Original Article

Outcomes Of Intertrochanteric Femur Fracture Treatment With Proximal Femoral Nail Anti-Rotation (PFNA)

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Abstract

Background: In elderly people, common injuries are caused because of low energy trauma and osteoporosis. These common injuries are called proximal femoral fractures. The category of proximal femoral fractures includes pertrochanteric fractures, femur fractures, subtrochanteric fractures, and intertrochanteric fractures. Intertrochanteric fractures are hip fractures that are common in old people.

Objective: Our research aims to evaluate the functional results when intertrochanteric fractures are cured with Proximal Femoral Nail anti-rotation (PFNA).

Study design: A cross-sectional study

Place and Duration: This study was conducted at Dow International Medical college, Dow University of Health Sciences, Karachi **hospital from December 2021 to December 2022**

Methodology: All of the patients were having type III and type IV intertrochanteric fractures (Boyd and Griffin) for about 1 week. PFNA with a helical screw (240 millimeters) was used to treat the participants. After the treatment, participants had to visit the hospital after 2 weeks in the starting. Later, they had a monthly follow-up for the next 6 months. Harris Hip Score (HHS) was used to assess the functional outcome in every visit.

Results: Overall, 80 participants were treated with PFNA in this research study. The mean age was 49.51±12.31 years. A total of 4.66 days were the mean duration of the fracture. Boyd and Griffin type III fracture was seen in the majority of the participants. All participants achieved the radiological union at 15.4 weeks. The mean HHS was 84.52 at the 6th monthly follow-up.

Conclusion: The majority of the participants showed good and excellent results when intertrochanteric fractures were cured with Proximal Femoral Nail anti-rotation (PFNA).

Keywords: intertrochanteric fractures, Proximal Femoral Nail anti-rotation, Harris Hip Score, adults

INTRODUCTION

In elderly people, common injuries are caused because of low energy trauma and osteoporosis. These common injuries are called proximal femoral fractures [1]. These fractures are also found in younger people but the reason is high-

energy trauma such as road traffic accidents [2]. The category of proximal femoral fractures includes pertrochanteric fractures, femur fractures, subtrochanteric fractures, and intertrochanteric fractures [3]. Intertrochanteric fractures are hip fractures that are common in old people [4]. To treat these fractures, there are several treatments available such as proximal femoral locking plate, interlocking nail, dynamic hip screw (DHS), gamma nail, and proximal femoral nail anti-rotation (PFNA) [5]. In unstable fractures, instead of using extramedullary implants, intramedullary implants are preferred [6]. It is because there are fewer chances of implant failure, hemorrhage, and infection and early mobilization is ensured. To treat intertrochanteric fractures (type III and IV), the gold method used is Proximal Femoral Nail anti-rotation (PFNA) [7]. PFNA is a device that was found by the AO/ASIF in 2003 [8]. It was established so that a proper fixation strength can be attained in the existence of osteoporotic bone. This device is made up of an intramedullary nail with a proximal angulation of 6 degrees. This nail is available in both, long and short versions [9]. There are several research studies available that have reported that positive results were seen when intertrochanteric fractures were cured with PFNA [10]. Therefore, our research also aims to evaluate the functional results when intertrochanteric fractures are cured with Proximal Femoral Nail anti-rotation (PFNA).

METHODOLOGY

There were a total of 80 patients enrolled in this study. All of the patients were having type III and type IV intertrochanteric fractures (Boyd and Griffin) for about 1 week.

Exclusion criteria: Those patients who were having other types of fractures such as pathological fractures, open fractures, and bilateral fractures were not a part of this research. Moreover, patients who had revision surgery or they were having polytrauma were also excluded from this research study.

All of the participants were informed and their written consent was taken. All of the participants were asked to give their complete history and their physical examination was also done. Every patient was operated on by the principal author. Spinal and general anesthesia was used. PFNA with a helical screw (240 millimeters) was used to treat the participants. It was done under image intensifiers by using the same technique of treatment for all participants. The technique was that the lag screw was positioned centrally and inferiorly in the neck of the femur in the anteroposterior (AP) view and centrally in the lateral view, ensuring that the Tip Apex Distance (TAD) was less than 20mm. In every case, the nail was locked distally. All of the participants were rehabilitated and mobilized before the treatment. They were all observed by a qualified physiotherapist. After the treatment, participants had to visit the hospital after 2 weeks in the starting. Later, they had a monthly follow-up for the next 6 months. Harris Hip Score (HHS) was used to assess the functional outcome in every visit[11]. Moreover, radiographs were also used to evaluate the radiological union. At the last follow-up in the 6th month, the final HHS was obtained and interpreted according to the following values; Less than 70 (Poor), 70-80 (Fair), 81-90 (Good), and 91-100 (Excellent).

SPSS version 23 was used to analyze the recorded data. The mean and standard deviation of quantitative variables were obtained (duration of fracture, age, HHS). The qualitative variables were expressed as percentage and frequency (fracture types, gender, and anatomical side). The data for gender, duration of fracture, age, fracture type, and anatomical side was stratified. To evaluate the p-value, a t-test and Chi-square test (before stratification) were conducted. A significant p-value was considered as <0.05.

RESULTS

Overall, 80 participants were treated with PFNA in this research study. The mean age was 49.51±12.31 years. The age of the participants ranged from 27 years to 70 years. Our research shows that most of the patients were women, with a representation of 66.25% of the total participants. A total of 4.66 days were the mean duration of the fracture. The duration of the fracture ranged from 1 to 7 days. In our research, most of the participants were having left-sided fractures. Boyd and Griffin type III fracture was seen in the majority of the participants. Table number 1 shows the demographics as well as different variables. All participants achieved the radiological union at 15.4 weeks. The mean HHS was 84.52 at the 6th monthly follow-up. Most of the participants were having good and excellent outcomes based

on HHS. After the comparison of the data, it was seen that the Harris Hip Score for gender, fracture type, age, and duration of fracture was significant.

Table No. 1: demographics as well as different variables

Variables	**N**	**%**
Age (years)		
• **≤ 50**	44	55
• **> 50**	36	45
Gender		
• **Female**	53	66.25
• **Male**	27	33.75
Duration of fracture (days)		
• **≤ 4**	55	68.75
• **> 4**	25	31.25
Fracture side		
• **Left**	42	52.5
• **Right**	38	47.5
Type of fracture (Boyd and Griffin)		
• **Type III**	43	53.75
• **Type IV**	37	46.25

Table number 2 shows the outcomes as per HHS.

Table No. 2: outcomes as per HHS

Variables	**Functional Outcomes (HHS)**			
	Excellent (N)	**Good (N)**	**Fair (N)**	**Poor (N)**
Age (years)				
• **≤ 50**	13	19	10	2
• **> 50**	12	17	5	2

Gender				
• **Female**	17	25	8	3
• **Male**	8	11	7	1
Duration of fracture (days)				
• **≤ 4**	15	25	11	4
• **> 4**	10	11	4	0
Fracture side				
• **Left**	5	26	8	3
• **Right**	20	10	7	1
Type of fracture (Boyd and Griffin)				
• **Type III**	13	21	8	1
• **Type IV**	12	15	7	3

Table number 3 shows the p-values for all the variables, showing them as significant or insignificant.

Table No. 3:p-values for all the variables

Variables	**P-value**
Age (years)	0.488
Gender	0.409
Duration of fracture (days)	0.153
Fracture side	0.013
Type of fracture (Boyd and Griffin)	0.720

DISCUSSION

This research study was conducted on 80 patients who were having intertrochanteric fractures which were cured using PFNA. The mean Harris Hip Score was 84.52 at the 6th monthly follow-up. A total of 25 patients showed excellent outcomes (31.25%) and 36 patients showed good outcomes (45%). In the research study of Onta et al., the mean HHS was 84.73 [12]. In their study, excellent outcomes were seen in 35.1% of patients, and good outcomes were seen in 45.9% of patients. However, 13.5% of patients showed fair outcomes, and 5.4% of patients showed poor outcomes. According to these authors, PFNA is a minimally invasive method that takes less time in the treatment, less blood loss, and less radiation exposure as compared to other techniques. Another study was conducted by Garabadi whose research included 70 patients that were treated with PFNA [13]. He did a 1-year follow-up after which the functional scores were excellent in 62 patients, poor in 2 patients, and good in 4 patients. Moreover, another research was

conducted by Radaideh et al. on 50 patients [14]. The mean HHS was 79.34 at the last follow-up and the follow-up duration was 18 months. According to these authors, PFNA is an important method to treat unstable intertrochanteric fractures. It is because this method is easy, provides stable fixation, is associated with less blood loss, and shows excellent functional and radiological results.

A comparison analysis was conducted by Sharma and Mahajan between PFNA and PFN [15]. It was recorded that the mean HHS for PFN was 75.37 (p-value=0.54) while it was 78.85 for PFNA. It was concluded that complications were fewer in PFNA than in PFN. Another research was conducted by Ye et al. in which there were 90 participants involved. They had a 1-year follow-up and the mean HSS was 80.5 [16]. A total of 26 patients showed excellent outcomes, 9 patients showed fair outcomes, 37 patients showed good outcomes, and 18 patients showed poor outcomes. According to these authors, PFNA is an important method to treat unstable intertrochanteric fractures. It is because this method has higher union rates, takes less time in treatment, and has early postoperative mobilization. In the research study of Sahin and Erturer, the mean HHS was 77.8 [17]. In their study, excellent outcomes were seen in 24.4% of patients, and good outcomes were seen in 42.2% of patients. However, 20% of patients showed fair outcomes, and 13.3% of patients showed poor outcomes.

There was a local study conducted on 35 patients with intertrochanteric fractures. This study was conducted by Shah and Aslam who recorded union in every patient without any complications [18]. However, these authors did not use Harris Hip Score for their study. Another local research study was conducted by Ali and Khan who included 20 patients that were treated with PFNA and 20 patients that were treated with Sliding Hip Screw [19]. In this study, it was concluded that a better union rate was seen in the PFNA group than in the SHS group. Moreover, the authors also noted fewer complications in the PFNA group and the functional outcome was also better in the PFNA group. Another author named Kumar included 30 patients in his research study who were treated with PFNA (helical blade) and the other 30 patients with PFNA (screw) [20]. There was no significant difference seen in the results of these 2 implants. However, PFNA (helical blade) was a better option because it took less time in the treatment and there was less radiation exposure than PFNA (screw). There was a study conducted by Zhang that included 295 participants with intertrochanteric fractures and they were treated with PFNA [21]. It was recorded that 2 crucial technical factors could prevent the mechanical failure of PFNA. Those factors are the following; achieving the best possible fracture alignment and ensuring that the screw is centrally positioned in the lateral view.

There were a few limitations of our research. Firstly, our sample size was very small. Secondly, the follow-up period was also short. Due to these limitations, we recommend that further research studies should be conducted to evaluate the importance of PFNA in the treatment of unstable intertrochanteric features.

CONCLUSION

The majority of the participants showed good and excellent results when intertrochanteric fractures were fixed with Proximal Femoral Nail anti-rotation (PFNA). Therefore, it is recommended that PFNA can be seen as an important choice to treat unstable intertrochanteric features.

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Conflict of interest

None

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