

Original Article

Evaluation of dynamic hip screw plate v/s proximal femoral nail for unstable inter-trochanteric fracture femur

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ABSTRACT

Background: Intertrochanteric fracture is most common fracture around hip joint in elderly patients. Dynamic Hip Screw (DHS) plate is gold standard treatment for stable Intertronchantric fracture but it has its own complication in unstable intertronchantric fracture. So newer implant was introduced “Proximal Femoral Nail (PFN)” but it has its own complication. We studied 100 cases of unstable intertrochantric fracture to know which implant is better and was clinically assessed by Kyles criteria.

Aims and objectives: To compare the short term result in DHS and PFN in all type of IT fracture and to set guidelines for managements of these fracture

Methodology: This was Prospective randomized study comprised of unstable Fracture Intertronchantric treated by DHS and PFN. The cases were selected by envelop method for fixation unstable IT Fracture. The series consist of 100 cases were divided into 2 groups of patient treated by DHS and PFN . These cases where followed up for 6 months. Fracture stability was assessed by according to EVANS classification.

Results: The mean time needed for the two procedures was 56.6 minutes (range 45-65 min) in Group A (DHS) and 40.8 minutes (range 35-51 min) in Group B (PFN). The period of hospitalization in Group A (DHS) was 9-12 days mean of days while in Group B (PFN) was 5-7 days with mean of days.

Conclusion: Any modality of treatment done with proper expertise maintaining ideal surgical steps and principle, PFN carries slightly better result than DHS but which was not statically significant.

Keywords: Intertronchantric Unstable Fracture, Proximal Femoral Nail (PFN), Dynamic Hip Screw Plate (DHS)

INTRODUCTION

Advanced fast growing technology and high velocity transport media has increased the number of injuries in the recent years. Intertrochanteric fracture is one of them. This has changed the pattern of intertrochanteric fracture so much that there is no one treatment which can be agreed upon.

Due to increased life span and due to increased osteoporosis in the old age the rate of intertrochanteric fractures has increased [1,2]. Before the advent of the term osteoporosis Sir Astley Cooper (1824) wrote “That regular decay of nature which is easily detected in the dead body and one of the principal of these is found in the bones, for they become thin in their shell and spongy in their texture.” John Buchwald in 1923 said “we all come into this world under the brim of the pelvis but quite a few of us will leave through the neck of the femur.”

The goal of treatment is fracture reduction and stable osteosynthesis to allow immediate mobilization. For many years, the sliding hip screw

and plate had been the gold standard in treating intertrochanteric fractures [3-5] Nowadays, there is an increasing interest in intramedullary nailing, especially for the unstable pertrochanteric fractures. There are several studies comparing intramedullary hip screw (IMHS, Smith & Nephew) to other intramedullary devices or sliding hip screw [6-8].

Anatomical and biomechanical factors play an important role in healing of this fracture. This fracture combines the problems of both upper shaft and trochanter of the femur. This Non operative treatment is often unsuccessful as it often results in complications like varus deformity, shortening and other hazards of immobilization such as deep vein thrombosis, hypostatic pneumonia, pressure sores, dehydration etc. It is very rarely used now a day unless there is absolute contraindication to internal fixation. Intertrochanteric fractures of the femur readily unite no matter what treatment is used because most of it is the cancellous bone, has a good blood supply and covered by muscles. If non union occurs, it is mostly due to interposition of soft tissues. Many surgeons have introduced number of

new devices but there is not a single modality of treatment one which can be used with confidence and full reliance. Ongoing efforts to find an acceptable implant have resulted in a wide variety of implants having some advantages and disadvantages. We conducted a study of 100 cases of intertrochanteric fractures. The goal is to determine the better implant between dynamic hip screw and proximal femoral nail while treating these fractures. Present study will help in clearing views regarding management of fracture IT and support evidence base practice.

MATERIAL AND METHODS

Study duration, sample size and place of study:

Between July 2012 to June 2014, 100 consecutive patients who sustained Unstable Intertranchantric fracture where operated in Dr. Panjabrao Deshmukh Memorial Medical collage Amravati.

Inclusion criteria: Male and Female between 50-80 yrs. where taken and patients who are will to undergo study with regular follow up.

Exclusion criteria: Patients unfit for anesthesia, patients having ipsilateral fracture, patients with pathological and compound fracture, pediatric patients and patients no willing for study. 50 patients were treated with DHS and PFN respectively and they were selected by envelop method indicating the treatment for each patients.

Methods: In group A, patient were treated with DHS while in group B patients were treated with PFN. Fracture stability was assessed according to EVANS Classification in which patients were treated by DHS and PFN [9, 10]. Prophylactic intravenous second generation cephalosporin was administered before operation and discontinued 3 days in PFN and 5 days in DHS postoperatively. Patients were mobilized on second post-operative day in PFN, allowing them to partial weight bearing was started while weight bearing was delayed in DHS i.e. 4 weeks.

The patients were evaluated for their functional status and by serial plain radiographs at 1, 3, 6 and 12 months after operation. Fracture healing was judged based on increased sclerosis and obliteration of fracture lines. X-rays interpreted in association with clinical data and more specifically by the elimination of pain during weight bearing. In order to estimate the functional outcome the Kyles criteria were used as shown in table-1 [11].

Table1: Kyles criteria

Excellent	Normal ROM (Range Of Motion), No Limp, No Pain
Good	Normal Rom , No Limp, Occasional Pain, Use of Cane
Fair	Restriction of ROM, Noticeable Limp, Moderate Pain, Use of Walker/ 2 Cane
Poor	Pain in every ROM, Non Ambulatory

RESULTS

In group A (Patient where treated with DHS) there were 27 female and 23 male while in group B (Patients treated with PFN) there were 33 female and 17 male and mean age was age group was 65.5 yrs. as shown in **table-2**.

Table 2: Age wise distribution of all cases

Age Groups	Group A(DHS)		Group B(PFN)	
	Male	Female	Male	Female
50—60	4 (18.18)	6 (22.22)	6 (37.5)	5 (14.2)
61—70	16 (72.72)	18 (66.66)	9 (56.25)	27 (77.14)
71—80	2 (9.09)	3 (11.11)	1 (6.25)	3 (8.57)
Total	22 (100)	27 (100)	16 (100)	35 (100)

Table 3: Distribution of data

Variable	data
Mean time needed for the two procedures	
Group A (DHS)	56.6 minutes
Group B (PFN)	40.8 minutes
Average period of hospitalization	
DHS	9-12 days
PFN	5-7 days
Mechanism of injury	
Due to fall	72.86 %
Road traffic accident (RTA)	25.71%
Others	1.43%
Fluoroscopy time	
DHS	57.5Sec
PFN	73.75Sec
Average blood loss	
DHS	375 ml
PFN	140 ml

The **mean time needed** for the two procedures was 56.6 minutes (range 45-65 min) in Group A (DHS) and 40.8 minutes (range 35-51 min) in Group B (PFN). The **period of hospitalization** in Group A (DHS) was 9-12 days mean of days while in Group B (PFN) was 5-7 days with mean of days. There were no mortality seen in Group A and Group B. In

these study maximum cases where **due to** fall i.e. 72.86 % and the 25.71% cases included history of RTA (Road Traffic Accident) and 1.43% other. Dynamic Hip Screw require less fluoroscopy time than Proximal Femoral Nail. Blood Loss was seen more in DHS than PFN intra operatively.

Table 4: Average time taken for union.

Time taken for union	DHS (%) (N=50)	PFN (%) (N=50)
Less than 16 weeks	22(44)	32(64)
16-24 weeks	18(36)	12(24)
24-36 weeks	10(20)	4(8)
Non union	00(00)	02(4)

Above table reveals that 44% of DHS group patient required less than 16 weeks for union, followed by 36% required 16-24 weeks and 20% patient required 24-36 weeks. while in PFN groups 64% patients required less than 16 weeks for union, followed by 24% required 16 -24 weeks, 8% required 24-36 weeks and only 4% patient was found Non union.

Table 5: Operative complications

Complication	PFN(% , n = 50)	DHS(% , n = 50)
Intra operative complications		
Locating entry point	4 (8%)	-
Inappropriate reduction	4 (8%)	5 (10%)
Positioning of implant	2 (4%)	-
Post operative complications		
Superficial infection	04 (08%)	10 (20 %)
Deep infection	-	06 (12 %)
Pain at insertion site	08 (16%)	-
Shortening	02 (04%)	06 (12%)
Joint stiffness (Hip and bone)	02 (04%)	06 (12%)
Z effect	05 (10%)	-
Acetabular screw penetration	02 (04%)	-
Malunion (Varus deformity of head)	02 (04%)	01 (04%)
Non union	02 (08%)	-
Implant failure	04 (08%)	-

Location of entry point was difficult in four obese patient treated with PFN. This is common occurrence in obese pts. Inappropriate reduction treated with PFN, which lead to non-union. There was malposition of implant in two patient which resulted in varus mal-alignment and shortening.

Post-operatively superficial and deep infection where seen more in DHS than in PFN while due to inappropriate reduction and mal position of implant lead to nonunion and varus mal-alignment and shorting.

Table 6: Result obtains in individuals

Result	PFN (% , n=50)	DHS (% , n=50)
Excellent	20 (40%)	16 (32%)
Good	24 (48%)	20 (40%)
Fair	02 (04%)	08 (16)
Poor	02 (04%)	06 (12)
Non-Union	02 (04%)	-
Total	50 (100%)	50 (100%)

Chi Square =2.07 DF= 3 p value=0.55 (NS) 88% and 72% patients had excellent and good result in PFN and DHS respectively while 8% and 28% had fair and poor result in PFN and DHS While two patients went in nonunion treated with PFN.

DISCUSSION

Intertrochanteric fracture is the fairly common fracture occurring in general population. It has been proved from time to time that there is no one common solution to the problem and no panacea. Thus it presents formidable problem to its treatment. We have treated 100 intertrochanteric fractures, treatment is analysed, compiled and data is presented.

Before the introduction of suitable fixation devices in the 1960s, treatment of proximal femoral fractures was mainly no operative consisting of prolonged bed rest in traction. Complications of prolonged immobility following hip fracture are:

- Increased risk of dementia and confusion
- Constipation
- Bed sores
- Orthostatic pneumonia
- Deep vein thrombosis
- Pulmonary embolism
- Muscle weakness
- Orthostatic hypotension
- Joint contractures

To avoid these complications and for rapid mobilization and restoration of function, majority of fractures should be treated operatively. Restoration of mobility in-patients with unstable fractures ultimately depends on the strength of surgical construct. There are multiple factors and variables, which affects the biomechanical strength of repair. Surgeon independent variables are bone quality, fracture pattern and stability. Whereas surgeon dependent variables are quality of fracture reduction and choice and placement of implant, varieties of implants have been used to fix these fractures. With

better understanding of biomechanics of trochanteric fractures there has been development of better implants.

Age distribution

In this study out of 100 patients 21 cases i.e. 21% were in 50-60 years of age group there were 79 patients i.e. 79% above 60 years. The maximum age was 78 years. In Horn and Wang series [12] series average age was 69.6 years and Kyles series [11] 71 years.

Mechanism of injury

Majority of these fractures are caused by fall (72.86%). G.N. Spears and J.T. Owens [13] noticed in cadaveric femora that femora classed as poorly mineralized broke more under dynamically applied loads as compared to well mineralized bone. Horn and Wang stated that mechanism of injury is not direct but due to failure of stress resisting forces during sudden bending or twisting forces.

Union of fractures

Total 44% of DHS group patient required less than 16 weeks for union, followed by 36% required 16-24 weeks and 20% patient required 24-36 weeks. while in PFN groups 64% patients required less than 16 weeks for union, followed by 24% required 16 -24 weeks, 8% required 24-36 weeks and only 4% patient was found Nonunion.

Complications

In proximal femoral nailing. The persistent non-union was associated with inappropriate reduction.

In our study closed reduction was not achieved in 10% which is comparable to study by Boldin et al i.e. 10%. No cutout was seen in our study, while in study of Boldin et al 2 cases i.e. 3.63% were seen, which he described to be due to wrong selection of screws.

Thus it appears from our study that intra operative complications were more common with PFN, while post-operative complications are more in patients treated with DHS for type III and type IV fractures.

CONCLUSION

Internal fixation of fracture of intertrochanteric region of femur with proximal femoral nailing gives better results in unstable intertrochanteric fractures. Intra operative technical difficulties associated with PFN can be reduced by thorough knowledge and understanding of both the anatomy and implant. By using some technical tips difficult closed reduction can be done and internal fixation with PFN can be attempted. Biological internal fixation of intertrochanteric fracture reduces intra operative

morbidity of the patients. Superficial infection was more in dynamic hip screw. Anatomic reduction and correct screw placement is very important. Early mobilization can be allowed with proximal femoral nailing. The complication of head and neck penetration etc. are much reduced if used with the proper technique. Coxa Vara shortening is the commonest complication and is not related to the implant used but to the degree of osteoporosis. The fluoroscopy time in the PFN group (average 73.75 sec) was significantly higher as compared to that of the DHS group (average 57.5 sec) The DHS patients had significantly more blood loss intra -operative compared to PFN group (average 235ml) Osteoporotic bones with Singh's index less than three are responsible for most of the complications.. Though PFN is biomechanically a more stable implant, it is technically more demanding, and this advantage have translated to improve outcomes compared with extra medullary devices (DHS) in type III and IV fractures

To conclude, any modality of treatment done if properly indicated done with proper expertise, maintaining ideal surgical steps and principles then Proximal femoral nailing carry better results in unstable intertrochanteric fractures as compared to Dynamic hip screw.

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