IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)
e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 14, Issue 9 Ver. I (Sep. 2015), PP 15-21
www.iosrjournals.org

Intramedullary or Extramedullary fixation for Intertrochanteric fractures – A comparison study

Dr. V Ramnarayan[1], Dr. Pravin K Vanchi[2], Dr. M. Mohan Kumar[3]
[1,2,3] *(Department of Orthopaedics, Sri Ramachandra University, India)*

Abstract: *This study is taken up to compare the results of DHS and PFN in the treatment of intertrochanteric fractures of hip. To determine the rate of union, complications, operative risks and functional outcomes in intertrochanteric fractures treated with DHS and PFN. To determine the effectiveness of PFN in comparison to DHS in the treatment of intertrochanteric fractures of hip. All fifty consecutive patients were randomized control study into two treatment of Group A for Dynamic hip Screw fixation and Group B for Proximal femoral nailing. According to Boyd and Griffin classification, type I is 6, type II is 27, type III is 9, type IV is 8. Mean timing of Surgery after the fracture is 8.92 days in dynamic hip screw and 6.68 days in proximal femoral nail. There was no significant difference between the two groups in the rate of postoperative mobilisation. Despite the difference in per operative blood loss, the haemoglobin levels and the requirements for blood transfusion were similar in the two groups. There was no significant difference in the hospital stay between the two groups. It appeared that PFN had some benefits over DHS in terms of operative time, blood loss, shortening, neck shaft angle, which has got significant p value. But with respect to the functional results both the DHS and PFN remains the same.*

Key words: *Dyamic hip screw (DHS), Proximal femur nail (PFN), Intertrochanteric fractures*

I. Introduction

Over the past fifty years, a wide variety of implants and fixation strategies have been utilized for the surgical stabilization of intertrochanteric hip fractures. Extramedullary devices, ex:-.Dynamic Hip Screw (**DHS**) with side plate assembly is the most commonly used device for the fixation of intertrochanteric fractures .It is a collapsible fixation device, which permits the proximal fragment to collapse or settle on the fixation device seeking its own position of stability. The latest implant for the management of intertrochanteric fracture is PFN. This implant is a cephalomedullary device and has many potential advantages like being intramedullary the load transfer is more efficient, shorter lever arm results in less transfer of the stress & less implant failures, advantage of controlled rotation is maintained., sliding is limited by intramedullary location, so less shortening & deformity, shorter operative time, less soft tissue dissection and lesser blood loss. In view of these conditions, this study is taken up to compare the results of DHS and PFN in the treatment of intertrochanteric fractures of hip. Aim of this study is to determine the effectiveness of PFN in comparison to DHS in the treatment of intertrochanteric fractures of hip.

II. Materials and Methods

2.1 Inclusion Criteria

- Age : 50 to 95 years
- Sex: both male and female
- All Fractures according to BOYD & GRIFFIN classification and MULLER- AO Classification of Intertrochanteric Fractures
- Fracture less than 6 weeks from date of injury
- Associated injuries/polytrauma

2.2 Exclusion criteria

- Age less than 50 years and greater than 95 years
- Fracture more than 6 weeks old
- Pathological Fractures/Tumours
- Neurovascular injuries

2.3 Pre operative evaluation:

Approval for this study was obtained from our local Institutional Ethical committee Board. After informed consent was given, all fifty consecutive patients were randomized (Randomized Control Study) into two treatments group. Group A for Dynamic hip Screw fixation and Group B for Proximal femoral nailing. Each

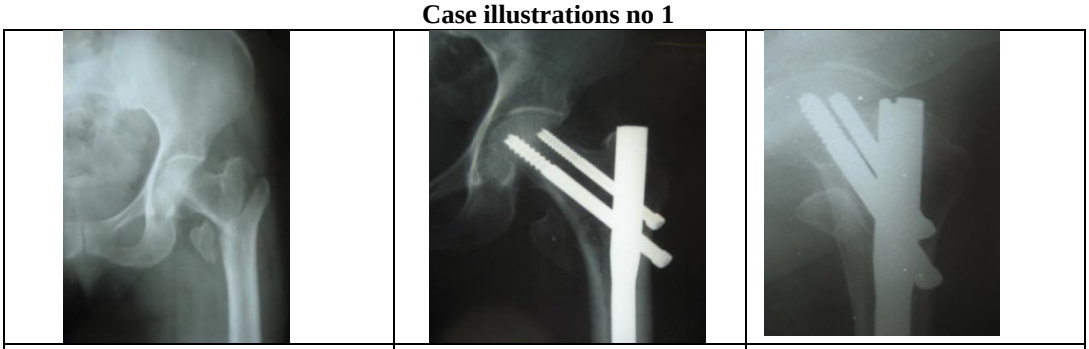
patient was evaluated with a "mobility score"[1] that considered three specific factors, which included the patient's ability to ambulate within their place of residence, the ability to ambulate outside, and the ability to go shopping (PARKER &PALMER MOBILITY SCORE). HARRIS HIP SCORE is used predominantly in our study to assess and compare the functional outcome of patients following PFN and DHS for Trochanteric fractures. At the follow up visit 1, 3, 6, 9, 12 months, pain over the operated site, the hemoglobin, radiological assessment for the position of the screw and neck shaft angle, range of motion, PARKER &PALMER MOBILITY SCORES, HARRIS HIP SCORE were noted.

III. Results

The youngest patient age is 54 years and oldest patient is 94 years. There were slightly more right-side than left-side fractures (56% vs. 44%). There are 23 males and 27 females included in the study. Mean age in the DHS group was 70 yrs and for the PFN group was 75 yrs.

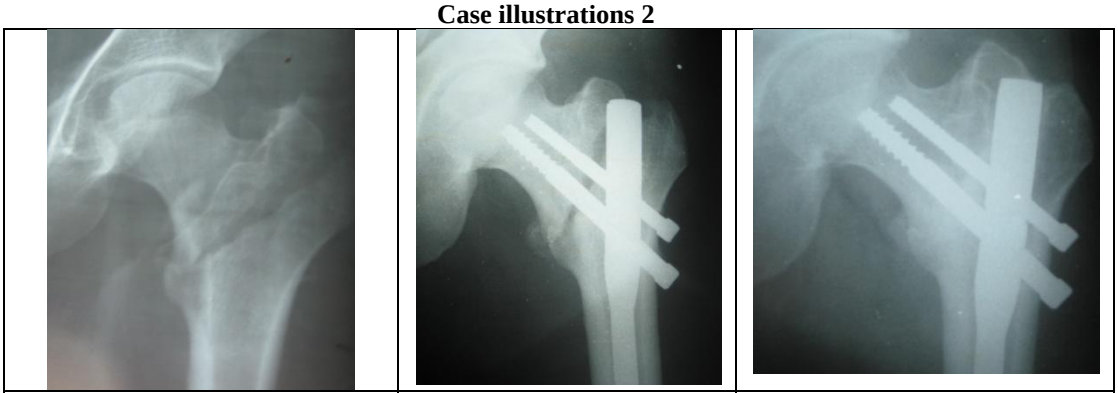
According to Boyd and Griffin classification, type I is 6, type II is 27, type III is 9, type IV is 8. Mean timing of Surgery after the fracture is 8.92 days in dynamic hip screw and 6.68 days in proximal femoral nail. Stable fracture in dynamic hip screw is 16 and proximal femoral nail is 17. Unstable fracture in dynamic hip screw is 9 and proximal femoral nail is 8.The pre op mobility status of the patient is assessed by Parker and Palmer mobility score. The length of incision and blood loss is very less in PFN group, an average of 3.3 cms and 160 ml respectively, in DHS group it was 7.8 cms and 275 ml respectively.There were no immediate and late complication in the DHS group, but in the PFN group , there was one screw back out due to the wrong entry point , which was taken from the lateral cortex of the femur. The mean varus angle in DHS group is 127degrees and in the PFN group it is 133 degrees. There was no wound infection and nonunion of trochanter. 48 % of patient treated with DHS returned to same job and in PFN 52% returned to the same job.

Case illustrations no 1



PRE-OPERATIVE X-RAY	**IMMEDIATE POST OP**	**24 WEEKS FOLLOW UP**

Case illustrations 2



PRE OPERATIVE X- RAY	IMMEDIATE POST OP	24 WEEKS FOLLOW UP

Case illustrations 3

		
PRE OPERATIVE X- RAY	IMMEDIATE POST OP	24 WEEKS FOLLOW UP

case illustrations 4

		
PRE OPERATIVE X- RAY	IMMEDIATE POST OP	24 WEEKS FOLLOW UP

case illustrations 5

		
PRE OPERATIVE X- RAY	IMMEDIATE POST OP	24 WEEKS FOLLOW UP

case illustrations 6

		
PRE OPERATIVE X- RAY	IMMEDIATE POST OP	24 WEEKS FOLLOW UP

Table1: Pre operative variables of 50 patients:

	DHS	PFN
Mean age (yrs)		
Male	69.33	74.18
Female	70.30	75.14
Mean timing of operation following injury (fracture)		
Days after the fracture	9.56	6.76
ASA score		
I	4	3
II	12	7
III	7	14
IV	2	1
FRACTURE TYPE		
Stable	16	17
Unstable	9	8

Table2: Operative and post operative details of 50 patients who had fixation

	DHS	PFN
Mean length of incision (cms)	7.8	3.3
Mean operating time (mins)	90	68
Mean intra operative blood loss (ml)	315	196
Mean radiation time (mins)	2.02	2.84
Wound drainage (ml)	50	20
Mean haemoglobin level (g/dl)		
Preoperative	9.5	9.9
Post operative	8.3	9.08
Patients receiving blood transfusions	3	2

Table 3: Radiological and clinical results

PARAMETERS	**DHS**	**PFN**
Shortening(cms)	1.2	0.87
Greater trochanter fracture	0	1
Varus angulation(degrees)	127	133
Screw cut out	0	0
Post-op Shaft fracture	0	0
Non-union	0	0
Mean time to full weight bearing(weeks)	1.3	1.2
Harris Hip Score	84	86
Ambulate independently	20	23
Doing Routine daily work	16	18
Doing lighter work	4	4
HIP ROM(Degrees)		
Flexion	110	111
Extension	9	12
Abduction	30	32
Adduction	15	19
Internal rotation	16	17
External rotation	25	30

Statistical analysis: There was no significant difference between the two groups in the rate of postoperative mobilisation. Despite the difference in peroperative blood loss, the haemoglobin levels and the requirements for blood transfusion were similar in the two groups. There was no significant difference in the hospital stay between the two groups. Although the total mobility score was similar in the two treatment groups , the ability to walk outside was significantly better at those time periods for the patients who had an intramedullary hip-screw. The use of assistive devices was not found to differ between the two treatment groups.

3.1 Analysis of result:

The following criteria were used by us to analyse the result : 1. Pain, 2. Gait, 3. Hip function, 4. Union at the fracture site, 5. Limp length discrepancy	
Excellent - No pain - Normal gait - More than 75% movement at the hip joint - Able to sit cross leg and squat normally - Good union at the fracture site - Shortening < 0.5 cm	Good - Mild pain - Minimal limp - 50-75% movement at the hip joint - Able to squat and sit cross legged with minimal difficulty - Shortening < 1 cm
Fair - Moderate pain able to perform the activities of daily living - Moderate limp can able to walk with using walking aids - 50-25% movement at the hip joint - Unable to squat and sit cross leg - Shortening 1-2 cm	Poor - Resting pain at the hip joint - Limp is severe unable to walk with the help of walking aid - < 25% movement at the hip joint - Unable to squat and sit cross leg - Shortening >2cm

IMPLANT	NO OF CASES	EXCELLENT	GOOD	FAIR	POOR
DHS	25	15	5	3	2
PFN	25	17	6	1	1

Table 4: the Harris hip score results:

IV. Discussion

According to D.C.R.Hardy[2] et al, In the DHS group, the mean pre op mobility score was 4.4±2.9 and the post op score was 3.4±3.4, in our study the pre op score is 6.68±1.15, and the post op score is 5.24±1.13. In the PFN group the mean pre op score was 5.2±3.3 and the post op score was 5.3±3.03 and in our study pre op score is 6.36±1.16 and post op score is 5.32±1.26. Mean operative time in minutes, in the DHS group was 57± 24.8 and in our study it is 90±0.19. In the PFN group it was 71±28.9 and in our study it is 68±0.25.The operative time is much less in the PFN group in our study . The blood loss (ml) in the DHS group is 198± 82.9 in our study 315±31.12 in the PFN group it is 144 ±120.5 in our study it is 196±26.4, even though there was decreased blood loss, it does not the affect the blood transfusion rates in the post operative period, hence it becomes insignificant.

Table 5: Comparitive analysis of Results with other studies

	DominiqueC.R Hardy et al 1998		P value	Our study		P value
	DHS	PFN		DHS	PFN	
MOBILITY SCORE						
PRE OP	4.4±2.9	5.2±3.3	0.06	6.68±1.15	6.36±1.16	0.16
POST OP	3.4+_3.41	5.3+_3.03	0.01	5.24±1.13	5.32±1.26	0.14
MEAN OP TIME IN MIN	57±24.8	71±28.9	0.02	90±0.19	68±0.25	0.02*
LEVEL OF HEMOGLOBIN (g/dl)						
PRE OP	12.9±1.46	12.3±1.65	0.13	9.5±0.43	9.9±.80	0.37
POST OP	9.4±1.79	9.3±1.61		8.33±0.33	9.08±0.72	
MEAN SHORTENING (cms)	3.4±1.08	0.6±0.69		1.2±0.24	0.87±0.20	

* Statistically significant

According to the Baumgartner[3], in a prospective study of 135 patients who were treated with a sliding hip screw or an intramedullary nail, the intramedullary device was associated with 23% less surgical time and 44% less blood loss and we also advocate the author's result because we had more surgical time in the plate than with the nail. The complication rate was similar in both the group three had lateral femoral shaft fracture in the group of patient treated with nail, two had screw cut out in the plate group, in our study we had only one screw back out due to the wrong entry point taken in the lateral cortex of the femur in the nail group. There was no significant difference between the two group with regard to the functional recovery. The author did not recommend the intra medullary nail in the treatment of stable fractures, but because of decreased operative time and lesser blood loss it might be the implant of choice for the treatment of all types of Intertrochanteric fractures.

Table 6: Comparitive analysis of Results with other studies

VARIABLE	MICHAEL .R. BAUMGARTNER et al1998		P VALUE	OUR STUDY		P VALUE
	DHS(68)	PFN(67)		DHS(25)	PFN(25)	
MEAN AGE	79	81	NS	70	75	0.50
INTRA OPERATIVE BLOOD LOSS(ml)	340±302	245±145	NS	315±31.12	196±26.4	0.00*
PATIENT RECEIVING BLOOD	1.8±1.7	2.2±2.4		3±1	2±1	NS

* Statistical significant

Our study also shows that the time taken to mobilize with a frame is shorter with the PFN than with that of the DHS. The reason for this may be combinations of postoperative factors like pain, muscle dysfunction and medical comorbidities. The entry point for PFN is usually through a small incision above the greater trochanter. This entry point causes less damage to the superior gluteal nerve and gluteus medius muscle than other entry points in the piriform fossa[4] .The DHS, however, requires a larger incision and probably damages more muscle and soft tissues.

The peroperative blood loss was significantly less with the proximal femoral nail probably because of the closed operative technique which requires only a 3 cm incision and a small split in the abductor musculature, whereas in contrast, the DHS needs a much longer incision and elevation of the vastus lateralis. Also, we performed only minimum reaming of the femoral shaft to reduce medullary blood loss in the PFN. Despite these advantages we were unable to show any benefit for the patients, since the postoperative haemoglobin levels and transfusion requirements of the two groups were almost similar.

The mean operative time that was needed to insert an intramedullary hip-screw was significantly lesser than that needed to insert a compression hip-screw. There were no post-operative femoral fractures in either group, and only one PFN was removed for screw back out.

The better mobility after treatment with the intramedullary hip-screw may be explained by the fact that these patients had less limb-shortening; this was particularly true for those who had an unstable fracture. Two centimeters of shortening or more is not uncommon after treatment of a comminuted intertrochanteric fracture with a compression hip-screw, and this shortening may have prevented these older, sometimes senile, patients from regaining the ability to walk. Nevertheless, the advantages of increased mobility, although important, are insufficient to alter the other functional parameters, such as social independence.

Table 7: Comparative analysis of Results with other studies

VARIABLE	J.Pajarinen et al5 2001		P value	Our study		P value
	DHS(41)	PFN(42)		DHS (25)	PFN(25)	
MEAN NECK SHAFT ANGLE(deg)	121	`129	0.785	123.96±1.01	129.60±1.685	0.00*

The mean intra operative blood loss was 315 ml in the DHS group and in the PFN group it was 196 ml. The difference was significant. The shortening in the DHS group was 1.2 cms, and in the PFN group it was 0.87 cm. This difference was significant.

The neck shaft angle in the DHS group was 123.96 degrees and in the PFN group it was 129.60 degrees. This difference also was significant. The fluoroscopy time in the DHS group was 2.02 minutes and in the PFN group it was 2.84minutes. This difference was not significant. The mean time to full weight bearing was 1.3 months and in the PFN group it was around 1.2 months. This difference was not significant. Harris hip function score was more or less same in one year follow up. In the DHS group excellent result was 60 % , good was 20% , fair was 12% and poor 4% of the patients and in the PFN group excellent was 68%, good was 24%, fair was 4% and poor was 4% of the patients .

In the PFN group only one patient had lateral cortex break. It occurred due to the wrong entry point.

V. Conclusion

It appeared that PFN had some benefits over DHS in terms of operative time, blood loss, shortening, neck shaft angle, which has got significant p value. But with respect to the functional results both the DHS and PFN remains the same.

References

[1]. Al-yassari G, Langstaff RJ, Jones JW, Al Lami M. The AO/ ASIF proximal femoral nail (PFN) for the treatment of unstable trochanteric fracture. Injury. 2002; 16:386-93

[2]. Hardy DC, Descamps PY, Krallis P, Fabeck L, Smets P, Bertens CL, Delince PE. Use of an intramedullary hip-screw compared with a compression hip-screw with a plate for intertrochanteric femoral fractures. A prospective, randomized study of one hundred patients. J Bone Joint Surg Am. 1998;80:618-30.

[3]. Baumgaertner MR, Curtin SL, Lindskog DM. Intramedullary versus extramedullary fixation for the treatment of intertrochanteric hip fractures.Clin Orthop. 1998;348:87-94.

[4]. Moein CM, Verhofstad MH, Bleys RL, van der Werken C. Soft tissue injury related to choice of entry point in antegrade femoral nailing: piriform fossa or greater trochanter tip. Injury 2005; 36:1337-42.

[5]. J. Pajarinen et al pertrochanteric femoral fracture treated with dynamic hip screw or a proximal femoral nail, JBJS 2005; 87-B: 76-81.