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Original Research Article

Comparing Clinical and Radiological Outcome of Long Proximal Femur Nail (PFN) and Subtrochanteric Fracture Femur fixed by Dynamic Condylar Screw (DCS)

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Abstract

Background: There are different kinds of injuries that have a significant impact on the physical health of the people. One of them is Subtrochanteric Fracture that includes those injuries that caused by severe high energy trauma in the younger population. These kinds of fractures are usually associated with the femoral head and having the high impact as dislocation of hip. There are many treatments available, but the Dynamic Condylar Screw (DCS) and Proximal Femur Nail (PFN) are mostly considered for better recovery of the patients.

Aim: To compare Clinical and Radiological Outcome of Long Proximal Femur Nail (PFN) and Subtrochanteric Fracture Femur fixed by Dynamic Condylar Screw (DCS)

Method: For the investigation of the fracture and treatment process and recovery the study has involved total 35 patients. The randomized sampling technique was considered for including the patient treated with PFN 15 patients and DCS techniques 20 patients. The study period was from December 2020 to December 2021.The patients that were involved in the study had subtrochanteric femur fractures within two weeks.

Result: The study has involved people from different age groups and most number of patients (37.14%) was aged between 51-60 years and least number of patients (8.57%) were in age group of 20-30 years. There were 65.71% male and 34.28% were female patients and 42.85% of there were treated using PFN approach and 57.14% were treated using DCS approach. According to analysis, 25.71% patients were categorised type 2, 45.71% were categorised type 3, 17.14% were considered type 4 and 11.42% were type 5 categories.

Conclusion: From the analysis of clinical outcome of PFN and DCS groups, it has been carried out the PFN was the better surgical intervention compared to DCS as it has shorter period for treatment and helped to full recovery of the patients.

Keywords: Subtrochanteric Fracture, Proximal Femur Nail, Dynamic Condylar Screw and simultaneous transcervical screwing

Background

There are different kinds of injuries that have a significant impact on the physical health of the people. One of them is Subtrochanteric Fracture that include those injuries that caused by severe high energy trauma in the younger population [1]. However, the old age people are also facing the issues related to this due to trivial fall and osteoporotic bones. This kind of injury accounts for 10%-30% of all the hip fractures. Moreover, these are one of the most complicated injuries to treat and the complication rate is up to 40% [2]. Apart from this, the Proximal Femur Nail (PFN) is externally uncommon injury that occurs among the younger population. The attribute mechanism includes axial compression against the acetabular roof, with hip in flexion and abdication. The associate injuries considering the PFN are often seen the knee is an attitude of flexion [3].

This kind of fracture is usually associated with the femoral head and having the high impact as dislocation of hip. The major symptoms of this kind of injury involve inability to get up from a fall or to walk properly, server pain in the hip region and groin, inability to put weight on leg on the side of injured hip and outward turning of the leg on the side of injured hip [4]. The major risk factors that caused the issue among the people are age, gender, osteoporosis, and other chronic medical conditions. Age and gender play a significant role in this kind of injury as the increase in age led to weak bones and lose the density of the bones. Additionally, the women have higher chances of this kind of injury[5].

This region gets exposed to high pressure during the day-to-day activities and high weightlifting. These kinds of fractures are difficult to treat and lead to many complications in performing the daily operations [6]. The surgical treatments are required for recovery of such patients [7]. However, the patients could face the serious complications after the treatment such as thrombophlebitis, urinary and lung infections, deep vein thrombosis and ulcers [8]. The early surgical treatment can help the people to get recovered but the level of complications can affect the physical approach of the patients. There are many other treatments are available, but the Dynamic Condylar Screw (DCS) and Proximal Femur Nail (PFN) are mostly considered for better recovery of the patients [9].

These kinds of techniques include the simultaneous transcervical screwing and shaft plating, intramedullary fixation and involve different types of additional transcervical flexation, nailing with femoral neck-lag screwing and fixation with cephalomedullary locking [10]. Diagnose and treatment of such issues is requiring high level of expertise in managing the health condition of the patient and approach is following different surgical difficulties [11].

Aim

To compare Clinical and Radiological Outcome of Long Proximal Femur Nail (PFN) and Subtrochanteric Fracture Femur fixed by Dynamic Condylar Screw (DCS)

Material and method

For the investigation of the fracture and treatment process and recovery the study has involved total 35 patients. The randomized sampling technique was considered for including the patient treated with PFN 15 patients and DCS techniques 20 patients. The study period was from December 2020 to December 2021.The patients that were involved in the study had subtrochanteric femur fractures within two weeks. The observation of patients was done at 6-weeks, 3-months, and 6 months.

Inclusion criteria

1. Subtrochanteric fractures.

2. Skeletally mature patients.

3. Patients admitted to the hospital within two weeks of the injury.

Results

Table 1: Age

Age (Years)	Number of patients	Percentage
20-30	3	8.57%
31-40	4	11.42%
41-50	8	22.85%
51-60	13	37.14%
60 and above	7	20%

The study has involved people from different age groups and most number of patients was age between 51-60 years 37.14% and least number of patients was age group of 20-30 years 8.57%.

Table 2: Gender

Gender	Number of patients	Percentage
Male	23	65.71%
Female	12	34.28%

The study has involved both male and female patients for comparing PFN and DCS. There were 65.71% male and 34.28% were female patients.

Table 3: Mode of treatment

Mode of treatment	Number of patients	Parentage
PFN	15	42.85%
DCS	20	57.14%

For the study, there were total 35 patients involved and 42.85% of there were treated using PFN approach and 57.14% were treated using DCS approach.

Table 4: Seinsheimer's classification of fracture

Seinsheimer's classification of fracture	Number of patients	Percentage
Type 2	9	25.71%
Type 3	16	45.71%
Type 4	6	17.14%
Type 5	4	11.42%

Four types of classification considered for analysing the level of complication and selecting the treatment option. According to analysis, 25.71% patients were fall into category of type 2, 45.71% were categories type 3, 17.14% were considered category of type 4 and 11.42% were fall into type 5 category.

Table 5: Construct characteristics

Mode of treatment	Bone material density	Bending moment	Number of cycles sustained
PFN	0.98±0.34	9.99±1.30	41819±13836
DCS	0.88±0.30	15.32±0.87	19529±21970
P-value	0.71	<0.05	<0.05

The characteristics of patients were analysing focusing on bone material density and bone moment as well as number of cycles sustained. According to analysis, the bone material density between PFN and DCS has shown no significant difference ($p>0.05$), whereas there was significant difference in bending moment and number of cycles sustained between PFN and DCS ($p<0.05$). Bending moment was significant higher in DCS whereas number of cycles sustained was significant more in PFN.

Table 6: Functional outcome

Mode of treatment	Excellent	Good	Fair	P-value
PFN	12	5	3	<0.05
DCS	4	8	3	
Total	16	13	6	

The functional outcome of both treatment groups was identified considering the classification in excellent, good, and fair categories. According to analysis, considering both groups total 16 patients were fall into excellent category, 13 patients were good, and 6 patients were fair. Significant association was found between mode of treatment and functional outcome ($p<0.05$). PFN showed better functional outcome as compared to DCS.

Table 7: Full weight-bearing time

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

The analysis of post-operation activities was conducted, and it has carried out three different periods such as 6 weeks, 3 months, and 6 months. According to analysis, the patients those were treated using PFN have started full weight bearing after 6 weeks and no pain was observed. Apart from this, patients treated using DCS approach were having mild pain and not able to take full weight.

Table 8: Interpretive parameters

Mode of treatment	Operative time	Blood loss	Fluoroscopy time
PFN	66.35 mins	0.47 ltr	21.97 sec
DCS	92.37 mins	1.4 ltr	41.63 sec
P-value	<0.05	<0.05	<0.05

The interpretive parameters were compared between PFN and DCS groups and significant difference was found in operative time, blood loss and fluoroscopy time. All the three parameters were significantly low in PFN as compared to DCS

Table 9: Postoperative parameters

Mode of treatment	Rate of infection	Rate of non-union	Mean union time
PFN	3.60%	0.01%	16 weeks
DCS	8.90%	21%	19 weeks
P-value	<0.05	<0.05	<0.05

Post-operative parameters were analysed, and significant difference was found in them between PFN and DCS. All the three parameters were significantly lower for PFN as compared to DCS.

Discussion

The study has involved people from different age groups and most number of patients (37.14%) were aged between 51-60 years and least number of patients (8.57%) were aged between of 20-30 years. There were 65.71% male and 34.28% female patients. For the study, there were total 35 patients involved and 42.85% of there were treated using PFN approach and 57.14% were treated using DCS approach.

Wei et al., (2014)[12] has also suggested that number of male patient were higher than the female for treatment. Additionally Sanju et al., (2017)[13] has also identified that the male have the higher chances of having this kind of fracture as they take part in sports, biking and others.

For the current study four type of classification considered for analysing the level of complication and selecting the treatment option. According to analysis, 25.71% patients were categorised as type 2, 45.71% were categorised type 3, 17.14% were categorised as type 4 and 11.42% were type 5 category. The outcomes of the current study were having similarity with Cheema et al., (2012)[14] as maximum patients were having Type III femur fracture. In their study, 26.31% of patients were treated with type 2, 31.87% were having type 3, 21.17% have type 4 and rest of the patients had type 5 fracture.The functional outcome of both treatment groups for current study was identified considering the classification in excellent, good, and fair categories. According to analysis, considering both groups total 16 patients were fall into excellent category, 13 patients were good, and 6 patients were fair. There was significant difference found ($p<0.05$). The study outcomes of Chaturvedi et al. (2015)[15] were similar as the outcome of the present study.

For the current study, the analysis of post-operation activities was conducted, and it has carried out three different periods such as 6 weeks, 3 months, and 6 months. According to analysis, the patients those were treated using PFN have started full weight bearing after 6 weeks and no pain

was observed. Apart from this, patients treated using DCS approach were having mild pain and not able to take full weight. The mean time for union for PFN for the current study was 16 weeks and for the patients treated with DCS the mean time of union was 19 weeks. According to study of Hossain et al., (2015)[16] the mean union time for both groups were 16 weeks. [17]

Conclusion

From the analysis of clinical outcome of PFN and DCS groups, it has been carried out the PFN is better than DCS as it has shorter period for treatment and helped to full recovery of the patients. Moreover, the functional outcome of PFN patients was good and these patients were had significant improvement.

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