

Functional Outcome of Subtrochanteric Fractures Treated With Proximal Femoral Nail Vs Dynamic Condylar Screw

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Abstract:

Introduction- Subtrochanteric fractures are included among those injuries caused by severe high energy trauma in the younger population, and also caused by trivial fall in osteoporotic bones in the elderly population. The Subtrochanteric fractures account for 10-30 % of all hip fractures to be treated and thus complication rate is high as 20-40%. The Subtrochanteric region lies between the inferior borders of Lesser trochanter extending distantly 5 cm to the junction of proximal and middle third of the femur. The main point of occurrence of these fracture is the junction between the trabecular bone and cortical bone. There are a lot of treatment modalities available for treating the sub trochanteric fractures. In this study two of them will be focused namely Dynamic condylar screw (DCS) and proximal femur nail (PFN)

Aims and objectives- Aim of the study is to compare functional outcome of Proximal Femoral Nailing (PFN) and Dynamic Condylar Screw (DCS) in treating subtrochanteric fractures

Materials and methods-A randomized control study was done in 30 patients treated for subtrochanteric fractures with PFN and DCS done in GMCH ,Guwahati during the period between April 2021 to April 2022 and followed up for 1 year of which 15 were treated with PFN and 15 with DCS .Functional outcome were followed up using HARRIS HIP SCORE and radiological outcome using serial x-rays .

Results-An average age group 51 to 60years ,mean(40%) were commonly affected with this type of fracture with males more affected then females . Patients treated with PFN shows improved functional outcome then those treated with DCS. Mean union rate is also high for PFN.

Conclusions-Cases treated with PFN have shown early rehabilitation , less blood loss, less operative time, early union when compared with those treated with DCS as per observation of our study .With our study PFN have given us encouraging results over the DCS.

Key words – PFN(proximal femoral nail),DCS(dynamic condylar screw),subtrochanteric fracture femur.

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I. Introduction

Subtrochanteric fractures are included among those injuries caused by severe high energy trauma in the younger population, and also caused by trivial fall in osteoporotic bones in the elderly population.¹ The Subtrochanteric fractures account for 10-30 % of all hip fractures to be treated and thus complication rate is high as 20-40%.² The Subtrochanteric region lies between the inferior borders of Lesser trochanter extending distantly 5 cm to the junction of proximal and middle third of the femur.³ The main point of occurrence of these fracture is the junction between the trabecular bone and cortical bone. This region gets exposed to high pressure while performing day to day activities.⁴ Therefore it is difficult to treat those kind of fractures easily.⁵ In order to avoid major complications such as mortality, a surgical treatment regime is required to be followed.⁶ The long term immobilization of the leg might result in serious complications like thrombophlebitis, urinary and lung infections, deep veins thrombosis and ulcers.⁷ There are a lot of treatment modalities available for treating the sub trochanteric fractures. In this study two of them will be focused namely Dynamic condylar screw (DCS) and proximal femur nail (PFN).

II. Materials And Method

Sources of data – The present study is conducted ,in the Department of Orthopaedics , Gauhati Medical College and Hospital

Study period - This prospective study is conducted in The Department of Orthopaedics , Gauhati Medical College and Hospital, Guwahati for a period of one year from April 2021 to April 2022.

Methods of collection of data –

• **Inclusion criteria –**

- ✓ All type of the Subtrochanteric fractures attending at Gauhati Medical College and Hospital in the emergency and outpatient department (opd)
- ✓ Age > 30 years and above
- ✓ Sex : both male and female

• **Exclusion criteria -**

- ✓ Pathological subtrochanteric fractures
- ✓ Compound subtrochanteric fractures
- ✓ Patients who are medically unfit to undergo surgery

Sample size – A total of 30 patients undergoing the above cited procedure, randomized into 2 groups of 15 each of PFN and DCS.

Ethical clearance -The Institutional Ethical clearance obtained prior to the initiation of study.

Study type - The present study will be a prospective study.

Methods of measurement of outcome -Each patient is reviewed at a regular interval of 2 week, 6 week, 3 months and 6 months interval depending on the signs and symptoms and compliance of the patient upto 1 year. Patients were assessed by using HARRIS HIP SCORE of clinical outcome and radiologically for sign of healing or any complication .

Preoperative evaluation :-

Patients are selected after proper consent and assesment done.X-ray pelvis with bilateral hip including proximal femur is taken.Routine blood investigations were done.

Surgical technique:-

PFN:-

Patients were placed in traction table .

Closed reduction tried under image intensifier.

If closed reduction is not possible ,open reduction with lateral incision is done .

DCS:-

Patients were placed in traction table

Longitudinal lateral approach was used



Fig :DCS INSTRUMENT



FIG: PFN INSTRUMENT

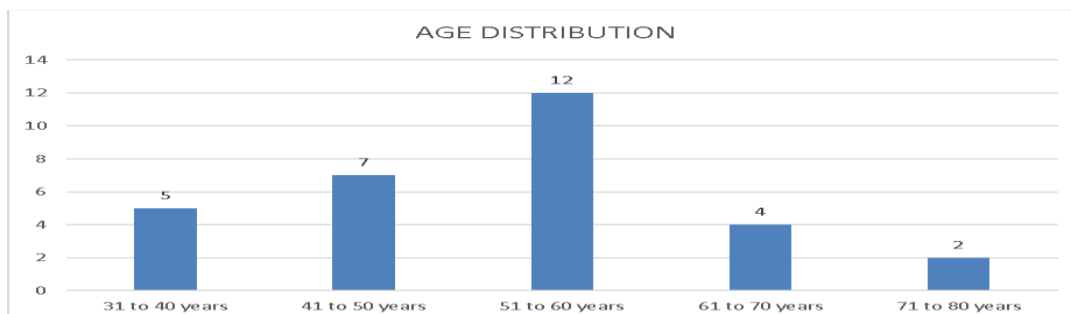
III. Results

In our study a total of 30 cases was taken and was treated for a subtrochanteric femur fractures .the results of the study is mentioned below :

Age distribution-

In our study out of 30 patients, 5 were in age group of 31-40 years,7 were 41-50 years, 12 were 51-60 years, 4 were 61-70 years and 2 were 71to 80 years and again they were divided into PFN and DCS group.

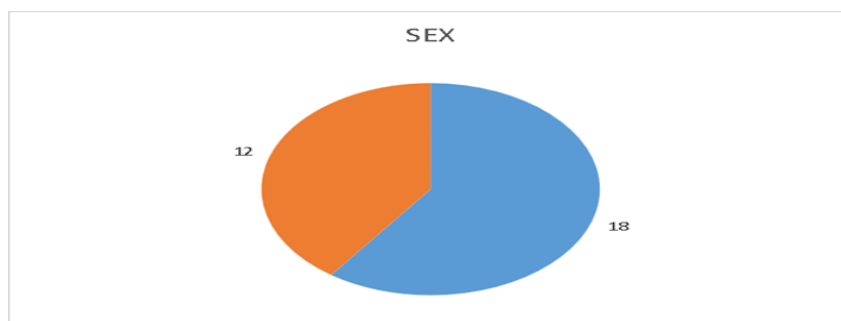
AGE	Frequency	Percent	Valid Percent	Cumulative Percent
31 to 40 years	5	16.7	16.7	16.7
41 to 50 years	7	23.3	23.3	40.0
51 to 60 years	12	40.0	40.0	80.0
61 to 70 years	4	13.3	13.3	93.3
71 to 80 years	2	6.7	6.7	100.0
Total	30	100.0	100.0	



Sex distribution:-

In our study out of 30 patients 18 were male and 12 were female

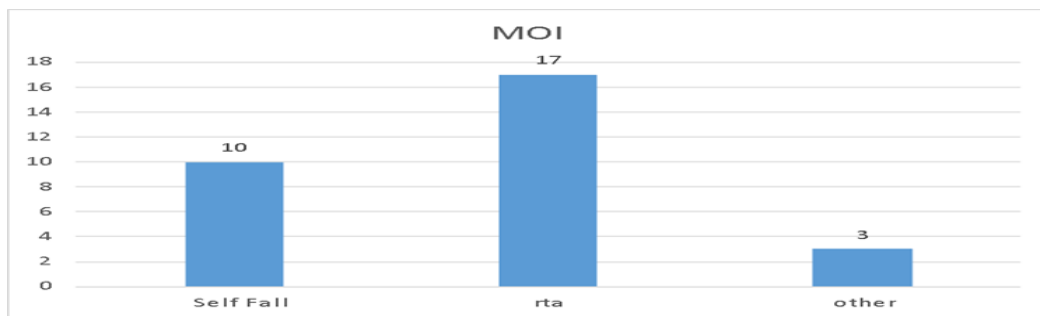
SEX		Frequency	Percent	Valid Percent	Cumulative Percent
	M	18	60.0	60.0	60.0
	F	12	40.0	40.0	100.0
	Total	30	100.0	100.0	



Mode of Injury:-

In our study out of 30 patients 10 patient were having injury following self fall, 17 were having injury following RTA and 3 patients were having mechanism of injury other than above two.

MOI		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Self Fall	10	33.3	33.3	33.3
	RTA	17	56.7	56.7	90.0
	other	3	10.0	10.0	100.0
	Total	30	100.0	100.0	

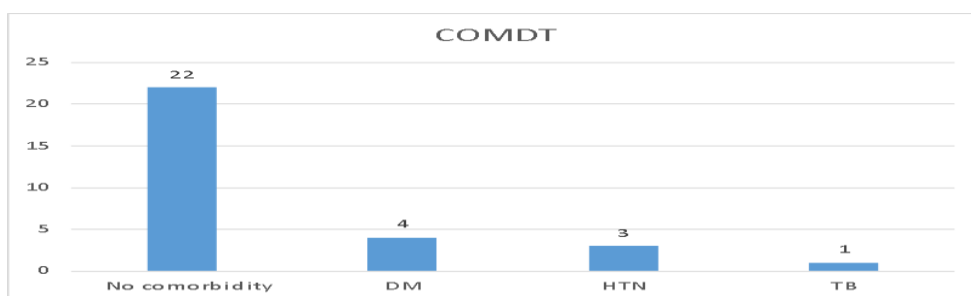


P value is not significant when compared with different groups.

Comorbidity:-

In our study out of total 30 patients, 4 were having diabetes, 3 patients were having hypertension, 1 patient was having past treatment history for tuberculosis and completely treated and 22 patients did not have any abnormalities

COMDT					
		Frequency	Percent	Valid Percent	Cumulative Percent
	No comorbidity	22	73.3	73.3	73.3
	DM	4	13.3	13.3	86.7
	HTN	3	10.0	10.0	96.7
	TB	1	3.3	3.3	100.0
	Total	30	100.0	100.0	

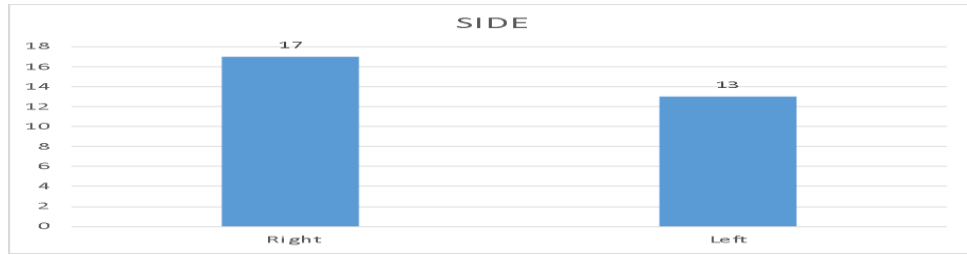


P value is not significant when comorbidities were compared between groups

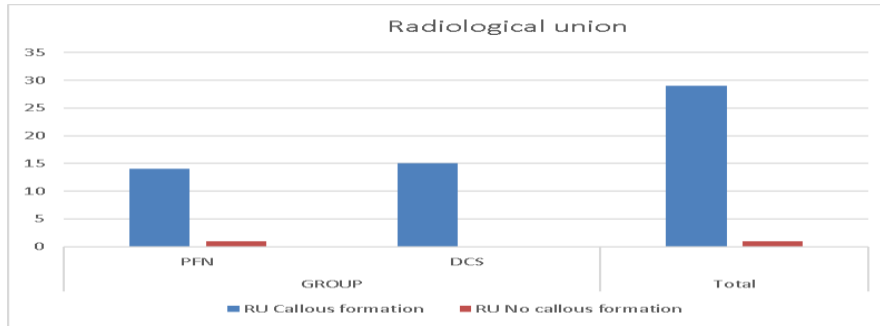
Side:-

In our study of 30 patients, 17 had fracture over the right side and 13 on left side

SIDE					
		Freque ncy	Perc ent	Valid Percent	Cumula tive Percent
Val id	Right	17	56.7	56.7	56.7
	Left	13	43.3	43.3	100.0
	Total	30	100.0	100.0	



Radiological union:-

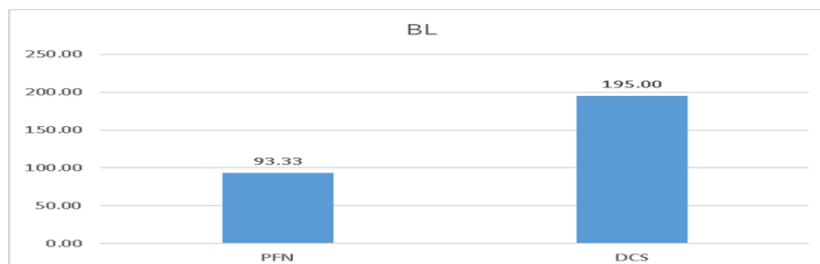


RU					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Callous formation	29	96.7	96.7	96.7
	No callous formation	1	3.3	3.3	100.0
	Total	30	100.0	100.0	

P value was not significant when radiological union was compared between the groups.

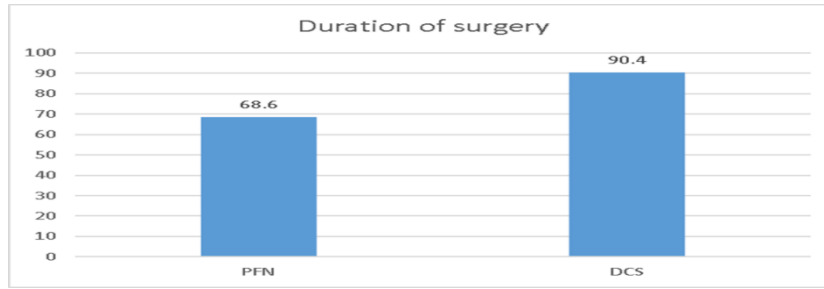
Blood loss-

Mean Blood loss amongst PFN group was found to 93.33 ml and DCS 195 ml. P value is significant when compared between groups



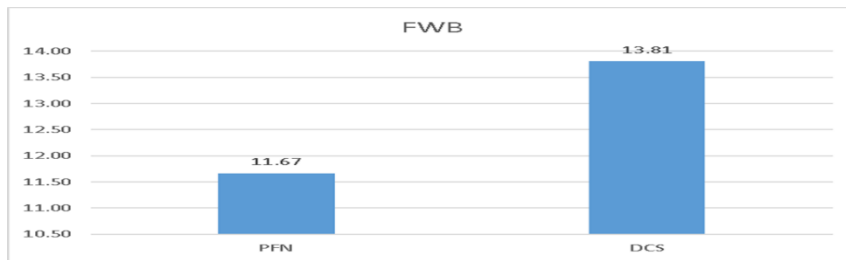
Operative time-

Mean operative time was 68.6 min for PFN group and (0.4 min for DCS. P value is significant when compared.



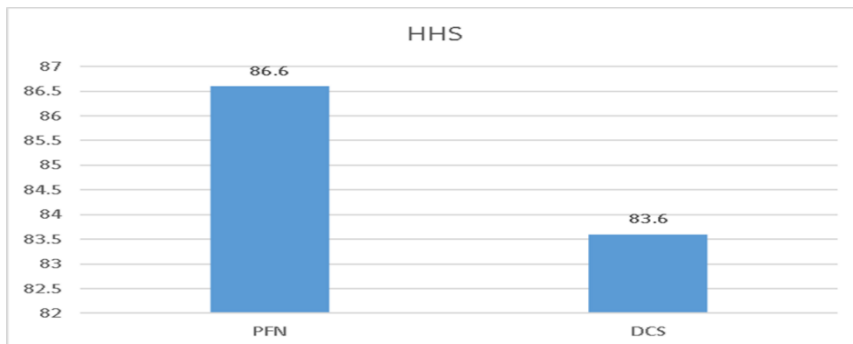
Full weight bearing-

Mean time of weight bearing for PFN is 11.67 weeks and DCS is 13.81 weeks. P value came out to be significant.



Harris hip score-

HHS of PFN group was 86.6 and DCS was 83.6. It is not significant when compared between groups.

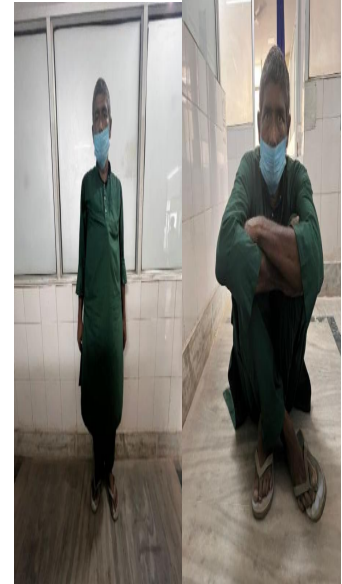


CASE ILLUSTRATIONS:-

**PFN
PRE OPERATIVE POST OPERATIVE**



14 WEEKS POST OPERATIVE CLINICAL PICTURE



DCS

Preoperative

Postoperative



12 weeks

22 weeks

clinical picture



IV. Complication

2 patients with DCS and 1 patient with PFN showed superficial infection. Out of the 3 patients, 2 were diabetic. The infections were controlled with intravenous antibiotics and regular wound dressings. 2 patients out of 30 patients had UTI which was treated with proper antibiotics and controlled in due course of time.

Complications related to implant:-

PFN group:-

1 patient among this group had screw backout, however follow-up x-rays showed signs of union. We had difficulty in placing the anti rotation screw in 2 cases but out of these 2 patients only one showed delay in radiological union and other one was united in due course of time. Only one patient with delay in radiological union showed varus collapse but patient refused any further surgical intervention.



DCS group:-

1 patient among the DCS group had varus malunion and leads to delayed weight bearing

V. Discussion

Proximal femur fractures are very demanding and failures are commonly associated with management. Failure in the management of Sub trochanteric fracture femur are mainly due to: fracture biomechanics, multiple deforming forces leading to high stress concentration around the subtrochanteric area which leads to increased complication rates after surgical management⁹.

Road traffic accident is the most common mode of injury amongst all the patients in our study (56%). It was found that closed manipulation of these fractures are associated with difficulties in attaining and maintaining the reduction. These challenges are overcome by surgical means. Thus, the surgical line of management is preferred in the management of these fractures.¹⁰

Various modalities of treatments are available which include cephalomedullary nailing, dynamic condylar screw, proximal femoral locking plate and reconstruction nail. In spite of having many implant options in management of adult subtrochanteric femur fractures, there is an increased trend in the use of intramedullary devices. Use of intramedullary devices are more challenging than what was expected of a closed nailing technique due to the technical fallacies associated with these devices and troublesome biomechanics of subtrochanteric fracture.¹¹

The ultimate goal of the treatment is early mobilization of the patients preventing the complications of fracture disease. Our study was conducted in GMCH, Guwahati. 30 consecutive patients of Subtrochanteric fractures were treated with PFN and DCS in equal numbers by randomizing the patients through randomization charts.

Patients were followed at frequent interval upto 6 months and they were assessed in terms of clinical, functional and radiological outcome. The results were analyzed and observations of our study are as follows,

1. Age: Most of patients in our study were in the age of 51-60 years of age, with mean age of 52.00.
- Gender: In PFN group there were 8 male and 7 female patients. In DCS, 10 male and 5 female patients.
2. Mode of injury: Road traffic accident was most common mode of injury. 9 in PFN group and 8 in DCS
3. Patients were operated within 7.3 days in PFN group and 6.9 days in DCS group on an average
4. Mean operating time in PFN was 68.60 minutes and in DCS was 90.40 minutes.
5. Mean lag screw was 85 mm both in PFN and in DCS group. Mean antirotation screw size was 75mm in PFN.
6. Mean hospital stay was 8.4 days in DCS and in PFN was 7.4 days.
7. Patients treated with PFN were allowed to full weight bearing on an average of 11.67 weeks and patients treated with DCS were allowed full weight bearing on an average of 13.81 weeks.
8. On basis of Harris Hip Score the functional outcome of all patients were assessed: In PFN group we had 3 excellent results, 12 good results and in the DCS group we had 2 excellent results, 9 good results, 4 fair results.

9. Complications: 2 patients in PFN group, 1 patient in DCS group had superficial wound infection. 1 patient in PFN group and 2 in DCS group had persistent thigh pain. 1 each patients had varus collapse in DCS and PFN group. In 2 patients of the PFN group we had difficulty in placing anti-rotation screw of which one patient had delay in radiological union.

COMPARING THE RESULTS WITH OTHER STUDIES:

AGE DISTRIBUTION:-

In our study of total 30 patients, 5 were 31 to 40 years, 7 were between 41 to 50 years, 12 were between 51 to 60 yrs and 4 were between 61 to 70 yrs, 2 were between 71 to 80 years of age and again they were divided into two groups one belonging to PFN group and other belonging to DCS group. Most of patients in our study were in the age of 51 to 60 years of age, with mean age of 52.00 years. Both the studies concluded no significant difference in both group in terms of p value and our result were consistent with both of them.

STUDY	OVERALL	PFN	DCS
AkshayBhimrao Fuse et al ¹¹	-	52 yrs	53 yrs
Virupaksha B Kachewar et al ¹²	58.23	-	-
In our study	52.00	51.37	52.65

GENDER RATIO:-

In our study out of total 30 patients 18 were male and 12 were female and this result was consistent with the above two studies.

MECHANISM OF INJURY:-

In our study out of 30 patients 17 patients were having injury following RTA, 10 were having injury following self fall and 3 patients from other causes.. RTA was the predominant cause in both the Akshay Bhimrao Fuse et al and Virupaksha B Kachewar et al and it is consistent with our study. All the studies concluded no significant difference in both group in terms of p value and our result were consistent with above studies .

OPERATING TIME:-

STUDY	PFN	DCS	P value
AkshayBhimrao Fuse et al	-	-	0.019
Virupaksha B Kachewar et al	66	92.30	<0.05
SidharthaNayak et al ¹³	66.35	95.37	<0.005
In our study	68.6	90.4	.00

All the studies concluded no significant difference in both group in terms of p value and our result were consistent with above studies .

BLOOD LOSS DURING SURGERY:-

In our study, results showed significant difference in blood loss during surgery in two groups which were consistent with Virupaksha B Kachewar et al.

UNION FOLLOWING OPERATION:-

In our study we have taken the time of full weight bearing to be the time of union and it will be compared with different studies In our study results showed significant difference in union time in two groups which were consistent with both the study.

HARRIS HIP SCORE:-

There was significant difference between HHS of two groups in contrast to our study where no significant difference was found in HHS between the 2 groups.

VI. Conclusion

There was no statistically significant difference between patients operated with PFN and DCS in terms of radiological union, varus collapse and functional outcome at six months follow up, which is consistent with study by Akshay Bhimrao Fuse et al, Virupaksha B Kachewar et al, Sidhartha Nayak et al.

Statistically significant differences were noted in patients operated with Proximal Femoral Nail with ‘p’ values less than 0.05 in terms of duration of surgery, blood loss during surgery and time taken to partial weight bearing and full wt. bearing.

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