



A Comparative Study on the Results of Unstable Trochanteric Fractures of Femur Treated Primarily with Dynamic Hip Screw Plate vs Proximal Femoral Nail

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ABSTRACT: Unstable trochanteric fractures include posteromedial fragmentation, reverse oblique pattern, lateral wall fracture and subtrochanteric extension.¹ Unstable trochanteric fractures usually can be treated by anatomical reduction with the use of a sliding hip screw or cephalomedullary nail. DHS is cost-effective and user-friendly whereas PFN, though biomechanically superior, is a relatively new entrant.⁴ Thus this comparative study helped us to understand the management of unstable trochanteric fractures in terms of surgical technique and evaluate the functional outcomes after fixation with PFN and DHS.

The study was an observational longitudinal follow up comparative study. 50 adult patients of age group 40 to 80 years having unstable trochanteric fractures of femur treated with either DHS plate or PFN were included in the study. 27 such patients were operated with DHS whereas 23 patients were operated with PFN. Modified Harris hip score, duration of hospitalisation, presence or absence of abduction lurch and time to independent mobility were compared between the two groups during postoperative follow up.

Patients treated with PFN had better outcome than DHS in terms of shorter duration of hospitalisation, early mobilization in terms of early pain-free full weight bearing and better functional result on the basis of modified Harris hip score at final follow up. But, PFN fixation was associated with more abduction lurch compared to DHS.

Thus, PFN proved to be a better implant than DHS in the management of unstable trochanteric fractures of femur.

Keywords: Dynamic Hip Screw; Functional outcome; Harris hip score; Proximal Femoral Nail; Unstable trochanteric fractures.

I. INTRODUCTION

Petrochanteric fractures involve those occurring in the region extending from the extracapsular basilar neck area to the region along the lesser trochanter proximal to the start of the medullary canal of the femur.^{5, 9, 11} Unstable characteristics include posteromedial fragmentation, reverse oblique pattern, lateral wall fracture and subtrochanteric extension.¹ AO type 31-A2.2 to 31-A3.3 are classically known as unstable trochanteric fractures.²

Unstable trochanteric fractures usually can be treated by anatomical reduction with the use of a sliding hip screw or cephalomedullary nail.^{6, 10, 14} The most commonly used device is the Dynamic Hip Screw with side plate assemblies.⁷ The latest implant for management of trochanteric fractures is proximal femoral nail.³ The preferred type of device is controversial.²

Modified Harris hip score, duration of hospitalisation, presence or absence of abduction lurch and time to independent mobility were compared between patients operated with DHS and PFN during postoperative follow up.

II. MATERIALS AND METHODS

The study was an observational longitudinal follow up comparative study.

This study was carried out in a tertiary care hospital. The study was done from January 2020 to January 2021. Patients were recruited in the study from January 2020 to June 2020. As they were followed up for 6 months, my study extended upto January 2021.

After obtaining approval from our institute's scientific and ethical committee and getting informed consent form duly signed, 50 adult patients with unstable trochanteric fractures of femur were included in the study following the inclusion and exclusion criteria.



Inclusion criteria:

- 1) Age: 40 to 80 years
- 2) Sex: both sexes
- 3) All types of unstable trochanteric fractures of femur (31-A2.2 to 31-A3.3)

Exclusion criteria:

- 1) Previous surgery of the proximal femur
- 2) Pathological fractures other than osteoporosis
- 3) Ongoing chemotherapy or radiotherapy treatment due to malignancy
- 4) Polytrauma.
- 5) Patients having preexisting deformity or disability of either hip
- 6) Chronic osteomyelitis
- 7) Tuberculosis of hip
- 8) Patients having cognitive dysfunction
- 9) Patients having significant systemic comorbidities like CVA etc.

Based on a prospective comparative study of 2016 by Jonnes C et al⁸, taking difference of total blood loss as 86 ml between the groups, the required sample size was 72 at 5% level of significance and 80% power. SD I had arbitrarily

taken as 130. Z alpha= 1.96 and Z beta= 0.84. As per the previous records of the hospital, around 50 cases of unstable trochanteric fractures of femur could be taken under this study in the stipulated study period. We had hence taken 50 cases as total sample size. Initially, 61 cases were included in the study. But, 11 patients were lost to follow up. All 50 cases of unstable trochanteric fractures of femur were treated in the Department of Orthopaedics in a tertiary care hospital with either DHS plate or PFN based on individual surgeon's preference. 27 such patients were operated with DHS plate whereas 23 patients were operated with PFN. DHS with sliding plate and general principles of PFN were used in my study. Method of data collection was prospective. Prospectively, patient admitted in the period of January 2020 to June 2020 were included in the study. The patients were followed up for a period of 6 months at regular intervals, ie, at 3 months and 6 months after surgery.

On follow up, modified Harris hip score²¹ was calculated for all patients and the outcome was used for comparison between DHS and PFN operated groups. Duration of hospitalisation, presence or absence of abduction lurch and time to independent mobility were also compared between the two groups.

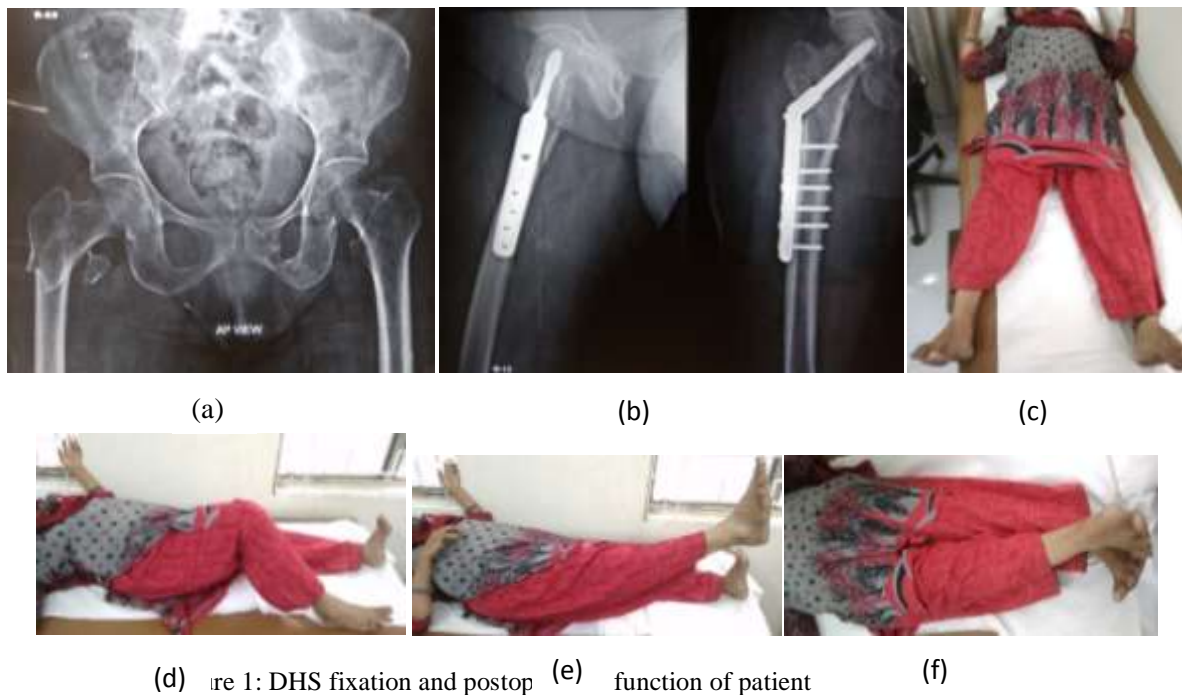


Figure 1: DHS fixation and postop (e) function of patient (f)

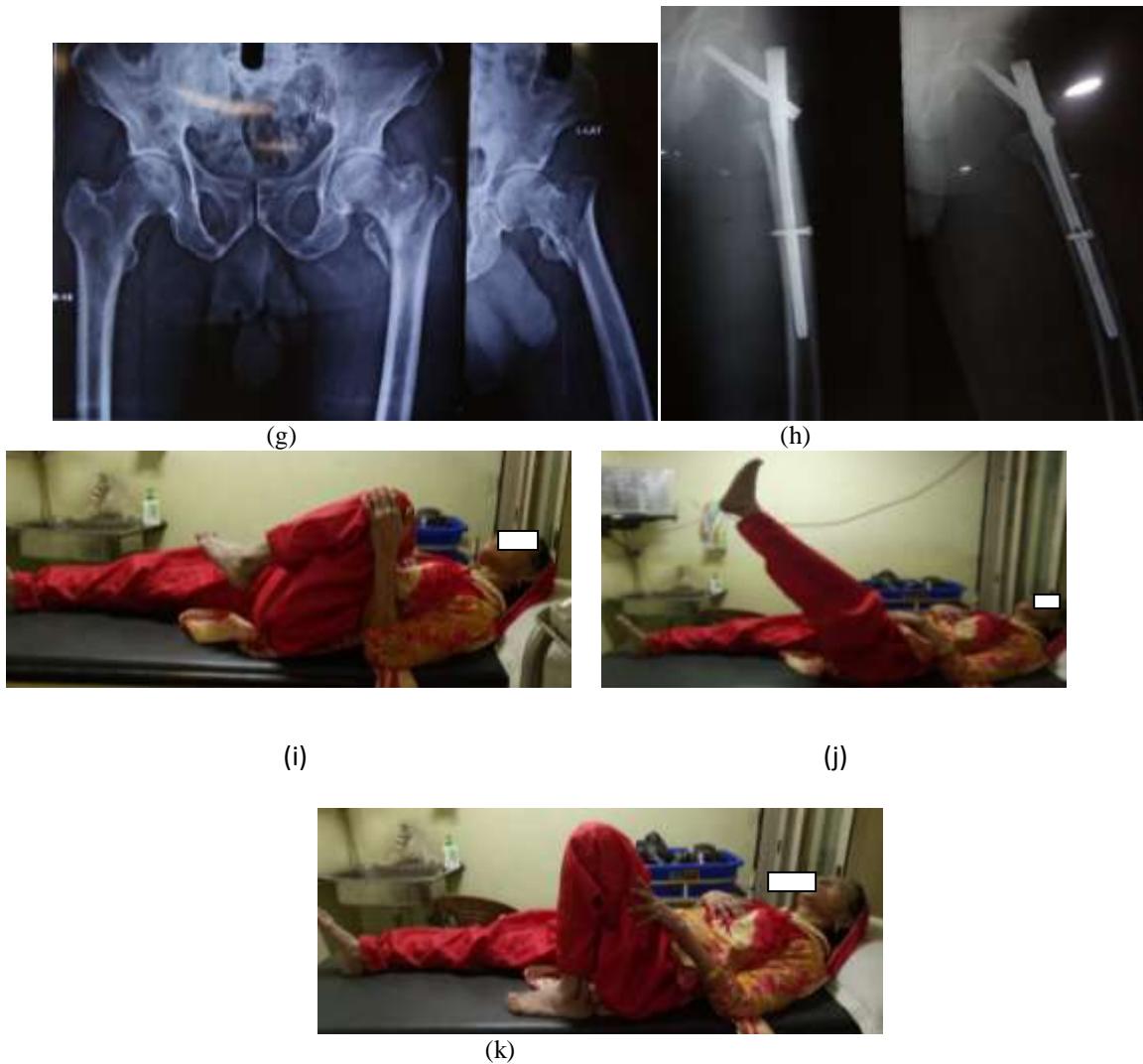


Figure 2: PFN fixation and postoperative outcome

Statistics: Categorical variables (Modified Harris hip score³⁰ and abduction lurch) were expressed as Number of patients and percentage of patients and compared across the groups using Pearson's Chi Square test for Independence of Attributes/ Fisher's Exact Test as appropriate. Continuous variables (average duration of hospital stay in days and time to independent mobility in

weeks) were expressed as Mean, Median and Standard Deviation and compared across the groups using Mann-Whitney U test. The statistical software SPSS version 20 had been used for the analysis. An alpha level of 5% had been taken, i.e. if any p value was less than 0.05 it had been considered as significant.

III. RESULTS

Table 1: Abduction lurch in 3 months and 6 months postop

		GROUP		Total	p Value	Significance
		DHS	PFN			
ABDUCTION LURCH IN 3 MONTHS POSTOP	ABSENT	13(48.15)	6(26.09)	19(38)	0.109	Not Significant
	PRESENT	14(51.85)	17(73.91)	31(62)		
Total		27(100)	23(100)	50(100)		
ABDUCTION LURCH IN 6 MONTHS POSTOP	ABSENT	21(77.78)	13(56.52)	34(68)	0.108	Not Significant
	PRESENT	6(22.22)	10(43.48)	16(32)		
Total		27(100)	23(100)	50(100)		



GROUP		FULL WEIGHT BEARING (WEEKS)	DURATION OF HOSPITALISATION (DAYS)	MODIFIED HARRIS HIP SCORE ²¹ AT 3 MONTHS POSTOP	MODIFIED HARRIS HIP SCORE ²¹ AT 6 MONTHS POSTOP
DHS	Mean	13.33	7.41	72.37	81.41
	Median	14.00	6.00	72.00	79.00
	SD	3.17	3.61	8.23	8.79
PFN	Mean	9.17	6.35	76.35	84.09
	Median	8.00	5.00	79.00	85.00
	SD	2.85	3.32	8.56	8.44
p Value		<0.001	0.047	0.092	0.250
Significance		Significant	Significant	Not Significant	Not Significant

Table 2: Full weight bearing, Duration of hospitalization and Modified Harris Hip Score²¹ at 3 months and 6 months postop

IV. DISCUSSION

Surgical stabilization of trochanteric fractures of femur is its traditional remedy for several decades now.^{12, 15, 16} Besides the extramedullary fixation devices, newer intramedullary devices have come into existence.¹¹ Both intramedullary and extramedullary devices have got positive and negative features.^{13,19} The idea of the present dissertation was to do a comparative study of the two methods of treatment in unstable trochanteric fractures of femur.

50 adult patients aged between 40 to 80 years with unstable trochanteric fractures of femur were included in the study following inclusion and exclusion criteria. The study was done from January 2020 to January 2021. Patients were recruited in the study from January 2020 to June 2021 and they were followed up for 6 months at regular interval, ie, at 3 months and at 6 months. 27 patients were operated with DHS and 23 patients were operated with PFN and modified Harris hip score was compared between the two groups during postoperative follow up. Duration of hospitalisation, presence or absence of abduction lurch and time to independent mobility were also compared between the two groups.

In this study an attempt was made to survey, evaluate, document and quantify our success in the management of unstable trochanteric fractures of femur by using Dynamic Hip Screw (DHS) and Proximal Femoral Nail (PFN) implants and compare the results in these two groups with the results of three other studies by **J. Pajarinen et al¹⁷ in 2005**, **Z. Y. Huang et al¹⁸ in 2010** and **Raman VP et al²⁰ in 2016**.

DURATION OF HOSPITALISATION:

In a study of 108 cases by **J. Pajarinen et al¹⁷**, the patients were discharged at a mean of six days (1 to 15) post-operatively in both the groups (DHS and PFN).

In a study of 96 cases by **Z. Y. Huang et al¹⁸**, the mean duration of stay in days in DHS group was 11 ± 4.3 and in PFN group was 12 ± 5.1 days.

In a study of 60 cases by **Raman VP et al²⁰**, there was no significant difference in average duration of hospital stay between the two groups.

In our study, the mean duration of stay in days in DHS group was 7.41 days and in PFN group was 6.35 days.

STARTING OF PAIN-FREE FULL WEIGHT BEARING:

In a study of 108 cases by **J. Pajarinen et al¹⁷**, post-operative mobilisation was successful for both DHS and PFN groups equally. Moreover, fracture healing was not interfered by lack of compression in the PFN group.

In a study of 96 cases by **Z. Y. Huang et al¹⁸**, there is no mention of starting of full weight bearing.

In a study of 60 cases by **Raman VP et al²⁰**, the mean time for full weight bearing was 14.42 weeks for DHS and 10.75 weeks for PFN.

In our study, the mean time for pain-free full weight bearing was 13.33 weeks for DHS and 9.17 weeks for PFN.

FUNCTIONAL RESULTS (ACCORDING TO MODIFIED HARRIS HIP SCORE²¹):

In a study of 108 cases by **J. Pajarinen et al¹⁷**, PFN operated patients started full weight bearing at 4 months, earlier than DHS operated patients. PFN favoured better functional outcome in elderly



population. Reason might be that DHS caused significantly greater fracture impaction with femoral neck shortening.

In a study of 96 cases by **Z. Y. Huang et al**¹⁸, DHS and PFN are equally effective in the treatment of trochanteric fractures.

In a study of 60 cases by **Raman VP et al**²⁰, in patients treated with DHS 16 cases (53.3%) had excellent results, 8 cases (26.7%) had good results, 5 cases (16.7%) had fair results and 1 case (3.3%) had poor results. While in patients with PFN group, 15 cases (50%) had excellent results, 13 cases (43.3%) had good results, 2 cases (6.67%) had fair results and no patients with poor results.

In our study, in DHS group, 8 cases (29.63%) had excellent results, 5 cases (18.52%) had good results, 10 cases (37.04%) had fair results and 4 cases (14.81%) had poor results. While in PFN group, 9 cases (39.13%) had excellent results, 8 cases (34.78%) had good results, 5 cases (21.74%) had fair results and 1 case (4.35%) had poor result.

In our study, in DHS group, 14 (51.85%) patients had **abduction lurch at 3 months postop** and in PFN group, 17 (73.91%) patients had abduction lurch at 3 months postop.

In DHS group, 6 (22.22%) patients had **abduction lurch at 6 months postop** whereas in PFN group, 10 (43.48%) patients had abduction lurch at 6 months postop.

Mean modified Harris hip score²¹ at 3 months postop was higher in PFN group (mean score-76.35) compared to DHS group (mean score-72.37).

Mean modified Harris hip score²¹ at 6 months postop was higher in PFN group (mean score-84.09) compared to DHS group (mean score-81.41).

In the DHS group, 1 patient developed lag screw cut out and 9 patients developed shortening of affected lower limb. None of these happened in the PFN group.

V. CONCLUSIONS

In our study, we found that patients treated with Proximal Femoral Nail had better outcome than Dynamic Hip Screw in terms of shorter duration of hospitalisation, early mobilization in terms of early pain-free full weight bearing and better functional result on the basis of modified Harris hip score²¹ at final follow up.

But, PFN fixation was associated with more abduction lurch at 3 months and 6 months after surgery compared to DHS.

Thus, from our study, Proximal Femoral Nail proved to be a better implant and had an edge

over Dynamic Hip Screw in the management of unstable trochanteric fractures of femur.

However, it was a small study to conclude anything definitely.

VI. LIMITATIONS

As it was a longitudinal follow up study, we had followed up our patients for only 6 months. So, short duration of follow up was a limitation of our study.

Less number of patients in the study had limited the final result.

We did not consider the time gap between day of injury and day of surgery in our observations and it might have affected the outcome analysis of our study.

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