



Original Research Article

Comparative study of the clinical and radiological outcome of subtrochanteric fracture femur fixed by dynamic condylar screw (DCS) and long proximal femur nail (PFN)

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ABSTRACT

Background: Subtrochanteric fractures are included among those injuries caused by severe high energy trauma in the younger population. However, in the older population, this particular hip injury is caused by trivial fall and osteoporotic bones in the elderly population. It is difficult to treat these kinds of fractures easily. In order to avoid major complication such as mortality, the early surgical treatment regime is required to be followed.

Aim: To compare and study the clinical and radiological outcome of subtrochanteric fracture femur fixed by Dynamic Condylar Screw (DCS) and Long Proximal Femur Nail (PFN)

Materials and Methods: Total of 30 patients was included in the study. Simple randomization technique was employed to categorized patients for either PFN treatment or DCS treatment. Fifteen patients out of 30 were treated using PFN, and the remaining 15 were treated using DCS using close reduction. The study period was from July 2017 to June 2019. All the patients with subtrochanteric femur fractures within two weeks of injury were included for the study. Patients' follow-up was done at 6-weeks, 3-months, and 6 months.

Results: The highest number of patients, i.e. 40%, was aged between 51 and 60 years with the mean age of 58.23 ± 1.26 years. The number of male patients (66.66%) was higher as compared to female patients. The mode of treatment for 50% of patients was PFN while it was DCS for the remaining 50% of the patients. The highest number of patients, i.e., 50% had Type III femur fracture. The patients treated using PFN showed improved functional outcome as compared to the patients treated using DCS. The patients were able to bear full weight within five weeks of surgery. The mean union time for patients treated with PFN was 16 weeks, while the mean union time in patients treated with DCS was 19 weeks. Also, the mean Harris Hip Score for patients treated with PFN was 90 and for the patients treated with DCS was 85.

Conclusion: In light of the above results and literature, it was clear that PFN was a better surgical intervention as compared to DCS. It required a shorter operation duration and rehabilitation time. The patients treated with PFN showed improved functional outcomes as compared to the patients treated with DCS.

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1. Introduction

Subtrochanteric fractures are included among those injuries caused by severe high energy trauma in the younger population. However, in the older population, this particular

hip injury is caused by trivial fall and osteoporotic bones in the elderly population¹ The subtrochanteric fractures account for 10%-30% of all the hip fractures² They are the most typical type of fractures to be treated, and thus the complication rate is as high as 20%-40%.³

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The subtrochanteric region lies below the inferior border of lesser trochanter extending distally 5 cm² to the junction of proximal and middle third of the femur⁴. The main point of occurrence of these fractures is the junction between the trabecular bone and cortical bone. This region gets exposed to high pressure while performing day-to-day activities.⁵

Therefore, it is difficult to treat these kinds of fractures easily. In order to avoid major complication such as mortality, the early surgical treatment regime is required to be followed⁶. The long-term immobilization of the leg might result in serious complications like thrombophlebitis, urinary and lung infections, deep vein thrombosis and ulcers⁷. There are a lot of treatment modalities available for treating the subtrochanteric fracture⁸. Still, accurate treatment measures are debatable. In this study, two of them will be focused, namely, Dynamic Condylar Screw (DCS) and Proximal Femur Nail (PFN).

2. Aim

To compare and study the clinical and radiological outcome of subtrochanteric fracture femur fixed by DCS and Long PFN.

3. Materials and Methods

Total of 30 patients was included in the study. Simple randomization technique was employed to categorized patients for either PFN treatment or DCS treatment. Fifteen patients out of 30 were treated using PFN, and the remaining 15 were treated using DCS using close reduction. The study period was from July 2017 to June 2019. All the patients with subtrochanteric femur fractures within two weeks of injury were included for the study. Patients' follow-up was done at 6-weeks, 3-months, and 6 months.

3.1. Inclusion criteria

1. Patients admitted for the treatment of subtrochanteric fractures.
2. Skeletally mature patients.
3. Patients admitted to the hospital within two weeks of the injury.

3.2. Exclusion criteria

1. Patients with pathological subtrochanteric fractures.
2. Patients having open fractures.
3. Patients admitted to the hospital after 3 weeks of the injury.
4. Patients having systematic diseases and their surgery was postponed.

4. Results

Total of 30 patients was taken for the study and was treated for a subtrochanteric femur fracture. The following results

were obtained:

The above table shows that the highest number of patients, i.e. 40% was aged between 51 and 60 years. The mean age for the study was also identified to be 58.23±1.26 years.

The above table showed that the number of male patients was much higher as compared to female patients. There were 66.66% males in the study.

It was evident from the above table that the mode of treatment for 50% patients was PFN while it was DCS for the remaining 50% of the patients.

The above table depicted that according to the Seinsheimer's classification, the highest number of the patients, i.e., 50%, had Type III femur fracture.

As per the above table, there was no statistically significant difference ($p>0.05$) in the bone material density of the specimens of both the groups. Further, the average bending moment of the implant in the DCS group was approx 50% higher than the PFN group, thus showing a statistically significant difference between the two groups ($p<0.05$). Similarly, there was a statistically significant difference in mean numbers of cycle sustained between the PFN and DCS group ($p<0.05$). It was significantly higher for PFN as compared to DCS group.

As per the above table, it has been identified that the patients treated using PFN showed significantly improved functional outcome as compared to the patients treated using DCS.

From the above table, it was identified that the patients were able to bear full weight within 6 weeks of surgery. However, among patients treated with DCS were able to bear weight within 12 weeks post-surgery.

As per table 8, there was a statistically significant difference in the intraoperative parameters between PFN and DCS groups ($p<0.05$). PFN group showed better results as compared to the DCS group.

As per table 9, there was a statistically significant difference in the postoperative parameters between PFN and DCS groups ($p<0.05$). PFN group showed better results as compared to the DCS group. The mean union time for patients treated with PFN was 16 weeks, while the mean union time in patients treated with DCS was 19 weeks.

Also, the mean Harris Hip Score for patients treated with PFN was 90 and for the patients treated with DCS was 85, with $p<0.05$, showing a significant difference between them. Harris Hip Score for patients treated with PFN was significantly higher as compared to the Harris Hip Score for patients treated with DCS.

5. Discussion

It was found in the current study that the most common age group of patients was 51-60 years and above. On the other hand, as per the study of Chaturvedi et al., (2015),⁴ the majority of the patients belonged to 21-40 years of age

Table 1: Age group

Age-group	Number of patients	Percentage
20-30	2	6.66
31-40	3	10
41-50	6	20
51-60	12	40
61 and above	7	23.33

Table 2: Gender distribution

Gender	Number of Patients	Percentage
Male	20	66.66
Female	10	33.33

Table 3: Mode of treatment

Mode of Treatment	Number of patients	Percentage
PFN	15	50
DCS	15	50

Table 4: Seinsheimer's classification of fracture

Seinsheimer's classification of fracture	Number of patients	Percentage
Type II	7	23.33
Type III	15	50
Type IV	5	16.66
Type V	3	10

Table 5: Construct characteristics

Mode of treatment	Bone material density	Bending moment	Number of cycles sustained
PFN	0.96±0.31	9.97±1.28	41815±13825
DCS	0.85±0.28	15.25±0.81	19525±21963
P-value	0.69	<0.05	<0.05

Table 6: Functional outcome

Mode of treatment	Functional outcome			P-value
	Excellent	Good	Fair	
PFN	10	3	2	<0.05
DCS	4	8	3	
Total	14	11	5	

Table 7: Full weight-bearing time

Mode of treatment	6-week follow-up	3-months follow-up	6-month follow-up
PFN	Full weight-bearing	No pain	Back to daily activities
DCS	Partial weight-bearing	Full weight-bearing, Mild Pain	-

Table 8: Intraoperative parameters

Mode of treatment	Operative time	Blood loss	Fluoroscopy time
PFN	66.25 mins	0.42 ltr	21.90 sec
DCS	92.30 mins	1.2 ltr	41.53 sec
P-value	<0.05	<0.05	<0.05

Table 9: Postoperative parameters

Mode of treatment	Rate of infection	Rate of non-union	Mean union time
PFN	3.54%	0%	16 weeks
DCS	8.84%	20%	19 weeks
P-value	<0.05	<0.05	<0.05



Fig. 1: Case 1-PFN



Fig. 2: Case 2- PFN

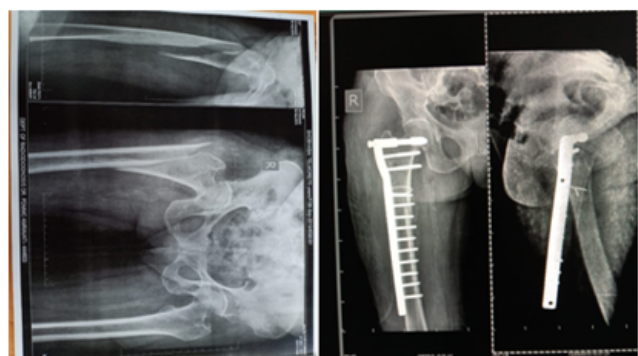


Fig. 3: Case 3- DCS

group.

In the current study, the mean age of the patients was 58.23 ± 1.26 years. Furthermore, according to the study of Jiang et al., (2007),⁹ the mean age was found to be 53 years which was a little less as compared to the current study.

The current study showed a male preponderance as more number of male patients were affected by subtrochanteric femur fractures than female patients. Similarly, according to the study of Wei et al., (2014),¹⁰ the number of male patients was more as compared to that of the female. Furthermore, as per the study of Sanju et al., (2017),¹¹ the number of male patients affected by subtrochanteric femur fractures



Fig. 4: Case 4- DCS

were more as compared to the females.

The constructive characteristics in the present study were comparable with that of Cheema et al., (2012).¹² The current study found that the majority of the patients suffered from Type III femur fracture. Similar results were found in the study of Chittaranjan et al., (2019).¹³ Contrastingly, according to the study of Chaturvedi et al., (2015)⁴ the majority of the patients suffered from Type II femur fracture.

The functional outcome in the current study was excellent for the majority of the patients treated with PFN. On the other hand, the functional outcome for the majority of the patients treated with DCS was good. This implied that patients treated with PFN showed better improvement as compared to DCS. Similar results were obtained in the study of Chaturvedi et al., (2015)⁴

As depicted in the current study, the patients were able to bear full weight within six weeks of surgery. However, among patients treated with DCS were able to bear weight within 15 weeks post-surgery. The mean union time for patients treated with PFN was 16 weeks, while the mean union time in patients treated with DCS was 19 weeks. The union time for patients treated with PFN as per the study of Hossain et al., (2015).¹⁴ was 16 weeks that was at par with the current study.

The mean Harris Hip score for patients treated with PFN in the current study was 90, which was at par with the study of Sanju et al., (2017).¹¹ On the other hand, the mean Harris Hip Score for the patients treated with DCS was 85 in the current study. Rohilla et al., (2008).¹⁵ found the mean Harris Hip score for the patients treated with DCS to be 88.

6. Conclusion

In light of the above results and literature, it was clear that PFN was a better surgical intervention as compared to DCS. It required a shorter operation duration and rehabilitation

time. The patients treated with PFN showed improved functional outcomes as compared to the patients treated with DCS.

7. Source of Funding

None.

8. Conflict of Interest

None.

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