VOLUME-7, ISSUE-6, JUNE-2018 • PRINT ISSN No 2277 - 8160

Original Research Paper

Orthopaedics

COMPARATIVE STUDY OF DYNAMIC HIP SCREW (DHS) AND PROXIMAL FEMUR NAIL (PFN) IN TREATMENT OF PERITROCHANTRIC EXTRACAPSULAR FEMORAL FRACTURES

Dr. Aashish Pathak

Dr. Rajeev Mohagaonkar*

*Corresponding Author

ABSTRACT

OBJECTIVES: To study Dynamic Hip Screw (DHS) and proximal femur nail (PFN) in treatment of peritrochantric extracapsular femoral fractures.

MATERIAL AND METHODS: Between Aug. 2003 to Aug, 2008, 90 cases of intertrochantric fractures studied prospectively. 45 cases were treated with PFN and 45 cases with DHS. Follow up period of 12 months. Both groups were compared in terms of amount of intra-operative blood loss, duration of surgery, intra-operative radiological exposure. Postoperative complications such as back out of implant, bending or breaking of implant, delayed union or non-union. At end of 1 year functional outcome was determined using Hip Harris score.

RESULTS: DHS require longer duration of surgery with more blood loss. Intra-operative radiological exposure required was higher in PFN group. There was no significant difference in the non ambulatory period postoperatively. There was no significant difference in fracture union time. There was single case of non-union in PFN group while none patient in DHS group had non-union. Functional recovery was essentially same in both groups at end of 1 year.

CONCLUSION: PFN offers a less invasive surgical technique with less blood loss and less duration of surgery compared to DHS. Rest outcome parameters remain the same.

KEYWORDS : DHS; PFN; peritrochanteric fracture femur

INTRODUCTION

Most common fractures in the elderly are distal radius, vertebrae, and proximal femur. A proximal femur fracture causes most of the disability and dependence in daily activity. Hip fractures thus results high mortality and morbidity rates reported between 14- 47%[1]. The goals of treatment must be to minimize the morbidity and mortality of the patients with effective rehabilitation. From biomechanical point of view, two main alternatives are available. The first type consists of a sliding neck screw or bolt connected to a plate in lateral femoral cortex. The other alternative for stabilization is, to use an intra-medullary nail that stabilizes the head neck fragment by means of sliding neck screw[2]. Development by Richard's manufactures company in the USA in the 1960's produced Dynamic hip screw[3]. Dynamic Hip Screw (DHS) allowed controlled collapse and early and full weight bearing[4, 5]. The Arbeitsgmeinschaftfür osteosynthesefragen (AO/AISF) developed the Proximal femur nail (PFN) in 1996 with an additional anti rotational hip pin together with a smaller distal shaft diameter. The use of intra-medullary devices in treatment of intertrochantric fracture has been shown on increasing in last decade[6,7].

Cocharane data base review 22 comparing DHS with other intramedullary implant show that DHS still method of choice, but there are very few trial comparing DHS and PFN[8].

AIMS AND OBJECTIVES:

To compare DHS and PFN in treatment of extra capsular peritrochantric fractures in term of duration of surgery, Intra-operative blood loss & radiation exposure, postoperative mobilization period, radiological union time & Postoperative complications with functional recovery at end of 1 year.

MATERIAL & METHOD:

This study was carried out in Department of Orthopaedics of Seth Nandlal Dhoot Hospital, Aurangabad. Total 88 patients with 90 acute peritrochantric fractures were included in study. 2 patients in study had bilateral fractures. 52 male & 38 female patients were included in study. 2 patients died during early postoperative period due to diseases unrelated to fractures were excluded from study. All patients were followed up for minimum period of 1 year. Fresh fractures without any comorbidity in skeletally mature patients were included in this study. Pathological fractures, fractures more than 3 weeks old were excluded. Fracture was classified using Orthopaedic Trauma Association (OTA) alphanumerical classification system. After an informed consent a detailed history of present fracture as well as past medical, surgical illness was noted. AP X-ray of pelvis with both hips in 10° of internal rotation was taken in every patient. Complete preoperative laboratory workup & Pre-anaesthesia evaluation was done in all patients. For DHS patient's affected limb in 10° abduction and contra lateral limb in abduction & flexion. If closed reduction was not possible then open reduction was done and fracture was fixed with 'K' wires. Lag screw position in inferior part of femoral neck in AP view and in posterior part in lateral view was achieved in most of cases. For PFN, on fracture table reduction was done in abduction but final position was in adduction. If reduction is stable in abduction but unstable in adducted position then fracture transfixed with 'K' wire in abduction. Limb in then adducted and proceed with surgery. Entry taken at tip of greater trochanter, guide wire is passed and the entry site reamed, nail was the introduced manually unreamed. Using C-Arm control the both guide wires for neck screw placed & screws then passed after reaming and tapping. Postoperative evaluation and follow up in both groups was same as post operative check x-ray was taken on postoperative day 1.Weight bearing encouraged earliest possible partial or full weight .Patients were followed periodically at interval of 6 weeks up-to first 6 month and then 3months up to end of 1 year. Clinically and radiological assessment was done in terms of, radiological union of fracture, Range of motion and complication e.g. cut out screw. At the end of 1 year hip functional scoring was done using Hip Harris Score. The data was collected and analyzed. Statistical analysis was done using unpaired "T" test.

RESULTS AND OBSERVATIONS

Present study consists of 88 patients with 90 fractures, 45 fractures were treated with Dynamic Hip Screw (DHS) and 45 fractures with Proximal femur nail (PFN).The majority of patients in present study were between 60-80 years (57%), 72% patients in present study was age more than 60 years. Mean age is DHS Group was 68 years and in PFN group was 64 years (Table no 1). According to AO/AISF classification, there were total 72 out of 90 (80%) were unstable fractures (Type 31 A.2 and Type 31 A.3). Majority of the patient was AOAISF Type 31.in both groups (Table no 1).In DHS Group mean duration of surgery was 48.6 minutes while in PFN group it was 38 minutes. The difference was statistically significant ($P < 0.05$). Mean amount of blood loss was 140 cc. in DHS Group. In PFN group it was

intra-operative 45cc. The amount of blood loss in less with PFN group and it was statistically significant (P< 0.05) (Table no 2). Intra-operative radiological exposure was calculated in total minutes of exposure, during procedure by image intensifier. Intra-operative radiological exposure was less with DHS Group and was statistically significant (P< 0.05). The mean radiological exposure in DHS group was 0.93min In PFN group average radiological exposure was 1.04 min (Table no 2).Postoperatively mobilization started on average 3 days after surgery in DHS group. In PFN group average 2 days patients were mobilized postoperatively. (Table no 2). In DHS Group, at end of 12 weeks 46% patients in DHS group had united while 97% patients had radiological union by the end of 24 weeks. There were 3% patients having union after 24 weeks in DHS group. None case of non-union seen in DHS Group (Table no 1).In PFN group 45% fractures had radiological union in 12 weeks; while at end of 24 weeks, 95% fractures were united 3.8% fractures show union after 24 weeks. Single case of non-union was observed in PFN group (Table no 1).In present study, postoperative complications were studied under local complication and mechanical complications. Local complications of wound haematoma, infection either superficial or deep-seated was observed. There was no local complication in both groups except single case of superficial infection in DHS group. It subsides within one week with treatment (Table no 2). There were 2 cases of screw back out in both groups. In DHS group both cases fracture united in back out implant, but one patient required implant removal to persistent pain. In PFN group, both cases required readjustment of implant. There was none case of implant bending or breaking. There was no intra-articular migration of screw in both groups (Table no 2). At end of 1 year functional assessment was done using Hip Harris score (HHS) in present study. Average score was 86 in DHS group, 88 in PFN group. The difference observed was not statistically significant (Table no 1).

Table no. 1: Variables parameters results

Variables		DHS		PFN		Total	
		cases	(%)	cases	(%)	cases	(%)
Age(yrs)	Less than 60	15	33	11	24	26	29
	61-80	25	56	26	58	51	57
	above 80	5	11	8	18	13	14
Type of fracture (AO-OTA)	31.A1	10	22	8	18	18	20
	31.A2	22	49	25	56	47	52
	31.A3	13	29	12	27	25	28
Radiological union time	l12 weeks	21	47	20	44	41	46
	12-24 weeks	23	51	22	49	45	50
	24-36 weeks	2	4	2	4	4	4
	Non union	0	0	1	2	1	1
Hip Harris Score(HHS)	Less than 70	2	4	5	11	7	8
	71-80	6	13	11	24	17	19
	81-90	25	56	26	58	51	57
	above 90	12	27	14	31	26	29

Table no.2: comparisons of intra op variable, post op mobility & complications.

		DHS	PFN
Intra-Operative	Duration (minutes)	48.6	38
	Blood loss(ml)	140	45
	Radiological. exposure	0.93	1.04
Post op day mobilisation		3	2
Complications	Local(infection)	1	0
	Mechanical(Back-out)	2	2

DISCUSSION

Majority of patients were between 60-80 years (57%). These finding are comparable with previous studies [9, 10, 20-1, 27]. In this study AO/OTA Type A-2 was most common type (47%) and 80 % fractures were unstable (AO/OTA Type2 and Type 3). In DHS Group 78% was unstable and 48.9% were Type 2.In PFN Group 82% fractures were unstable and 55.6% was Type 2. Average blood loss in PFN Group (45cc.) was significantly less than in DHS group (140cc,) in present study. Closed reduction minimal soft tissue dissection required for PFN reduces blood DHS surgical dissection, mean duration of surgery was significantly more in DHS group (48.6min.) than PFN group (38min.). Previous studies average blood loss and duration of surgery was higher with DHS, which was noted in previous studies 14, 15. Intra-operative radiological exposure required in DHS Group was mean 0.93 min. and 1.04 min. in PFN groups. In PFN group radiological exposure required was statistically significant. However in previous series of Soudan et al 5s as Intra-operative radiological exposure for PFN was less than DHS but was statically insignificant. In present study all patients were encouraged early mobilization after surgery. In DHS weight bearing group was 3 days and in PFN group it was 2 days and was comparable with previous study [11, 24]. Previous studies, complications of lag screw back out in DHS ranges from 4 to 10% [9, 12-3]. In present study 2 cases (4.4%) had back out of implant after 24 weeks, one case required implant removal after 6 months of surgery, however in both cases fracture united by 6 months. One case of superficial infection noted in DHS group, which was treated with oral antibiotics and healed completely. There was no case of avascular necrosis of femoral head, implant break, or bending noted in present study. These results are comparable with previous studies [12]. The lateral migration or back out of hip screw in PFN group was noted in 4%-30% in previous studies [2,16-8,20]. In present study 2 patients (4.4%) had lateral migration of screw. One patient required revision with PFN after 7 months. The union was observed in this case. Other case of lateral migration (PFN) but had non-union of fracture and required total hip replacement arthoplasty. In none case intra-articular migration of proximal screw was In present study, all cases shows radiological union except one case in PFN group (1.1% of all fractures). In DHS groups, 93% and in PFN group 90% of fractures were united by the end of 24 wks. In PFN group one patient required dynamisation after 5 months of surgery and union was observed by end of 30 weeks in same patients. Thus there was no significant difference observed in both groups in terms of radiological union time. The results of present study are comparable with previous studies [11,13]. At end of 1 year post operative functional evaluation was done using Hip Harris Score. In DHS and PFN group there was no significant difference observed in present study. In DHS group, 26.7% patient show excellent, 55.6% patient had good results. In PFN group 31% show excellent and 57% patient had good results [14,16].

CONCLUSIONS

DHS requires more surgical dissection, Intra-operative blood loss, and longer duration of surgery than PFN. However, the recovery and the functional outcome were seen to be comparable in both the groups and hence, it may be said that PFN is beneficial especially in old patients where the duration of surgery is to be reduced.

BIBLIOGRAPHY

1. Holt G, Gregori A, Smith R, Dunkan K, Finalyson DF. JBone Joint Surg (Br) 2008 Aug; 90-B: 1357-63.
2. Boldin C, Seibert FJ, Fankhauser F, Peicha G, Grechenig W, Szyszkowitz R. The proximal femoral nail (PFN)—a minimal invasive treatment of unstable proximal femoral fractures: a prospective study of 55 patients with a follow-up of 15 months. ActaOrthop Scand. 2003 Feb;74(1): 53-8.
3. Trozo RG. Hip nails for all occasions. OrthopClin North Am 1974; 5:479-91.
4. Regazzoni P. ProximaleFemurfrakturen In: Rehabilitation.II. Behandlungstaktikund Traumatologie Organverletzungen, Band 4 (eds. Laffer U, Dührig M,Harder F). Basel, Basler BeiträgezurChirurgie 1992; 4:97- 108.
5. Babst R, Renner N, Biedermann M, Rosso R, Heberer M,Harder F, Regazzoni P. Clinical results using the Trochanter Stabilizing Plate (TSP): the modular extension of the Dynamic Hip Screw (DHS) for internal fixation of selected unstable intertrochanteric fractures. J OrthopTrauma 1998; 12 (6): 392-9.
6. Jeffrey O. Anglen, MD, and James N.Weinstein, DO,on Behalf of the American Board of Orthopaedic Surgery Research Committee Nail or Plate Fixation of intertrochantric Hip Fractures: Changing Pattern of Practice A Review of the American Board of orthopedic Surgery Database J Bone Joint Surg(Am) 2008; 90:700-7.
7. Audigé L, Hanson B, Swiontkowski MF. Implant related complications in the treatment of unstable intertrochantric fractures: meta-analysis of dynamic screw-plate versus dynamic screw-intramedullary nail devices. IntOrthop. 2003:27(4): 197-203.
8. Cochrane Database Syst Rev. 2008 Parker MJ, Handoll HH. Gamma and other cephalocondylic intramedullary nails versus extramedullary implants for extracapsular hip fractures in adults. Jul 16 : (3).
9. Osterwalder A, Dietschi C, Martinoli S. Initial results with the AO Dynamic Hip Serew (DHS) OrthopIhre Grenzgeb. 1985 Mar-Apr; 123(2): 193-200.
10. Ortner F, Wagner M, Trojan E. Surgical management of pertrochanteric fractures with the dynamic hip screw of the AO type. Unfallchirurg. 1989 Jun; 92(6):274-81. [Article in German].
11. Bridle SH, Patel AD, Bircher M, Calvert PT. Fixation of intertrochanteric fractures of the femur. A randomised prospective Comparison of the gamma nail and the dynamic hip screw. J Bone Joint Surg Br.26.1991 Mar; 73(2): 330-4.
12. Guyer P, Landolt M, Keller H, Eberle C. The Gamma Nail in per- and intertrochanteric femoral fractures alternative or supplement to the dynamic hip screw? A prospective randomized study of 100 patients with and intertrochanteric femoral fractures in the surgical clinic of the City Hospital of Triemli, Zurich, 1991 Dec; 21(6): 242-9. [Article in German]
13. Gruss M, Traut R. Management of unstable pertrochanteric and per- to subtrochanteric femoral September 1989 June 1990 AktuelleTraumatol. fractures with the dynamic hip screw Aktuelle Traumatol. 1992 Aug; 22(4): 144-8. [Article in German].
14. O'Brien PJ, Meck RN, Blachut PA. Brockhuyse HM Sabharwal S. Fixation of intertrochantoric hip fractures: gamma nail versus dynamic hip screw, a randomized prospective study Can J Surg 1995 Dec :38(6): 516-20.
15. Willoughby R. Dynamic hip screw in the management of reverse obliquity intertrochanteric neck of femur fractures. Injury 2005 Jan; 36(1): 105-9.
16. Saarenpäa I. Heikkinen T, Ristiniemi J, Hyvönen P,Leppilahti J, Jalovaara P. Functional comparison of the dynamic hip screw and the Gamma locking nail in trochanteric hip fractures: a matched-pair study of 268 patients. IntOrthop 2007 Oct 18. PMID: 17943284
17. Simmermacher R K J, Bosch A M, Van der Werken C.The AO/ASIF-proximal femoral nail (PFN): a new device for the treatment of unstable proximal femoral fractures. Injury 1999; 30: 327-32.
18. Domingo LJ, Cecilia D, Herrera A, Resines C Trochanteric fractures treated with a proximal femoral nail. IntOrthop. 2001; 25(5): 298-301.
19. Dousa P, Bartonícek J, Jehlicka D, Skála- osenbaum J Osteosynthesis of trochanteric fractures using proximal femoral nails. ActaChirOrthopTraumatolCech. 2002; 69(1):22-30. [Article in Czech].
20. Al-Yassari G, Langstaff RJ, Jones JW, Al-Lami M. The AO/ASIF proximal femoral nail (PFN) for the Treatment of unstable trochanteric femoral fracture.Injury 2002; 33: 395-399.
21. 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: 401-405.
22. Pavelka T, Kortus J, Linhart M. Osteosynthesis of proximal femoral fractures using short proximal femoral nails. ActaChirOrthopTraumatolCech. 2003; 70(1):31-8. [Article in Czech].
23. Fogagnolo F, Kfuri M Jr, Paccola CA. Intramedullaryfixation of pertrochanteric hip fractures with the short AO-ASIF proximal femoral nail. Arch Orthop Trauma Surg 2004 Jan; 124(1):31-7.
24. Tyllianakis M Panagopoulos A, Papadopoulos A,Papasimos S, Mousafiris K. Treatment of extracapsular hip fractures with the proximal femoral nail (PFN):long term results in 45 patients. ActaOrthop Belg. 2004 Oct;70(5):444-54.
25. Windolf J, Hollander DA, Hakimi M, Linhart w Pitfalls and complications in the use of the proximal femoral nail. Langenbecks Arch Surg. 2005 Feb; 390(1)-59-65.
26. Pavelka T, Matejka J, Cervenková H. Complications of intemal fixation by a short proximal femoral nail. Acta ChirOrthopTraumatolCech. 2005; 72(6):344-54. [Article in Czech].
27. Zhang J, Yang L, Feng J, Wu Z, Xu R, Zeng B.Treatment of femur intertrochanteric fractures withproximal femoral nail in the old. ZhongguoXiu FuChong Jian WaiKeZaZhi. 2005 Sep; 19/(9):740-2. [Article in Chinese].
28. Hohendorff B, Meyer P, Menezes D, Meier L, Elke R.Treatment results and complications after PFN osteosynthesis. Unfallchirurg. 2005 Nov; 108(11):938,940, 941-6 [Article in German].
29. Gadegone WM, Salphale YS. Proximal femoral nail an analysis of 100 cases of proximal femoral fractures with an average follow up of 1 year. IntOrthop. 2007 Jun; 31(3):403-8.
30. Bartonícek J, Dousa P, Kostál R, Svatos F, Skála J.Duration of surgery in osteosynthesis of fractures of the trochanter. ActaChirOrthopTraumatolCech. 2001;68(5):294-9. [Article in Czech].
31. Saudan M, Lübbeke A, Sadowski C, Riand N, Stern R,Hoffmeyer P. 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 OrthopTrauma. 2002 Jul; 16(6):386-93.