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Original article:

Assessment of Efficacy of Dynamic Hip Screw and Proximal Femoral Nail in the Treatment of Intertrochanteric Fractures of Femur: A Comparative Study

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Abstract

Background: The proximal femoral nail (PFN) introduced by the AO/ASIF group in 1998 has become prevalent in treating trochanteric fractures in recent years. Although there were several reports showing benefits of proximal femoral nail, it was still associated with technical failures. Hence; we planned the present study to assess and compare the efficacy of Dynamic Hip Screw and Proximal Femoral Nail in the Treatment of Intertrochanteric Fractures of Femur.

Materials and Methods: The study was conducted in the Department of Orthopedics, Dr RML Hospital & PGIMER, New Delhi, India. The ethical clearance of the study was obtained from the ethical committee of the institute prior to commencement of the study. For the study, we included 50 cases of stable Intertrochanteric fracture patients ranging from age 18- 65 years. Patients who had blocked marrow cavity by other implant, deformed femur, narrow marrow cavity, pathological fracture or old fracture of femur were excluded from the study. An informed written consent was obtained from the patients after explaining them the procedure of the study.

Results: The mean age of patients in DHS group was 52.15 years and in PFN group was 54.66 years. The sex ratio was 12:9 in DHS and 15:14 in PFN. The average blood loss was 201 ml with DHS and 106 ml with PFN. We observed that loss of reduction was seen in 1 patient in DHS and 2 patients in PFN. Implant failure was seen in 2 patients in DHS and 1 patient in PFN. Second surgery was performed in 1 patient in DHS and 2 patients in PFN. There were no non-union or malunion in both the surgical procedures.

Conclusion: From the results of the present study, we conclude that DHS and PFN are equally efficacious procedures for the treatment of Intertrochanteric Fractures of Femur.

Keywords: Dynamic Hip Screw, Fracture, Proximal Femoral Nail.

INTRODUCTION

Trochanteric fractures are generally associated with bone fragility and caused by a low energy trauma: a significative increase of these fractures is expected on the next decades.[1, 2] Improvements of anaesthesiologic and surgical techniques have increased the rate of success and reduced the elevated risk of death within the first year after fracture, independently from the patients' age and health status.[3] Surgical treatment with stable fixation allows early mobilization and reduces complications. There are two main types of fixations for trochanteric fractures, which

are plate fixation and intramedullary implants. Dynamic hip screw (DHS) or sliding hip screw (SHS) has been the standard implant in treating trochanteric fractures. However, when compared with the intramedullary implants, it has a biomechanical disadvantage because of a wider distance between the weight bearing axis and the implants.[4, 5] The proximal femoral nail (PFN) introduced by the AO/ASIF group in 1998 has become prevalent in treating trochanteric fractures in recent years. Although there were several reports showing benefits of proximal femoral nail, it was still associated with technical failures. The cost of PFN is also much more than DHS.[6] Hence, the present study was conducted to compare the efficacy of Dynamic Hip Screw and Proximal Femoral Nail in the Treatment of Intertrochanteric Fractures of Femur.

MATERIALS AND METHODS

The study was conducted in the Department of Orthopedics, Dr RML Hospital & PGIMER, New Delhi, India. The ethical clearance of the study was obtained from the ethical committee of the institute prior to commencement of the study. For the study, we included 50 cases of stable Intertrochanteric fracture patients ranging from age 18- 65 years. Patients who had blocked marrow cavity by other implant, deformed femur, narrow marrow cavity, pathological fracture or old fracture of femur were excluded from the study. An informed written consent was obtained from the patients after explaining them the procedure of the study. The patients were operated by the same orthopedic surgeons to avoid any bias. The surgery was performed after obtaining various investigations and obtaining clearance from the physician. Closed reduction was attempted in all cases and if not achieved, indirect reduction using percutaneous or mini-open techniques was done before making entry for the PFN and DHS. For all the patients, same rehabilitation protocol was followed. The patients were called for follow up after 4 weeks, 10 weeks, 16 weeks, and 24 weeks.

The statistical analysis of the data was done using SPSS version 11.0 for windows. Chi-square and Student's t-test were used for checking the significance of the data. A p-value of 0.05 and lesser was defined to be statistical significant.

RESULTS

Table 1 shows the demographic details and surgical observations in subjects. The mean age of patients in DHS group was 52.15 years and in PFN group was 54.66 years. The sex ratio was 12:9 in DHS and 15:14 in PFN. The average blood loss was 201 ml with DHS and 106 ml with PFN. The results were statistically significant with average blood loss only. Table 2 shows the complications in the surgical procedures. We observed that loss of reduction was seen in 1 patient in DHS and 2 patients in PFN. Implant failure was seen in 2 patients in DHS and 1 patient in PFN. Second surgery was performed in 1 patient in DHS and 2 patients in PFN. There were no non-union or malunion in both the surgical procedures. The results were comparable and were observed to be statistically non-significant in both the procedures.

DISCUSSION

In the present study, a total of 50 cases of stable Intertrochanteric fracture patients ranging from age 18- 65 years were studied. We observed that loss of reduction was seen in 1 patient in DHS and 2 patients in PFN. Implant failure was seen in 2 patients in DHS and 1 patient in PFN. Second surgery was performed in 1 patient in DHS and 2

patients in PFN. There were no non-union or malunion in both the surgical procedures. The results were comparable and were observed to be statistically non-significant in both the procedures. The results were compared to previous studies in the literature. Ma KL et al conducted an updated meta-analysis to discuss the optimal treatment of intertrochanteric fractures aiming to determine which implant gives the lower rates of blood loss, complications. Comparison among the three groups was based on twelve indicators, including operative time, fluoroscopy time, operative blood loss, length of hospital stays, wound infection or hematoma, pneumonia, thromboembolic complications, fixation failure, operative fracture of femur, later fracture of femur, reoperation, and mortality. PFNA was associated with less blood loss and lower rate of fixation failure, but led to more fluoroscopy time. PFNA group versus Gamma nail group: PFNA led to less blood loss, shorter fluoroscopy time and length of hospital stay. DHS was associated with lower rate of operative fracture of femur, later fracture of femur, and reoperation, but caused more blood loss. In contrast, there was no difference regarding operative time, infection hematoma, pneumonia, thromboembolic events, and mortality. They concluded that PFNA should be a priority choice for treatment of intertrochanteric fractures with minimal rate of fixation failure, less blood loss and shorter length of hospital stay. DHS has distinct advantages over Gamma nail with lower rate of plant-related complications and should be preferred device for intertrochanteric fractures. Arirachakaran A et al conducted a network meta-analysis of randomized controlled trials (RCTs) comparing clinical outcomes between dynamic hip screws (DHS), Medoff sliding plating, percutaneous compression plating (PCCP), proximal femoral nails (PFN), Gamma nails and less invasive stabilization system fixation in femoral trochanteric fractures in the elderly. Compared to the other implants, PCCP showed the lowest total operative time and units of blood transfusion with an unstandardized mean difference (UMD) of 29.27 min and 0.89 units. The lowest incidence of general complications, wound complications and late complications of PCCP was 0.09, 0.01 and 0.05, respectively, when compared to others. The lowest fluoroscopic time was with DHS with an UMD of 0.24 min, whereas the lowest blood loss and shortest hospital stay were with PFN with an UMD of 233.61 ml of blood loss and 7.23 days of hospital stay when compared to all other fixation methods. Reoperation rates of all implants had no statistically significant difference. The network meta-analysis suggested that fixation with PCCP significantly shortens operative time and decreases the units of blood transfusion required, while also lowering risks of general complications, wound complications and late complications when compared to fixation. Use of PFN, showed the least intra-operative blood loss and shortest hospital stay. [7, 8]

Zhao C et al discussed characters of proximal femoral nail and dynamic hip screw for treating type A1, A2, A3 of intertrochanteric fractures. They reviewed 104 patients with intertrochanteic fractures, 33 patients were treated with proximal femoral nail (PFN), including 13 males and 20 females with an average age of 76 years (ranging from 63 to 87 years). 12 cases of type A1; 18 cases of type A2 and 3 cases of type A3; and 71 patients were treated with dynamic hip screw (DHS), including 29 males and 42 females with an average age of 74.5 years (ranging from 61 to 92 years), 32 cases of type A1, 34 cases of type A2 and 5 cases of type A3. An average time of operation was (51.5 +/- 4.4) min in PFN; (68.8 +/- 5.9) min in DHS. The length of incision was (9.6 +/- 0.9) cm in PFN; (15.5 +/- 1.5) cm in DHS. The blood loss was (179.0 +/- 12.9) ml in PFN; (269.3 +/- 40.0) ml in DHS. Varus collapse was none in

PFN, 1 case in DHS. The collodiaphyseal angle of 7 cases decreased in DHS. Lateral hip pain caused by proximal screw removal was 6 cases in PEN. It was concluded that the therapeutic effect of DHS and PEN was primitively same in treating type A1 of intertrochanteric fracture. Operative injuries of PFN were less than that of DHS and anti-tonia was stronger which is more suitable for type A2 and A3 of intertrochateric fractures. Yu W et al compared DHSs with PFNAs in the management of stable intertrochanteric fractures. 267 patients (267 hips) with stable IFFs (AO/OTA Type 3.1A1) were treated with a DHS or a PFNA. Inclusion and exclusion criteria were designed to focus on isolated stable IFFs in ambulatory patients. Follow-up was undertaken at 1, 3, 12, 15, 18, 21, 24, 36, 48 postoperative months, and at final follow-up. Radiograph outcomes were obtained at all visits. The primary outcome measure was re-operation rate. The secondary outcome was patient function, evaluated using Harris hip score (HHS). Tertiary outcomes included: intra- and post-operative orthopaedic complications. Two hundred twenty two patients (110 in the PFNA group and 112 in the DHS group) were evaluated with a mean follow-up period of 53 months (range, 48-60 months). There was an increased risk of reoperation after DHS in one-year follow-up: 0 % and 5.4 % for PFNA and DHS, respectively. The difference persisted with time: 6.4 % and 13.4 % at last follow-up. There are statistical differences in postoperative HHS at 12, 15, 18, 21, 24, 36, 48 months postoperatively and at final follow-up. No statistical difference in medical complications was observed between the two groups. The orthopaedic complications were more in the DHS group compared with the PFNA group. They concluded that compared with PFNA device, DHS device might not be the preferred implant for stable intertrochanteric femur fractures.[9, 10]

CONCLUSION

From the results of the present study, we conclude that DHS and PFN are equally efficacious procedures for the treatment of Intertrochanteric Fractures of Femur.

REFERENCES

1. Cummings SR, Rubin SM, Black D. The future of hip fractures in the United States. Numbers, costs, and potential effects of postmenopausal estrogen. Clin Orthop Relat Res. 1990;252:163–66.
2. Kannus P, Parkkari J, Sievänen H, et al. Epidemiology of hip fractures. Bone. 1996;18(Suppl 1):57–63.
3. Melton LJ, 3rd, Kearns AE, Atkinson EJ, Bolander ME, Achenbach SJ, Huddleston JM, et al. Secular trends in hip fracture incidence and recurrence. Osteoporos Int. 2009;20(5):687–94.
4. Kulkarni GS, Limaye R, Kulkarni M, Kulkarni S. Intertrochanteric fractures. Indian J Orthop. 2006;40(1):16–23.
5. Kish B., Sapir O., Carmel A., Regev A., Masrawa S. Full weight bearing after unstable per and subtrochanteric fracture using proximal femur nail. J Bone Joint Surg Br. 2001;83:289.
6. Steinberg E.L., Blumberg N., Dekel S. The fixion proximal femur nailing system: biomechanical properties of the nail and a cadaveric study. J Biomech. 2005;38(1):63–68.
7. Ma KL, Wang X, Luan FJ, Xu HT, Fang Y, Min J, Luan HX, Yang F, Zheng H, He SJ .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 Dec;100(8):859-66. doi: 10.1016/j.otsr.2014.07.023. Epub 2014 Nov 6.

8. Arirachakaran A, Amphansap T, Thanindratarn P, Piyapittayanun P, Srisawat P, Kongtharvonskul J. Comparative outcome of PFNA, Gamma nails, PCCP, Medoff plate, LISS and dynamic hip screws for fixation in elderly trochanteric fractures: a systematic review and network meta-analysis of randomized controlled trials. Eur J Orthop Surg Traumatol. 2017 Oct;27(7):937-952. doi: 10.1007/s00590-017-1964-2. Epub 2017 Apr 22.
9. Zhao C, Liu DY, Guo JJ, Li LP, Zheng YF, Yang HB, Sun JH. Comparison of proximal femoral nail and dynamic hip screw for treating intertrochanteric fractures. Zhongguo Gu Shang. 2009 Jul;22(7):535-7.
10. Yu W, Zhang X, Zhu X, Yu Z, Xu Y, Zha G, Hu J, Yi J, Liu Y. 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 May 21;17:222. doi: 10.1186/s12891-016-1079-7.

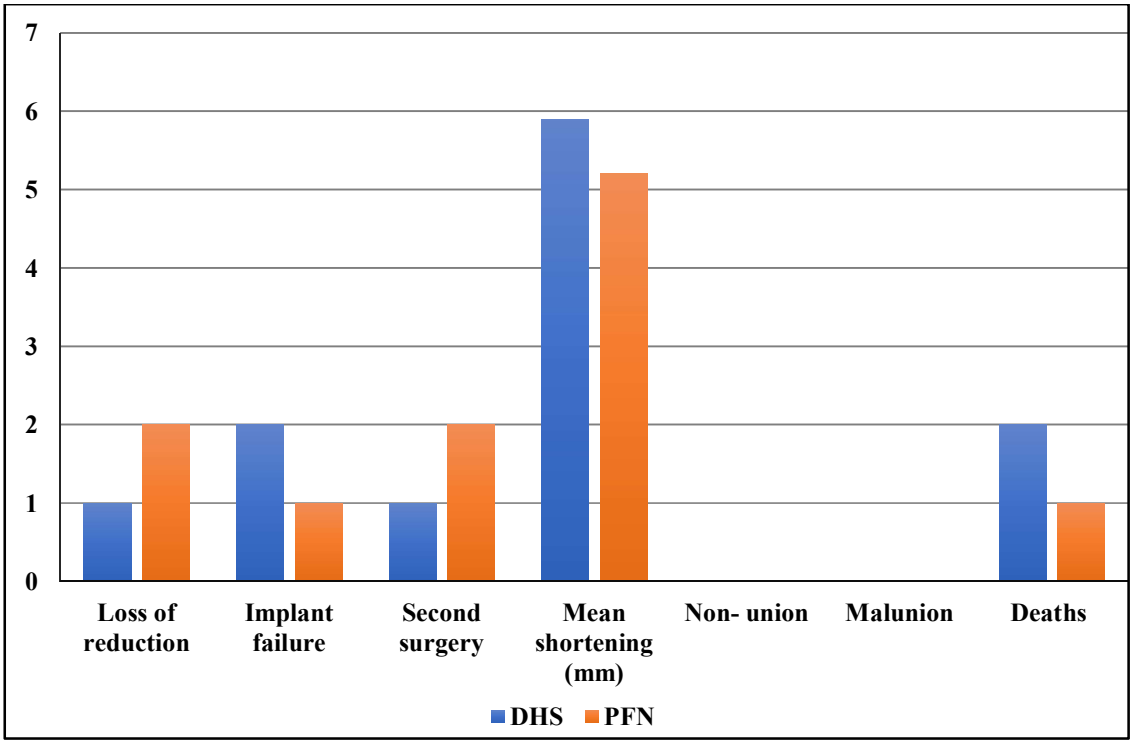
Table 1: Demographic details and surgical observations

Variables	DHS (n=21)	PFN (n=29)	p-value
Mean age (years)	52.15	54.66	0.12
Sex ratio (M:F)	12:9	15:14	0.15
Mean age of fracture at surgery (days)	3.8	3.4	0.22
Mean duration of surgery (in minutes)	71.25	77.65	0.87
Average blood loss (in mL)	201	106	0.002
Mean hospital stay (in days)	11.2	9.89	0.45

Table 2: Complications in the surgical procedures

Complications	DHS (n=21)	PFN (n=29)	p-value
Loss of reduction	1	2	0.22
Implant failure	2	1	0.16
Second surgery	1	2	0.84
Mean shortening (mm)	5.9	5.2	0.31
Non- union	0	0	0.09
Malunion	0	0	0.15
Deaths	2	1	0.5

Fig 2: Complications in the surgical procedures



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