ORIGINAL RESEARCH PAPER | Medical Science | Volume : 6 | Issue : 11 | November 2016 | ISSN - 2249-555X | IF : 3.919 | IC Value : 74.50

Comparative Analysis Between Dynamic Hip Screw and Short Proximal Femoral Nail in the Management of Stable Intertrochanteric Femoral Fractures

KEYWORDS: Proximal femur fractures, PFN, DHS

Dr Pankaj Inani
M.S Orthopaedics, Medical Officer,Government District hospital, Bhilwara

Dr. Akshat Vijay
M.S Orthopaedics Senior Resident, Department of Orthopaedics, Jhalawar Medical College,Jhalawar, Rajasthan

ABSTRACT

BACKGROUND & OBJECTIVE: *Aim of our study was to have Comparative analysis of results and complications of short PFN and DHS in the management of stable trochanteric fractures.*

MATERIALS AND METHODS: *Study included 30 cases of stable trochantric fractures femur which were divided into two groups by RCT type of study design, 15 patients (Group A) were operated with PFN and 15 patients (Group B) with DHS.*

RESULTS: *All fractures united with an average of about 15 weeks (Range:12 to 16 weeks). Most of patients (86.66%) had excellent outcome in DHS group compared to (53.33%) in PFN and some patients (13.33%) had good outcome in DHS group compared to (46.67%) in PFN group.*

CONCLUSION: *inter trochanter femoral fractures, particularly stable fractures can be better and more effectively treated with Dynamic Hip screw.*

Introduction-

Pertrochanter fractures are of intense interest globally as they are most frequently operated fractures and have become a serious health resource issue because of high cost of care required after injury. Trochanteric fractures are common in the elderly people. The incidence of trochanteric fractures is more in the female population compared to the male due to osteoporosis[1]. There are various forms of internal fixation devices used for Trochanteric Fractures. The most commonly used device is the Dynamic Hip Screw with Side Plate assemblies[2]. The latest implant for management of trochanteric fractures is proximal femoral nail, which is also a collapsible device with added rotational stability[3]. The most widely used extramedullary implant – the dynamic hip screw (DHS) – seems to have a biomechanical disadvantage when compared with intramedullary devices because the load bearing in the proximal femur is predominantly shared by the calcar.[3,4].Intramedullary devices are more stable under loading with a shorter lever arm, so the distance between the hip joint and the nail is reduced compared with that for a plate, thus diminishing the deforming forces across the implant[3,5,6.]

Aims and Objectives-

Comparative analysis of results and complications of short PFN and DHS in the management of stable trochanteric fractures.

Materials and Methods-

The present study included 30 cases of stable trochantric fractures femur, admitted in department of orthopeadics, J.L.N. Medical College and Associated group of hospitals, Ajmer between August 2012 to August 2013. Patients were divided into two groups by Randomized Controlled Trial type of study design, 15 patients (Group A) were operated with CRIF with short PFN (Proximal Femur Nail) and 15 patients (Group B) with ORIF with DHS (Dynamic Hip Screw) in a prospective series of stable pertrochanteric fractures. The patients were Randomized using Block Randomization sealed envelope technique. The data was checked for Normal Distribution with the help of Kolmogorov-Smirnov test with Lilliefors correction and Shapiro Wilk Test and it was found that the data were normally distributed. Therefore Parametric tests were applied for evaluation of results. Permission was obtained from the Ethical Committee of J.L.N. Medical College, Ajmer in accordance with 1975, helinski declaration before starting the research.

Inclusion and Exclusion Criteria for Study-

All patients with stable fracture of proximal intertrochanteric femur were included with exclusion of-

1. Other trochanteric fracture than stable two part trochanteric fracture.
2. Bilateral intertrochanteric fractures
3. Any open injury
4. Associated with vascular injury
5. Pathological fracture

Fractures were classified according to the A/O classification of trochanteric fractures. The results were analysed based on the Harris Hip Scoring System. All of these 30 patients were followed for mean duration of 11 months.

OPERATIVE TECHNIQUE-

The patient was placed in supine position on fracture table and fracture reduced by giving traction in external rotation and 20° abduction (to correct varus deformity) and finally internally rotated up to neutral position and adducted. The patient was then prepared and draped as for the standard hip fracture fixation. Prophylactic antibiotic was given to all patients 30 minutes before surgery.

For GROUP A (SHORT PFN) -

The tip of the greater trochanter was palpated and a longitudinal incision 5 cm proximal from the tip of the greater trochanter was given. Skin incision was extended deep into fascia lata and gluteus medius was split in line with the fibres. Entry was made at tip or slightly lateral to the tip of the greater trochanter. Guide wire was then inserted and over it a cannulated rigid reamer was inserted and manual reaming was done. An appropriate size nail with valgus angle of 6 degrees, was inserted as far as possible into the femoral opening until the hole for 8 mm screw was at the level of inferior

Volume : 6 | Issue : 11 | November 2016 | ISSN - 2249-555X | IF : 3.919 | IC Value : 74.50

margin of neck. A 2.8 mm guide wire was inserted through the drill sleeve after a stab incision, 5 mm deeper than the planned screw size. It's final position was kept in the lower half of the neck in AP view and in the center of the neck in lateral view. A second 2.8 mm guide wire was inserted in the similar way above the first one for antirotation screw. It's tip was also kept 5mm deeper than the planned antirotation screw. The antirotation screw was inserted first to prevent the possible rotation of the medial fragment and to reduce chances of varus when inserting the compression screw. Length of the antirotation screw was measured by measuring scale and 5 mm was deducted from it. Drilling was done over the guide wire with 6.5 mm drill bit upto the length of antirotation screw previously measured. Tapping was done and the same length 6.5 mm antirotation screw was inserted. Compression screw was placed in similar manner by drilling with 8 mm reamer. Distal locking was usually performed with two cortical screws by drilling with a 4mm drill bit.

For GROUP B (DHS) -The vastus lateralis splitting approach was used.The DHS angle guide was placed and lateral cortex was opened with 2 mm drill bit. The guide wire was inserted into the center of femoral head and advanced to subchondral bone.The proximal aspect of osseous insertion of gluteus maximus and the tip of lesser trochanter, which are 2 cm below the vastus lateralis ridge, help to identify the level of entry of 135° angle plate and level of insertion of guide wire. The guide wire should lie in middle of the femoral neck in both AP and Lateral views. The guide wire position was checked and tip apical index noted, if its position was not perfect and tip apical index more than 25 mm[7,8,9], its position was changed before proceeding further. The measuring scale was slided over the guide pin and triple reamer was set 5 mm shorter than this reading for reaming. Tapping done and before inserting a lag screw (Richard's Screw), it's proper size was measured by measuring gauge. The coupling screw was inserted through the hollow guide shaft into the hip screw. The guide shaft was removed and the DHS plate was slide into shaft of Richard's screw. With the impactor, the plate was hammered against cortex of femur. The plate was fixed to the femoral shaft in usual manner, traction was released and compression achieved by tightening the top screw.

Patients were taught static quadriceps exercises and knee mobilization in the immediate postoperative period. During postoperative period as per pain and tolerance of patient, they were made to standup with help of support on 4-5 postoperative day. Then gradually within next 2 to 3 days there were made to do non weight bearing walking with support (Walker). Patients were discharged from the hospital when all ssutures were removed. All patients were followed up at an interval of 6 weeks. 3 months, 6 months and 1 year. X-Ray pelvis with both hip AP-view and lateral view of operated hip were taken in follow up.

Results and Observations-

In our study, maximum no of patients were in the age group less than 50 years (76%) with mean age of 43.36 years and road traffic accidents were the most common mode of injury (53%). Majority of patients were male (63%). Mean duration of surgery for PFN was 62.6 mins (Range 45-85) and for DHS was 66 mins (Range 50-85). Average amount of blood loss was 410 ml (Range 401-450ml) in cases treated with DHS and 396 ml (Range 401-450ml) in cases with PFN. Partial weight bearing was started at 4 weeks and full weight bearing at 15 weeks on average, in all the patients treated either with short PFN or DHS. All cases showed radiological signs of union at an average of 15 weeks in both groups. All patients in both groups were using same aides for mobility at the end of 3 months of surgery and were using no aides for mobility at the end of 6 months post surgery.

TABLE-1 COMPLICATIONS IN GROUP A (SHORT PFN)

S.NO.	Complications	Number of cases	Percentage (%)
1	Difficult proximal locking	1	6.66
2	Difficult distal locking	1	6.66
3	Anterior thigh pain	3	20.0
4	Entry site hip pain	7	46.66
5	Hip pain	1	6.66
6	Shortening (>1cm)	1	6.66
7	Difficult reduction	1	6.66
8	Greater trochanter fracture	1	6.66

TABLE-2 COMPLICATIONS IN GROUP B (DHS)

S.NO.	Complications	Number of cases	Percentage (%)
1	Hip pain	1	6.66
2	Shortening (>1cm)	3	20.0
3	Superficial infection	1	6.66

TABLE-3 COMPARATIVE HARRIS HIP SCORE

Harris Hip Score	PFN (GROUP A)		DHS (GROUP B)	
	Number of cases	Percentage (%)	Number of cases	Percentage (%)
Excellent	8	53.33	13	86.66
Good	7	46.67	2	13.33
Fair	0	0	0	0
Poor	0	0	0	0
Total	15	100%	15	100%

Most of patients (86.66%) had excellent outcome in DHS group compared to (53.33%) in PFN and some patients (13.33%) had good outcome in DHS group compared to (46.67%) in PFN group.

DISCUSSION-

In our study, mean duration of surgery in group A was 62.6 minute and in group B was 66 min. Duration of surgery was more for initially operative cases of PFN. The learning curve for the treatment of fractures by Dynamic Hip Screw was smaller as compared to Proximal Femoral Nail. Blood loss measured by mop count (each fully soaked mop containing 50ml blood) was relatively lesser in group A as compared to those in group B. Average duration of stay in hospital was equal in both groups. Average time of union in all our 30 patients was about 15 weeks (Range:12 to 16 weeks). Similar results with respect to union time, mean blood loss during surgery, average radiation exposure and mean duration of surgery were seen by Benoit Giraud[10] et al,and Various intraoperative complications were seen in group A, One case had difficulty in reduction which was

Volume : 6 | Issue : 11 | November 2016 | ISSN - 2249-555X | IF : 3.919 | IC Value : 74.50

reduced by opening of fracture site. One case had greater trochanter fracture during opening of canal with manual reamer and in one case there was difficulty in proximal locking of PFN due to sliding of caudal guide wire in cranial direction. There was one case in which there was difficulty in distal locking of PFN due to misalignment of targeting device and screw went outside nail in this case, we removed screw and locking done with free hand technique so it is recommended to check distal locking intra operatively in IITV. Similar intra operative complications were seen byButt M.S, Ali MS 13et al and Habernek H, Frauenchun E14 et al.

The superficial wound infection at the suture site was seen in one patient of Group B.

In this patient treatment of IV Antibiotics was prolonged, in our protocol we gave IV antibiotics for 3 days but in presence of infection we continued them. for 10 days[15]. In this case wound healed in the end, similar to A. Bodoky, F. Harder[16] et al and Verley GW, Milner SA[17] et al. In one case of PFN (6.66%) we noted shortening of one cm. Shortening might have resulted due to comminution of variable degree at fracture site & concentric collapse at fracture site[18]. There were 3 cases (15%) of shortening seen in the cases operated by DHS. This shortening ranged from 1-1.5 cms. Patients were given shoe raise which compensated for the necessary shortening. Patients did not have any difficulty later while walking. Unlike Al-Yassari et al[19] and Banan et al[20]in our study there was no case with compression screw cut-out and Z-effect complications; probable reason can be delay in starting of weight bearing. Implant failure in dhs in the form of cut out in the Richard screw from the femoral head was observed in no case unlike Baumgaertner M.R[9] et al because most patients had good bone mass and all fracture are stable type.

The range of movements was excellent in all cases but excellent outcome in DHS group was 86.6% and in PFN group 53.3% because of mechanical complications of PFN like entry site hip pain in PFN (which is mainly found in individuals with short neck of femur, in those cases tip of PFN remain outside of greater trochanter and impinge on abductors and cause pain) and anterior thigh pain (because in India PFN available is of 25mm it crosses the mid diaphysis of femur of osteoporotic and old person and impinge on anterior cortex of femur. This may give rise to thigh pain). This is not seen in DHS. Similar results were seen by Habernek H, Aschauer E[21] et al and B. Giraud [22] et al in their studies respectively.

CONCLUSION-

Operative management which allows early rehabilitation and offers to the patient the best chances for functional recovery is the treatment of choice for trochanteric fractures. We conclude that inter trochanter femoral fractures, particularly stable fractures can be better and more effectively treated with Dynamic Hip screw.

Both implant had equal time of union and few complication in stable fractures but at long term follow up most of patient operated with PFN complain of implant related complications like greater trochanter tip (entry site of PFN) pain and anterior thigh pain which needed removal.

REFERENCES-

1. L J Melton, 3rd, E J Atkinson, and R Madhok, Downturn in hip fracture incidence; Public Health Rep. 1996 Mar-Apr; 111(2): 146–151
2. Ismo Saarenpaa. Extracapsular hip fractures- Aspects of intramedullary and extramedullary fixation. Acta Universitatis Ouluensis ; D Medica :990.
3. Minos Tyllianakis . Treatment of extracapsular hip fracture with PFN : Long term results in 45 patients. Acta orthopaedica Belgica 2004 ; 70(5): 444-454.
4. T Morihara . Proximal femoral nail for treatment of trochanteric femoral fractures. Journal of Orthopaedics Surgery 2007;15(3):273-277.
5. Sudhir S Babhulkar. Management of trochanteric fracture . I J O Oct 2006; 40(4): 210-218 .
6. Halder SC**.** The gamma nail for peritrochanteric fractures. J Bone Joint Surg 1992 ; 74-B : 340-344.
7. S. Terry$_{th}$ Canale, James H Betty Editors. Campbell's operative orthopaedics 11 edit. 2008 ; vol 3:3240-3241.
8. G S Kulkarni . Current concept review intertrochanteric fracture.IJO 2006; 40:,16-23.
9. Baumgartner MR, Curtin SL, Keggi JM: The value of tip apex distance in predicting failure of fixation of trochanteric fractures of hip. JBJS 77-A, 1058, 1995.
10. Benoit Giraud. Intratrochanteric fractures : Randomised prospective comparision of treatment with a dynamic hip screw (DHS) and antero-grade intramedullary nailing . J of Bone and Joint surgery- British vol 2008; 90-B, Issue SuppII: 291.
11. 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. ZhongguoGu Shang. 2009 Jul;22(7):535-7.
12. Huang X, Leung F, Xiang Z, Tan PY, Yang J, Wei DQ, Yu X : Proximal femoral nail versus dynamic hip screw fixation for trochanteric fractures: a meta-analysis of randomized controlled trials. Scientific World Journal. 2013.
13. Butt MS, Krikler SJ, Nafie S, Ali MS : Comparison of DHS and Gamma Nail : A prospective randomized, controlled trail. Injury 1995, Nov;25(9): 615-8.
14. Habernek H, Schmid L : Sports related proximal femoral fractures – A retrospective review of 31 cases treated in an eight year period. Br J. Sport Med 2000 Feb: 34(1) : 54-8.
15. Pavelka T, Matejka J, Cervenkova H Acta Chir Orthop Traumatol Cech 2005; 72:344-354.
16. A Bodoky, U Neff, M. Herberz and F Harder: Antibiotic prophylaxis with two doses of cephalosporin in patients managed with internal fixation for a fracture of hip JBJS Vol. 75, issue- 1,61-65, 1993.
17. Varley GW, Milner SA : Wound drains in proximal femoral fractures surgery. J.Roy. Soc. Med. 1995 Jan 88(1) : 42P-44P.
18. Babhulkar Sudhir S. Management of trochanteric Fractisres Department of -Orthopaedics, Indira Gandhi Medical College, Nagpur, INDIAN JOURNAL OF ORTHOPAEDICS October 2006 volume 40: Number 4: P. 210-218.
19. 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.
20. Banan H. The treatment of unstable, extracapsular hip fractures with the AO/ASIF proximal femoral nail (PFN) – our first 60 cases. Injury 2002 ; 33 : 401-405.
21. Habernek H, Wallner T, Aschauer E, Schmid L : Comparison of Enders Nail, Dynamic Hip Screw and Gamma nails in the treatment of peritrochanteric femoral fracture. orthopaedics 2000, Feb 23(2): 121-7.
22. B Giraud. Pertrochanteric fractures: A randomized prospective study comparing dynamic screw plate and intramedullary fixation. Rev Chir Orthop Reparatrice Appar Mot. 2005 Dec; 91(8): 732-736 .