final decision depends on the operative surgeon's preference to specific technique.

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

Introduction

Inter-trochanteric fractures are that extend atwix LT (lesser trochanter) and GT (greater trochanter). Motor vehicle accidents or fall from heights are the main causalities for inter-trochanteric fractures in adolescents. Simple fall causes inter-trochanter-ic fracture in geriatric age group. In Geriatric age group these are worsened by numerous aspects 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^[1]

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

Classification

Boyd and Griffin classification^[2]

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.

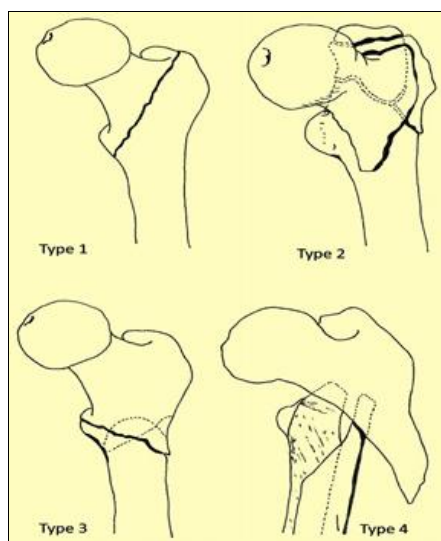


Fig 1: Boyd and Griffin classification ^[3]



Fig 2: Dynamic hip screw ^[4]

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 an anteversion of 10°. The nail has a 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 the nail. Two holes are present distally for fixing the distal screws. Out of two proximal screws, 1st one acts as derotation for static locking and 2nd acts as Dynamic fixation.

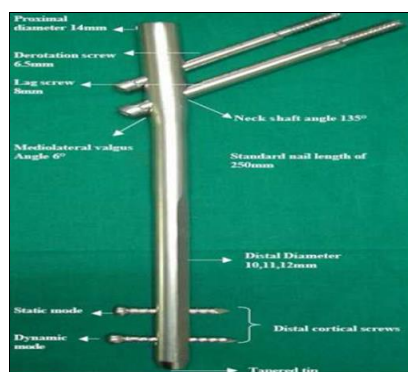


Fig 3: Proximal femoral nail, PFN

Methodology

An extensive search of articles 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 the 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 ^[5]. Because of the senile osteoporosis is most common in the trochanteric area and hip joint being major weight-bearing calcar gets atrophied and the trabecular space becomes weak fractures in this area are more common. The average age reported by other works is Cleave land and Thompson (1947)-76.0, Murray and Frew (1949)-62.5, Boyd and Griffin (1949) ^[2, 24] - 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 the conclusion that the ratio of occurrence of trochanteric fracture in women and men is 3:1. Melton J.L., Ilistrup DM, Riggs BL, *et al.* found that the male to female ratio is 1:1.8 ^[6]. Helfenste in (1947) suggested that, post-menopausal deficiency of the hormones is responsible for the stimulation of osteocalcic, causing osteoporosis. Activity. St. Urnier K.M., Dresing K (1995) found that incidence of per-trochanteric fractures is 10-15 years early in women than men ^[7]. 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) ^[11] 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 ^[8].
- 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 ^[9].
- 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 ^[10].
- 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 ^[11, 12].
- Radiological union in various studies is Kevin D. Harrington ^[13] 16 weeks, Juluru- P. Rao ^[10] 18 weeks, Luis A. Flores ^[14] 13 weeks, B. Mall ^[15] 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 ^[11, 12].

- In study by Qidwai *et al.*, in 2018 showed mean Harris-hip is more in PFN group compared to DHS group ^[16].
- In study by Ravi Shankar *et al.*, in 2015-showed PFN (91.7%) has good to excellent result compared to DHS (75%) ^[17].
- Jakkala *et al.* in 2019 ^[18], Chaitanya *et al.* in 2015 ^[19], Kumar R *et al.* in 2012 ^[20], Jose *et al.* in 2017 ^[21], Yadav *et al.* in 2016 ^[22], Mundla *et al.* in 2017 ^[23], Chowdhary *et al.* in 2017 ^[24], Jonnes *et al.* in 2016 ^[25], Nuber *et al.* in 2003 ^[25], Zhang *et al.* in 2014 ^[27], Avinash Kumar *et al.* in 2018 ^[28], Saudan *et al.* in 2002 ^[29], Gupta and Valiseti in 2014 ^[30], Ahmed *et al.* in 2018 ^[31], Huang *et al.* in 2013 ^[32], Bakshi *et al.* in 2017 ^[33], Bhakat *et al.* in 2013 ^[34], Veeranghadham *et al.* in 2017 ^[35], Jangir *et al.* in 2018 ^[36], Dhakhad *et al.* in 2017 ^[37] 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.

References

1. Cummings SR, Nevitt MC. A hypothesis: The causes of hip fractures. *Journals Gerontol* 1989;44(4).
2. Cirotteau Y, Boyd HB, Griffin LL. Classification: A refinement proposal. *European Journal of Orthopaedic Surgery and Traumatology*. Springer 2002;12:152-7.
3. Mokawem M, Bobak P, Aderinto J. The management of pertrochanteric fractures of the hip. *Orthop Trauma* 2012;26(2):112-23.
4. File: Cdm hip hardware 369.jpg - Wikipedia 2020. https://en.wikipedia.org/wiki/File:Cdm_hip_ hardware_369.jpg
5. Gallangher JC, Melton LJ, Riggs BL *et al.* Epidemiology of fractures of the proximal femur in Rocester, Minnesota. *Clinical Orthop* 1980;150:163-171.
6. Heinz T, Vécsei V. Complications and errors in use of the gamma nail. Causes and prevention. *Chirurg* 1994;65(11):943-52.
7. Griffin JB. The calcar femorale redefined. *Clin Orthop Relat Res* 1982;164:211-4.
8. Kevin D. Harington, San Francisco, James O, Jhoston. The management of comminuted unstable intertrochanteric fractures. *JBJS* 1973;55A(7):1367-76.
9. Rao Juluru, Banzon P, Manuel Weiss T, Andrew B, Rayhack John. Treatment of unstable intertrochanteric fracture with anatomic reduction and compression hip screw. *Clin Orthop and related research* 1983;175:65-78.
10. Pathak SK, Mehrotra V, Mall B. Role Of Dynamic Compression HIP Screw In Trochanteric Fractures Of Femur. *Indian Journal of Orthopaedics* 1999;33(3):226.
11. Kulkarni GS. Treatment of trochanteric fractures of hip by modified Richard's compression and collapsing screw, *Indian Journal of Orthopaedics* 1984;18(1):30.
12. Windoff J, Hollander DA, Hakmi M, Linhart W. Pitfalls & complications in the use of proximal femoral nail, *Lagenbecks arch surg* 2005;3901(1).
13. Albareda J, Laderiga A. Palanca Detal Complications and technical problems with the gamma nail. *Int Orthop* 1996;20:47-50.
14. Babhulkar Sudhir S. Management of trochanteric Fractures. *Indian Journal Of Orthopaedics* 2006;40(10):210-218.
15. Banan H, Al-Sabti A, Jimulia T, Hart AJ. The treatment of unstable, extracapsular hip fractures with the AO/ASIF proximal femoral nail (PFN)-our first 60 cases. *Injury* 2002;33(5):401-5.
16. Shakeel Qidwai A, Robin Singh, Amit Nandan Mishra VT, Afroz Ahmed Khan SSK, VK, Shakeel Qidwai A *et al.* Comparative study of functional outcome of the intertrochanteric fracture of femur managed by Dynamic hip screw and proximal femoral nail. *Natl J Clin Orthop* 2019;3(1):23-35.
17. Shankar PR, Anil V, Sureshababu G, Raju S, Sagar V. Comparative Study between proximal femoral nailing and dynamic Hip screw in the Management of Intertrochanteric Fractures of Femur. *J Evid based Med Healthc* 2015;2(5).
18. Jakkala S, Kurukunda V, Madiga N, Tirumuru S, Athinarapu MS, Raj N. A comparative study of proximal femoral nail and dynamic hip screw in the management of intertrochanteric fractures of femur. *Orig Res Artic J Evid Based Med Heal* 2019, P6.
19. Chaitanya MA, Rallapalli R, Prasad SY. Comparison of Dynamic Hip Screw and Plate with Proximal Femoral Nail in Trochanteric Fractures of Femur. *IOSR J Dent Med Sci e-ISSN* 2015;14(4):73-82.
20. Kumar R, Singh RN, Singh BN. Comparative prospective study of proximal femoral nail and dynamic hip screw in treatment of intertrochanteric fracture femur. *J Clin Orthop Trauma* 2012;3(1):28-36.
21. Jose DA, Imeida DV DA, Acharya DR, Rai DR. A comparative study of proximal femoral nailing versus dynamic hip screw device in the surgical management of intertrochanteric fractures. *Int J Orthop Sci* 2017;3(3k):743-5.
22. Yadav S, Srivastava DC, Shukla M. Comparative evaluation of dynamic hip screw and proximal femoral nail for fracture of intertrochanteric femur. *Int J Res Orthop* Yadav S *et al.* *Int J Res Orthop* 2016;2(4):286-90.
23. Kumar Reddy Mundla M, Rafi Shaik M, Reddy Buchupalli S. A prospective comparative study between proximal femoral nail and dynamic hip screw treatment in trochanteric fractures of femur. *Int J Res Orthop* Mundla MKR *et al.* *Int J Res Orthop* 2017;4(1):58-64.
24. Dinesh Chowdary S, Kiran CR, Lalki C. Comparative study of management of intertrochanteric fractures (type 3 and 4 boyd and griffin classification) by dynamic hip screw or proximal femoral nail. *Orig Res Artic J Evid Based Med Heal* 2017;4.
25. Jonnes C, Shishir SM, Najimudeen S. Type II intertrochanteric fractures: Proximal femoral nailing (PFN) versus Dynamic Hip Screw (DHS). *Arch Bone Jt Surg* 2016;4(1):23-8.

26. Nuber S, Schönweiss T, Rüter A. Stabilisation of unstable trochanteric femoral fractures. Dynamic hip screw (DHS) with trochanteric stabilisation plate vs. proximal femur nail (PFN). *Unfallchirurg* 2003;106(1):39-47.
27. Zhang K, Zhang S, Yang J, Dong W, Wang S, Cheng Y, *et al.* Proximal femoral nail vs. dynamic hip screw in treatment of intertrochanteric fractures: A meta-analysis. *Med Sci Monit* 2014;20:1628-33.
28. Kumar A, Bhaskar Sr Professor S, Avinash Kumar C, Rao B, Bhaskar S. Long term functional outcome of intertrochanteric femur fractures treated with dynamic hip screw v/s proximal femoral nail: Retrospective study. ~ 672 ~ *Int J Orthop Sci* 2018;4(2):672-6.
29. Saudan *et al.* Pertrochanteric fractures: is there an advantage to an intramedullary nail: a randomized, prospective study of 206 patients comparing the dynamic hip screw and proximal femoral nail. *J Orthop Trauma* 2002;16(6).
30. Gupta SKV, Shekar V, Postgraduate V, Venkatesh Gupta SK, Valiseti VS. Comparative study between dynamic hip screw vs proximal femoral nailing in intertrochanteric fractures of the femur in adults. *Int J Orthop Sci* 2015;1(1).
31. Ahmed H, Bassiooni H, Mohamady E, Mostafa MA. Comparison study of proximal femoral nail and dynamic hip screw devices in unstable trochanteric fractures. *Benha Med J* 2018;35(3):413.
32. Huang X, Leung F, Xiang Z, Tan PY, Yang J, Wei DQ *et al.* Proximal Femoral Nail versus Dynamic Hip Screw Fixation for Trochanteric Fractures: A Meta-Analysis of Randomized Controlled Trials. *Sci World J* 2013.
33. Singh Bakshi A, Kumar P, Brar Professor B, Pardeep Kumar Junior Resident C, Brar B. Comparative study between DHS and PFN in intertrochanteric fractures of femur. ~ 259 ~ *Int J Orthop Sci* 2018;4(1):259-62.
34. Bhakat U, Bandyopadhyay R. Comparative Study between Proximal Femoral Nailing and Dynamic Hip Screw in Intertrochanteric Fracture of Femur *. *Open J Orthop* 2013;3:291-5.
35. Prasad Veeragandham RKSSM. Comparative study between proximal femoral nailing and dynamic hip screw with proximal femoral locking compression plates in intertrochanteric fracture of femur | Veeragandham | *International Journal of Research in Orthopaedics*. *Int J Res Orthop* 2017;3(3):339-49.
36. Jangir M, Kumar S, Jindal S. A Prospective Comparative Study of outcome of Management of unstable Intertrochanteric Fractures of Femur with Dynamic Hip Screw (DHS) and Proximal Femoral Nail Antirotation (PFNA). *Int J Contemp Med Res [IJCMR]* 2018;5(5).
37. RKS D, Jain S, Verma R, Prajapati J. Original Article A comparative study of intramedullary and extramedullary fixation devices in type two unstable trochanteric fractures. *Int J Res Orthop* 2017;23(2):2-6.