

Comparative study between dynamic hip screw and trochanteric femoral nail in intertrochanteric femur fracture

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Study performed at Department of Orthopaedics, R. D. Gardi Medical College & C. R. G. Hospital & Associated Charitable Hospital, Ujjain (M.P.)

Abstract

Introduction: The incidence of intertrochanteric fracture has been rising with an aging population in many parts of the world and the number of hip fractures is expected to increase year after year. Reduction of fracture is the goal of treatment so that near anatomic alignment and normal femoral anteversion are obtained. Surgical treatment with stable reduction and fixation allows early mobilization and reduces complications. There are two main types of fixations for intertrochanteric fractures- the extramedullary plate fixation and intramedullary nail.

Aims and Objective: The main objective of this study was to compare outcome of Dynamic Hip Screw and Trochanteric Femoral Nail in patients of intertrochanteric femur fracture.

Material and Methods: In this study, 50 patients of intertrochanteric fracture were admitted and randomly divided into two groups. 25 patients operated with Dynamic Hip Screw and other 25 were undergone Trochanteric Femoral Nail fixation. Outcome after the surgery such as average duration of surgery, blood loss, hospital stay and functional outcome were assessed using Harris Hip Score.

Results: The study findings reveal that there was a significant difference in mean operative time between both study groups with $p < 0.05$. Hence in dynamic group mean operative time was 2.26 ± 0.44 hours and in trochanteric femoral nailing mean operative time was 1.96 ± 0.2 hours. Blood loss was more significant in patients with DHS as compared with TFN $p < 0.05$. In dynamic group mean Harris score was 81.76 ± 9.49 and in trochanteric femoral nailing mean Harris score was 87.12 ± 7.74 .

Conclusion: Surgical management of intertrochanteric fractures is the preferred treatment to avoid complications of prolonged immobilization. Dynamic Hip Screw (DHS) has been the gold standard. Our study indicates that TFN may be better choice when compared to DHS in unstable intertrochanteric fractures.

Keywords: Dynamic Hip Screw, Trochanteric Femoral Nail fixation, Intertrochanteric fracture

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Introduction

The incidence of intertrochanteric fracture has been rising with an aging population in many parts of the world and the number of hip fractures is expected to increase year after year.[1]

Though conservative treatment yields good results, it necessitates prolonged immobilization leading to complications like bed sores, deep vein thrombosis, fracture disease and pulmonary embolism. Another feature of conservative management is the possibility of varus drift and shortening in spite of an adequate period of immobilization. Therefore,

surgery is the mainstay of treatment. Reduction of fracture is the goal of treatment so that near anatomic alignment and normal femoral anteversion are obtained.[2]

Surgical treatment with stable reduction and fixation allows early mobilization and reduces complications. There are two main types of fixations for intertrochanteric fractures- the extramedullary plate fixation and intramedullary nail. Dynamic hip screw (DHS) or sliding hip screw (SHS) has been the gold standard implant in treating intertrochanteric fractures.[3]

Dynamic hip screw (DHS) also known as Sliding Screw Fixation is a type of orthopaedic implant which is designed for fixation of specific types of hip fractures which allows controlled dynamic sliding of the femoral head component along the whole construct. It is the most commonly used implant for extra capsular fractures of the hip which are common in older osteoporotic patients. The concept behind the dynamic compression is that the head of the femur is allowed to move along one plane; since bone responds to dynamic stresses, the femur may undergo healing by primary intentions, cells joining along boundaries, resulting in a concrete joint requiring no remodeling.[4]

Implants like Gamma nail & TFN consists of a dynamic sliding screw, which passes through a short intramedullary nail. This design allows sliding between the two parts to create impaction, as in the sliding screw. The proposed theoretical advantages of the Gamma nail are reduced blood loss due to the percutaneous technique, minimal tissue damage, and shorter operation time[5]. Internal fixation of intertrochanteric fractures was a significant innovation. It allows early mobilization of the patient and reduced deformity due to malunion.[6-7]

Aim & objectives

Aim and objective of this study was to compare the clinical and functional outcomes of Dynamic Hip Screw and Trochanteric Femoral Nail in the patients with intertrochanteric hip fracture using Harris Hip Score.

Material and methods

This study was done prospectively on patients presenting with intertrochanteric fracture in the Department of Orthopaedics, R.D.Gardi Medical College, Ujjain for a period of 2 years from August 2020 to July 2022. A total 50 patients with inter trochanteric fracture of femur were selected and randomly allocated to two groups with equal number of participants. 25 patients were operated with Trochanteric femoral nailing and other 25 were operated with Dynamic hip screw and plate. Patients with Boyd and Griffin type I, II, III & IV trochanteric fracture and who were above 18 years of age were included in the study. Patients with neurovascular injury, critically ill or having malignancy, patients with fracture of other parts of same limb and pathological fractures were excluded from the study. All patients were informed about the study and informed consent was received from each participant.

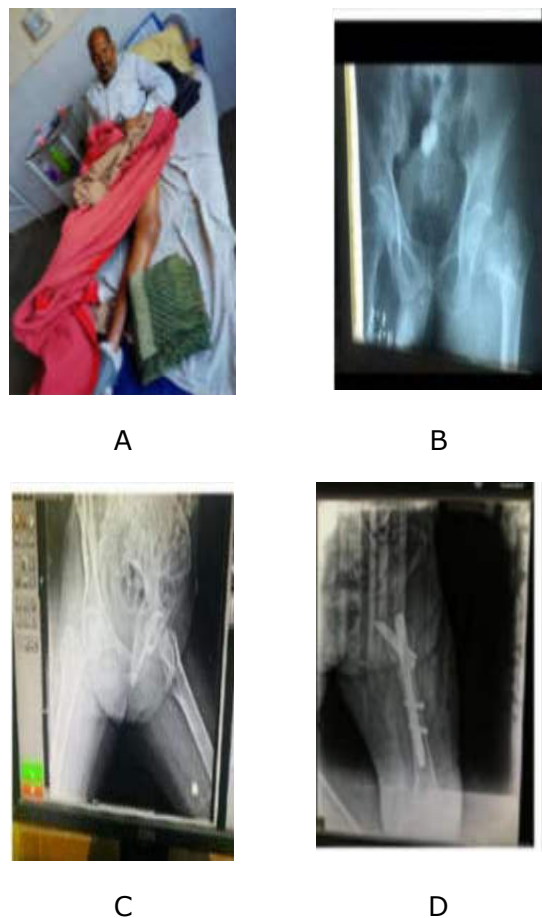


Figure-1, A, B, C, D Pre op and post op x-ray of TFN patient

A thorough pre-operative assessment like history, clinical & radiological examination and

routine investigations of the patient was done. Intra-venous antibiotics was given before the induction of anaesthesia and continued for 3 days postoperatively. Appropriate physiotherapy as tolerated by patient was started from first operative day, as soon as patient came out from anaesthesia. Partial weight bearing with the help of walker started, as tolerated by patients. Patients were followed up after 6, 10 and 14 weeks postoperatively. Full weight bearing was allowed after seeing bony union on X-ray. Bony union was assessed by radiographs of bilateral hip with pelvis-AP and Lateral views taken on 6-, 10- and 14-weeks. The results were assessed using Harris Hip Score. At the end of the study, both the groups were compared and analysed using descriptive statistical methods like the Pearson correlation, Chi square test and T-test.

type I, 28 (56.0%) had type II, 6 (12.0%) had type III and 3 (6.0%) had type IV fracture.

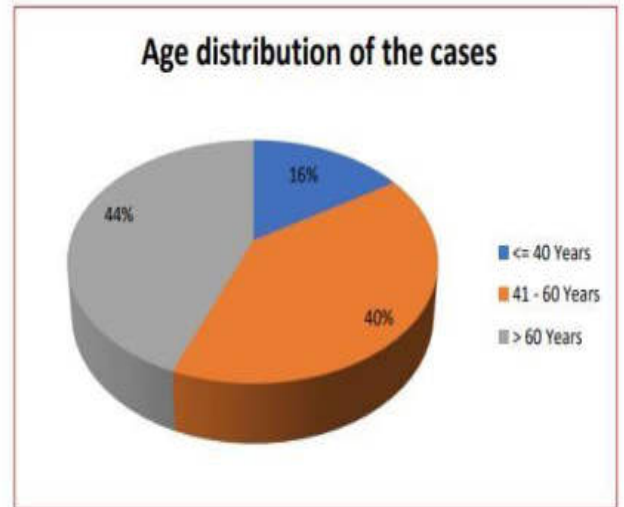


Figure 3: Age distribution of cases

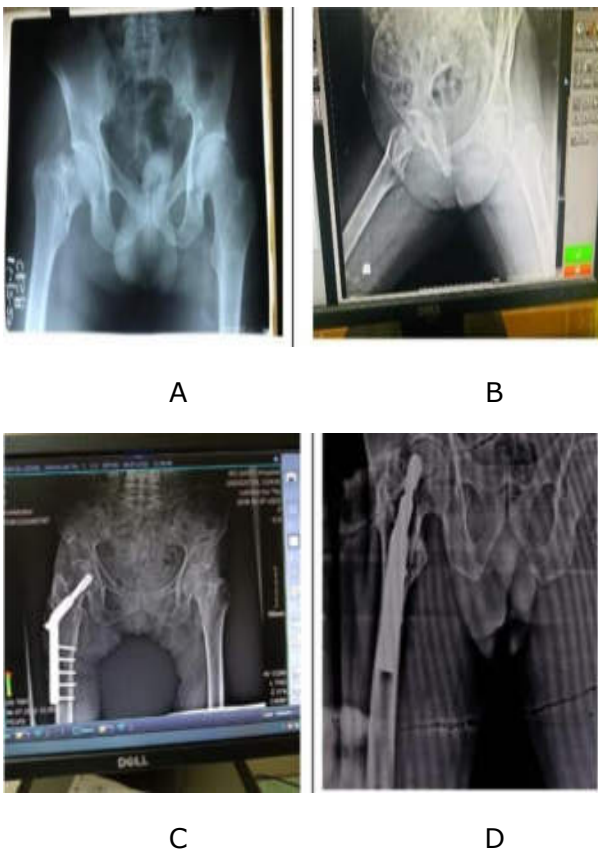


Figure 2- A, B, C, D Pre op and post op x-ray of DHS patient

Results

Fig 3 shows, in the present study, mean age of the cases was 57.98±16.68 years, minimum age was 20 years and maximum age was 85 years. Fig 4 shows, out of 50 cases, according to Boyd & Griffin classification 13 (26.0%) had

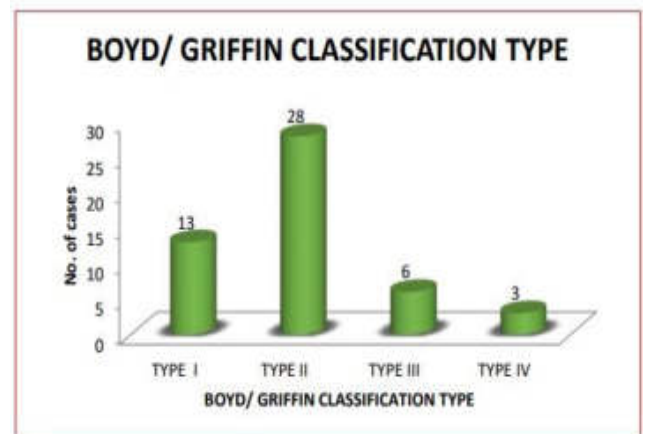


Figure 4: Boyd/ Griffin Classification of cases

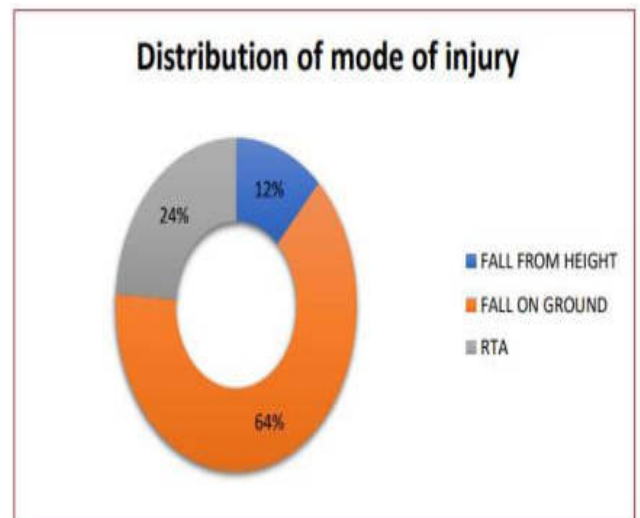


Figure 5 shows that out of 50 cases, majority of cases 32 (64.0%) fall on ground, 12 (24.0%) had RTA and 6 (12.0%) cases fall from height.

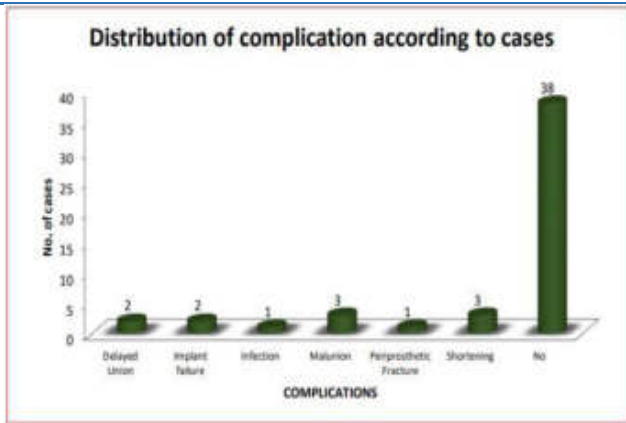


Figure 6 depicts that out of 50 cases 3(6%) had shortening, 3(6.0%) had malunion, 2(4.0%) cases had delayed union and implant failure respectively, 1(2.0%) cases had infection and periprosthetic fracture respectively and 38(76%) had no complications.

Table 1: Outcome distribution of the cases

Outcome	N	%
Poor	4	8.0
Fair	8	16.0
Good	13	26.0
Excellent	25	50.0
Total	50	100.0

Table 1 shows out of 50 cases, 25(50.0%) cases had excellent result, 13(26.0%) good, 8(16.0%) had fair result and 4(8.0%) had poor result.

Table 2: Association between outcome and study groups

Outcome	Group		Total
	DYNAMIC HIP SCREWS	TROCHANTERIC FEMORAL NAILING	
Poor	3 12.0%	1 4.0%	4 8.0%
Fair	6 24.0%	2 8.0%	8 16.0%
Good	7 28.0%	6 24.0%	13 26.0%
Excellent	9 36.0%	16 64.0%	25 50.0%
Total	25 100.0%	25 100.0%	50 100.0%

Chi-square= 5.03, p= 0.03

Table 2 shows that there was significant outcome difference between both study groups with $p < 0.05$. Dynamic group 9 (36.0%) had excellent outcome and trochanteric femoral group 16 (64.0%) had excellent outcome, in dynamic group 7 (28.0%) had good outcome and in trochanteric femoral group 6 (24.0.0%) had good outcome, in dynamic group 6

(24.0.0%) had fair outcome and in trochanteric femoral group 2 (8.0%) had fair outcome and in dynamic group 3 (12.0%) had poor outcome and in trochanteric femoral group 1 (4.0%) had poor outcome.

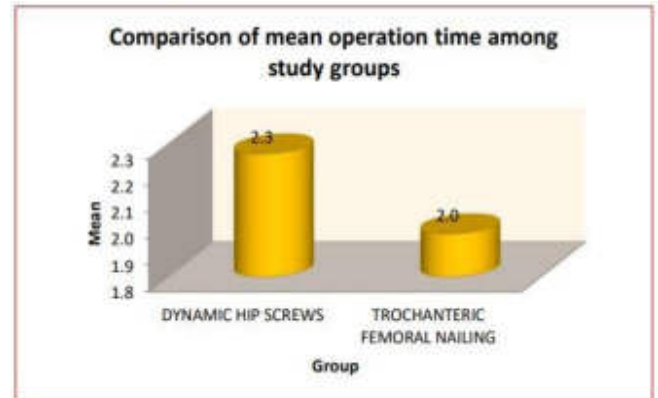


Figure 7 shows that, significant mean operative time difference was found between both study groups of the cases with $p > 0.05$. Hence in dynamic group mean operative time was 2.26 ± 0.44 hours and in trochanteric femoral nailing mean operative time was 1.96 ± 0.2 hours.

Table 3: Comparison of mean blood loss among study groups

Group		N	Mean	SD	t	p
BLOOD LOSS	DYNAMIC HIP SCREWS	25	270	43.3	6.041	0.000
	TROCHANTERIC FEMORAL NAILING	25	189.6	50.54		

Table 3 shows that, there was significant mean blood loss (in ml) difference between both study groups of the cases with $p < 0.05$. In dynamic group mean blood loss was 270 ± 46.3 ml and in trochanteric femoral nailing mean blood loss was 189.6 ± 50.54 ml.

Table 4: Comparison of mean Harris score comparisons between groups

Group		N	Mean	Std. Deviation	t	p
HARRIS H/P SCORE MAX SCORE -100 (3MONTHS - 14 weeks)	TROCHANTERIC FEMORAL NAILING	25	87.12	7.742	2.180	0.031
	DYNAMIC HIP SCREWS	25	81.76	9.497		

Table 4 shows that there was significant mean Harris score difference was found between both groups of the cases with $p < 0.05$. In dynamic group mean Harris score was 81.76 ± 9.49 and in trochanteric femoral nailing mean Harris score was 87.12 ± 7.74 .

Discussion

The study results reveal that, there was no significant age difference found between both study groups with $p > 0.05$. Hence both groups were comparable on the basis of age of the cases. Out of 50 cases 31 (62.0%) were males and 19 (38.0%) were females. There was no significant gender difference found between both study groups with $p > 0.05$. Hence both groups were comparable on the basis of gender of the cases.[8]

Out of 50 cases, according to Boyd & Griffin classification 13 (26.0%) had type I, 28 (56.0%) had type II, 6 (12.0%) had type III and 3 (6.0%) had type IV classification. In the present study out of 50 cases, majority were 32 (64.0%) fall on ground, 12 (24.0%) had RTA and 6 (12.0%) cases fall from height. In present study, out of 50 cases 26 (52.0%) cases had right side injury and 24 (48.0%) had left side injury. S. Mandal I (2019)[9] revealed that major trauma (road traffic accident) was the commonest aetiology (55%), whereas 45% fractures occurred due to accidental fall from height especially in elder population. According to complications, out of 50 cases 3 (6%) had shortening, 3 (6.0%) had malunion, 2 (4.0%) cases had delayed union and implant failure respectively, 1 (2.0%) case had infection and periprosthetic fracture respectively and 38 (76%) had no complications. Regarding complications, in case of incidences of various complications our study was statistically similar with the study of S.H.Bridle et al (1991)[10].

Present study there was significant mean operative time difference was found between both study groups of the cases with $p > 0.05$. Hence in dynamic group mean operative time was 2.26 ± 0.44 hours and in trochanteric femoral nailing mean operative time was 1.96 ± 0.2 hours. Subhadip Mandal et. al. (2015)[9] revealed that the mean \pm SD operative time was significantly longer in the group TFN (87.05 ± 17.36 min) than in the

group DHS (68.55 ± 14 min) ($P < 0.05$). In this series mean operative time was 10 minutes shorter with TFN (50.7 minutes) compared with DHS (60.4 minutes) that is comparable with the study of P. Bienkowski et. al. (2006)[11] In this series mean operative time was significantly longer in DHS group that is comparable with the study of H.M. Klinger et. al. (2005)[12].

In our study there was significant mean blood loss (in ml) difference was found between both study groups of the cases with $p < 0.05$. Mean blood loss during surgery was significantly lower in the TFN group. This observation was comparable with the study of J. Pajarinen et. al. (2005)[13] and Hu W et al (2006)[14]. There was significant outcome difference was found between both study groups with $p < 0.05$. Hence in both groups outcome of the cases was found similar. In dynamic group 9 (36.0%) had excellent outcome and in trochanteric femoral group 16 (64.0%) had excellent outcome, in dynamic group 7 (28.0%) had good outcome and in trochanteric femoral group 6 (24.0.0%) had good outcome, in dynamic group 6 (24.0.0%) had fair outcome and in trochanteric femoral group 2 (8.0%) had fair outcome and in dynamic group 3 (12.0%) had poor outcome and in trochanteric femoral group 1 (4.0%) had poor outcome. Subhadip Mandal et. al. (2019)[8] revealed that among TFN group regarding Harris Hip Score, at 10 weeks 75% of cases scored fair to good results and at 14 weeks 90% cases scored more than 70 and most of them were in excellent to good category. Two cases (8%) showed poor result. Results of our study are comparable to the other studies.

Conclusion

Surgical management of intertrochanteric fractures is the preferred treatment to avoid complications of prolonged immobilization. Dynamic Hip Screw (DHS) has been the gold standard. Intramedullary devices have biomechanical advantage as they are near to the mechanical axis of hip joint. Fifty patients with intertrochanteric fractures were treated with either DHS or Trochanteric Femoral Nail, 25 with DHS and 25 with TFN. Results were compared for average duration of surgery, blood loss, hospital stay and functional outcome according to Harris Hip score. The

duration of surgery, blood loss and hospital stay were significantly lower in TFN group. Our study indicates that TFN may be better choice when compared to DHS in unstable intertrochanteric fractures.

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