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ORIGINAL ARTICLE

Dynamic Hip Screw in Comparison with Proximal Femoral Nail Technique in Intertrochanteric Femur Fracture Patients

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ABSTRACT

Background: Hip bone fractures are the main cause of concern on a worldwide level. The main two operative techniques involve dynamic hip screw and proximal femoral nail technique.
Aim: To compare the dynamic hip screw with proximal femoral nail technique in intertrochanteric femur fracture patients.
Study design: Retrospective study
Place and duration of study: Department of Orthopaedics, Khyber Teaching Hospital, Peshawar from 1-7-2019 to 30-12- 2021.
Methodology: Seventy patients were enrolled and they were divided in two groups; Group 1 patients were operated with dynamic hip screw (DHS) while group 2 patients were operated by proximal femoral nail (PFN) technique. The detailed pre and post-operative clinical information including blood loss, incision size, Harris hip score and rate of complication was documented.
Results: The mean age of patients was 58.62±6.71 year with more male patients than females. The Harris hip score of proximal femoral nail technique was better than distal hip screw. The incision length of distal hip screw cases was 7.61±0.89 in comparison to 4.72±0.73 in proximal femoral nail technique cases with a longer duration of surgery and inter-operative blood loss in case of distal hip screw cases.
Conclusion: Proximal femoral nail technique is comparatively better than the distal hip screw procedure.
Keywords: Proximal femoral nail technique, distal hip screw, Hip fracture

INTRODUCTION

Fractures related with hip bone are a global health concern.[1,2] Asian population being very vulnerable for hip fractures is assumed to reach half of total hip fractures by year 2050.[3] Majority of the hip fractures observed in elderly are intertrochanteric fractures.[4] Earliest possible treatment and mobilization is the main aim in hip fracture management and recovery.[5] Dynamic hip screw (DHS)had been widely used for this purpose[6] but new research is continuously favoring the use of proximal femoral nail (PFN) technique[7-8].

There are many studies which debates on the understanding the exact protocol required for most suitable way of implant generation for intra or extra medullary-fixation which is needed in case of intertrochanteric femur fractures (IFF). The two main procedures under consideration are dynamic hip screw DHS andPFNT.[9-10] Studies published from various part of the world supports that both techniques are equally good and have shown efficient results in IFF cases[11-14].

A study also reported no variance in risk association between both surgical techniques.[15] Contrary to the above a meta-analysis reported increased re-surgery requirement among cases who underwent DHS than PFN technique.[10] Where as a few studies have also stated that DHS is an inappropriate procedure in cases where stable IFF is presented.[16] The reason being high failure chances and increased re operations risks in DHS.

This leads to generation of a theory that PFN technique might have an extra advantage over DHS technique. However there has never been a consistent classification for fractures which can prove this theory. There is an increased trend of using DHS technique for IFF cases despite of available contrary data[17].

This study was designed to evaluate this argument and compare both techniques for its outcome in patients with IFF.

MATERIALS AND METHODS

In a comparative retrospective analysis conducted at Department of Orthopaedics, Khyber Teaching Hospital, Peshawar from 1st July 2019 to 30th June 2021 after permission from Ethical Review Committee. A total of 70 patients record were observed until 18 months of their follow-up checkups. They were divided in two groups; Group 1 patients were operated with dynamic hip screw while group 2 patients were operated by proximal femoral nail technique. Individuals with IFF were included in the study while those with sub-trochanteric or pathological femur fractures were excluded. Study was approved from ethical board. DHS and PFN fixation were compared and analysis as well as their demographic, clinical information was documented. Operational time (min), incision length, intra-operative loss of blood (ml), post operative infection, re-operation frequency and lag-screw cutout rate were all recorded. All surgeries were addressed to general or neuraxial anesthesia. Fractures were reduced. For exposing the DHS a five cm linear cut to greater trochanter was placed. A four-hole side-plate at 135 degree was used with applying size-lag screw (4.5mm) post-inferiorly in femur neck. The tip axes length was maintained as less than 25 millimeters. For PFNT a five cm cut was made proximally to the tip of greater-trochanter. A 135-degree shaft neck angle with 240-millimeter distance was applied with distal locking. Swabs were post operatively weighed for measuring blood loss. Post operative follow up was performed at two weeks, 1-2, 12, 15 and 18 months. The outcomes were assessed by Harris hip score where poor score was below 70, fair was between 70 and 80, good was 80-90 and excellent was classified as 90-100.

Heterogeneity among procedure was analyzed through chi-square test. The data was also interpreted in terms of mean and standard deviations. SPSS version 24.0 was used for data analyzing purpose. $p<0.05$ was taken as significant.

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RESULTS

There were 70 cases within the age of 41-75 years. The mean age of the patients was 58.62±6.71 year. There were more males than females in this study (Table 1). The Harris hip score showed 1, 2, 12, 15, 18months showed a classification of good outcome with PFN slightly better than DHS score (Table 2).

Most of the patients had surgery of left side than right side. The incision length of DHS cases was 7.61±0.89 in comparison to 4.72±0.73 in PFN cases with a longer duration of surgery in case of DHS than PFN patients (Table 3). The present study recorded that the number of complications either medical or orthopaedic were significantly higher in DHS cases than PFN patients with a p value <0.05 (Fig. 1). The inter-operative blood loss in cases operated with DHS was much higher than those who underwent PFN (Fig. 2).

Table 1: Comparison of different variable among DHS and PFN cases (n=70)

Variable	DHS (n = 35)	PFN (n=35)	P value
Age (years)	59.05 ± 7.48	58.20±5.94	0.272
Sex (M:F)	22:13	19:16	0.500
ASA grade			
I	11	10	0.263
II	12	8	0.869
III	4	9	0.941
IV	11	8	0.626
Quality of reduction			
Good	31	32	0.465
Acceptable	4	3	
Poor	-	-	
Mean time to bone healing (weeks)	14.52 ± 2.4	15.07 ± 2.3	0.083
Pre-operative Harris Hip Score (HHS)	39.41 ± 2.99	39.59 ± 2.98	0.622

Table 2: Harris Hip Score of DHS and PFN cases

Months postoperative	DHS (n = 35)	PFN (n=35)	P value
1	74.36±4.6	75.46±4.4	0.139
2	85.39±3.5	86.93±3.7	0.346
12	87.24±4.0	88.25±4.	0.090
15	85.75±3.9	86.26±3.1	0.002
18	84.52±3.6	86.13±2.4	0.000

Table 3: Surgery side, incision length and duration of surgery among DHS and PFN patients

Variable	DHS (n = 35)	PFN (n=35)	P value
Surgery side			
Left	23	20	0.080
Right	12	15	0.090
Incision length (cm)	7.61 ± 0.89	4.72 ± 0.73	0.002
Surgery duration	70.51 ± 6.2	52.81 ± 5.58	0.001

Fig 1: Comparison of rate of complication between DHS and PFN cases

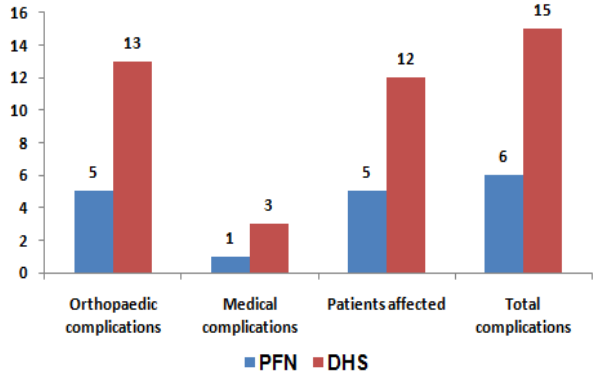
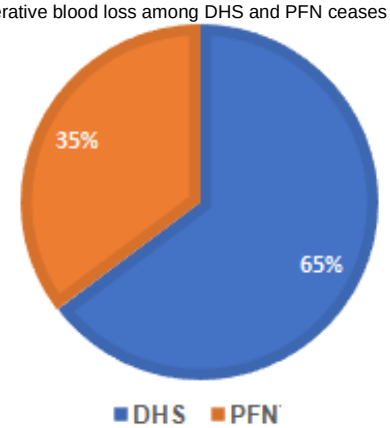


Fig 2: Intraoperative blood loss among DHS and PFN ceases



DISCUSSION

There were more males in the study than females with an average age around late fifties.[18] PFN was linked with lesser post-operative loss of blood and rate of complications as presented in this study. Similar results have been concluded by many other researchers. Further the Harris hip score of PFN patients was better than the DHS cases. In a study where sixty patients were treated for IFF the Harris hip score was 53.4 in DHS while 47.6 in PFN post three months of surgery. As the time prolonged the Harris hip scoring of both DHS and PFN become almost similar as 94.2 in case of DHS and 94 in patient operated by PFN interpreting no significance variance among both techniques in a long-term outcome.[19-20]

Elderly patients with osteoporotic changes and unstable IFF showed better results with PFN technique in some studies. Whereas young adult patients showed positive outcomes for DHS technique.[19,21]

Contrary to this there is comparative literature available which elaborates their study on stable and unstable IFF. The results of their study showed that despite of stable or unstable IFF the technique of PFN was much more efficient than DHS in all of their cases. Similar findings have been seen in the present study as well.[22-24] There was no record of mortality seen in the present study.

CONCLUSION

Proximal femoral nail technique is a technique associated with less blood loss, decreased rate of complication, better Harris hip score and smaller incision size. It has slightly better outcomes than dynamic hip screw procedure.

Conflict of interest: Nil

REFERENCES

1. Chang SM, Hou ZY, Hu SJ, Du SC. Intertrochanteric femur fracture treatment in Asia: what we know and what the world can learn. Orthop Clin North Am 2020;51(2):189-205.
2. Kanters TA, van de Ree CLP, de Jongh MAC, Gosens T, Hakkaart-van Roijen L. Burden of illness of hip fractures in elderly Dutch patients. Arch Osteoporos 2020; 15(1):11-17.
3. Cheung CL, Ang SB, Chadha M, Chow ES, Chung YS, Hew FL, et al. An updated hip fracture projection in Asia: The Asian Federation of Osteoporosis Societies study. Osteoporos Sarcopenia 2018;4(1):16-21.
4. Tay E. Hip fractures in the elderly: operative versus nonoperative management. Singapore Med J 2016;57(4): 178-81.
5. Li J, Zhang L, Tang P. Evolving concept in treatment of intertrochanteric fractures and development of internal fixation devices. ZhongguoXiu Fu Chong Jian Wai Ke Za Zhi 2019;33(1):1-7.
6. Zhang WQ, Sun J, Liu CY, Zhao HY, Sun YF. Comparing the intramedullary nail and extra medullary fixation in treatment of unstable intertrochanteric fractures. Sci Rep 2018; 8(1):23-9.
7. Jonnes C, Sm S, Najimudeen S. Type II intertrochanteric fractures: proximal femoral nailing (PFN) versus dynamic hip screw (DHS). Arch Bone Jt Surg 2016;4(1):23-8.
8. Gadegone WM, Shivashankar B, Lokhande V, Salphale Y. Augmentation of proximal femoral nail in unstable trochanteric fractures. SICOT J 2017;3:12-18.
9. 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 Monitor 2014;**20**:1628-33.
10. Ma KL, Wang X, Luan FJ, Xu HT, Fang Y, Min J, et al. Proximal femoral nails antirotation, Gamma nails, and dynamic hip screws for fixation of intertrochanteric fractures of femur: a meta-analysis. Orthop Traumatol Surg Res 2014;**100**(8):859-66.
11. Shen L, Zhang Y, Shen Y, Cui Z. Antirotation proximal femoral nail versus dynamic hip screw for intertrochanteric fractures: A meta-analysis of randomized controlled studies. Orthop Traumatol Surg Res 2013;**99**(4):377-83.
12. Avakian Z, Shiraev T, Lam L, Hope N. Dynamic hip screws versus proximal femoral nails for intertrochanteric fractures. ANZ J Surg 2012;**82**(1-2):56-9.
13. Hong JY, Suh SW, Park JH, Shin YS, Yoon JR, Yang JH. Comparison of soft-tissue serum markers in stable intertrochanteric fracture:

dynamic hip screw versus proximal femoral nail-a preliminary study. Injury 2011;42(2):204-8.
14. Niu E, Yang A, Harris AHS, Bishop J. Which fixation device is preferred for surgical treatment of intertrochanteric hip fractures in the united states? a survey of orthopaedic surgeons. Clin Orthop Relat R 2015;**473**(11):3647-55.
15. Bhandari M, Schemitsch E, Joensson A, Zlowodzki M, Haidukewych GJ. Gamma nails revisited: gamma nails versus compression hip screws in the management of intertrochanteric fractures of the hip: a meta-analysis. J Orthop Trauma 2009;**23**(6):460-4.
16. Jones HW, Johnston P, Parker M. Are short femoral nails superior to the sliding hip screw? a meta-analysis of 24 studies involving 3,279 fractures. Int Orthop 2006;**30**(2):69-78.
17. Yu W, Zhang X, Zhu X, Yu Z, Xu Y, Zha G, et al. Proximal femoral nails anti-rotation versus dynamic hip screws for treatment of stable intertrochanteric femur fractures: an outcome analyses with a minimum 4 years of follow-up. BMC Musculoskelet Disord 2016;17:222.
18. 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. Hindawi Publishing Corporation. Scientific World J 2013; 2013: 1-8.
19. Sharma A, Sethi A, Sharma S. Treatment of stable intertrochanteric fractures of the femur with proximal femoral nail versus dynamic hip screw: a comparative study. Rev Bras Ortop 2017; 53(4):477-481.
20. Zhao C, Liu DY, Guo JJ, LP L, Zheng YF, Yang HB, et al. Comparison of proximal femoral nail and dynamic hip screw for treating intertrochanteric fractures. Zhongguo Gu Shang 2009;22(7):535-7.
21. Kamboj P, Sharma PK, Jesadia B, Arora S, Siwach RC. A comparative prospective study of osteosynthesis in intertrochanteric fractures, using dynamic hip screw (DHS) and proximal femoral nailing (PFN). Int J Orthop Sci 2019; 5(2):954-60.
22. Chandy G, Saju S. A comparative study on the functional outcome of intertrochanteric fractures treated by proximal femoral nailing or dynamic hip screw fixation. Int J Res Orthop 2021;7(1):51-55.
23. Ashraf RA, Javed A, Asghar K, Amin A, Sheikh SI. Comparison of dynamic hip screw and proximal femoral nail in intertrochanteric femur fractures. JPOA 2021; 33(03):101-6.
24. Parker M, Bowers T, Pryor G. Sliding hip screw versus the targon PF nail in the treatment of trochanteric fractures of the hip: a randomised trial of 600 fractures. J Bone Joint Surg Br 2012; 94(3): 391–397.