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Dr. Pavankumar Patted
Senior Resident, Department of
Orthopaedics, ESICMC,
Kalburagi, Karnataka, India

Dr. Md. Sadiq
Assistant Professor, Department
of Orthopaedics, ESICMC
Kalburagi, Karnataka, India

Dr. Md Wajid Hussain Diggi
Senior Resident, Orthopaedics
Department, ESICMC,
Kalburagi, Karnataka, India

Functional outcome of proximal femoral nailing Antirotation (PFN-A) in intertrochanteric fractures: A prospective study

Dr. Pavankumar Patted, Dr. Md. Sadiq and Dr. Md Wajid Hussain Diggi

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Abstract

Introduction: The study was conducted to assess clinical and functional outcome of Proximal Femoral nailing antirotation in intertrochanteric fractures and to determine the rate of union, complications, operative risks and co morbidities associated with intertrochanteric fractures. Intertrochanteric fractures form around half of the total hip fractures in the elderly and pose a number of management dilemmas depending on the fracture configuration and status of the bones. There are numerous implants available for the internal fixation of these fractures ranging from dynamic hip screw which can be combined with trochanteric stabilisation plate; locking plates; intramedullary implants such as proximal femoral nail (PFN), trochanteric femoral nail (TFN) and Gamma nail.

Materials and Methods: The fractures were classified according to BOYD and GRIFFIN classification system. 40 patients of intertrochanteric fractures fulfilling the inclusion and exclusion criteria, were managed surgically using Proximal Femoral Nail A. The results were analyzed according to age, type of fracture, operative details and functional outcome using KYLE's criteria.

Results: Totally 40 patients with intertrochanteric fractures were operated with PFNA and were included in the study. The mean age of the patients was around 64 years with minimum age being 52 years and the maximum being 88 years. The mean duration of operation was recorded to be 49.59 min. Complications in this study were seen in 2 patients (5%), Complication was surgical site infection.

Conclusion: Our study suggests that the PFNA is a better implant in elderly patients with severe osteoporosis as there is the shorter operating time and easier placement of the helical blade and also allows for early mobilization. The main benefits being the shorter surgical time and the decreased need for fluoroscopy. It has a excellent functional outcome and least failure rates.

Keywords: PFNA, intertrochanteric fractures, trochanteric fractures, helical blade

Introduction

Intertrochanteric fractures are one of the most common fractures of the hip, more so common in the elderly with osteoporotic bones. 5% of all hip fractures are intertrochanteric fractures and 35–40% of these fractures are unstable three or four part fractures and associated with high rates of morbidity and mortality [1, 2]. Intertrochanteric fractures can be treated conservatively or operatively. Surgery minimise the risk of medical complications like pneumonia, Deep vein thrombosis and help in early mobilization. The proposed advantages of intramedullary nailing include a short incision, less operative time, minimal blood loss and rapid rehabilitation. Surgical stabilization of unstable intertrochanteric fractures in elderly is a challenge because of preoperative comminution, lateral wall breach, Osteoporosis and other comorbidities [3]. Though success rates of treating intertrochanteric fractures is high, treating unstable fractures is challenging. The new implants definitely help in decreasing the failure rates.

One of the newer nails is the PFNA (Proximal Femoral Nail Antirotation), one which incorporates a helical blade to provide anchorage to the femoral neck and Head. This helps compact the cancellous bone inside the Femoral Neck and Head, conferring stability and rigidity to the fixation [4].

The study was conducted to assess clinical and functional outcome of Proximal Femoral nailing antirotation in intertrochanteric fractures and to determine the rate of union, complications, operative risks and co morbidities associated with intertrochanteric fractures.

Corresponding Author:
Dr. Pavankumar Patted
Senior Resident, Department of
Orthopaedics, ESICMC,
Kalburagi, Karnataka, India

Materials and Methods

Type of study

A prospective study.

Inclusion criteria

Patients with age equal to or more than 50 years and patients with type II, III and IV Boyd and Griffin classification were included in the study.

Exclusion criteria

1. Polytrauma Patients 2. Open Fractures 3. Pathological Fractures 4. Patients unsuitable for surgery.

A total of 40 patients with intertrochanteric fractures operated with PFNA nail were followed up at the immediate post op period and at the end of 1st, 2nd, 3rd, and 6 months and evaluated for functional outcome using Kyle's criteria.

Surgery was performed using standard steps, as recommended by the manufacturer. We used a titanium cannulated 170 mm long by 10-12 mm diameter PFNA nail. The helical blade of 14 mm diameter was inserted in femoral neck without drilling.

All patients were initiated with active and passive exercises within 48 hours of surgery. All the patients were advised to completely bear weight after 4-8 weeks of post operative period.

Results

Table 1: Age distribution

Age in years	Total number of patients	Percentage
51-60	4	10%
61-70	24	60%
>70	12	20%

Table 2: Distribution of cases according to sex

Sex	Total number of patients
Male	45%(18)
Female	55%(22)
Total	40

The most common mode of injury was self fall (n=26, 65.00%), followed by road traffic accident (n=10, 25%) and the least was fall at work place (n=4, 10%).

Table 3: Type of fracture

Boyd and Griffin classification	Total number of fracture	Percentage
Two Part	18	60%
Three Part	6	20%
Four Part	6	20%

The mean duration of operation was recorded to be 49.59 min, which included the time from incision to suturing back the skin. We noted that the experience of the surgeon with the instrumentation, played a single major role in the reduction of the duration of the surgery.

The mean radiological union of unstable intertrochanteric fractures were 12.47 ± 2 weeks.

Table 4: Functional outcome using Kyle's criteria

Kyles criteria	Number of patients	Percentage
Excellent	30	75%
Good	8	20%
Fair	1	2.5%
Poor	1	2.5%

Table 5: Complications

Complication	Number of patients	Percentage
Surgical site infection	2	5%



Discussion

The choice of implant for the fixation of peri-trochanteric fractures of the hip remains a highly debated issue with a host of options. In PFN-A, the design of the helical blade allows for improved purchase in the femoral head, accomplished through radial compaction of the cancellous bone around the flanges of the blade during insertion^[5, 6]. The retention and compaction of the cancellous bone of the femoral head with the helical blade is advantageous compared to the bone loss that occurs with the drilling and insertion of the standard hip screw. Screw pull out in a dual screw design due to osteoporosis in old age is the most common cause of implant failure^[7]. PFN-A has a single helical blade and hence requires a smaller incision and decreased soft tissue handling. In elderly population with a high risk medical comorbidities this implant is suitable as it has decreased surgical time.

In the study conducted by Sommers *et al.* [8] and Ito *et al.*, [9] the authors clearly concluded that increasing the bone-implant interface surface with the spiral blade device improved the stability of fracture fixation in osteoporotic specimens, providing a significant advantage over the smaller contact interface provided by the threads of a conventional locking bolt. This is the main reason behind prevention of complications such as varus collapse and rotational stress.

PFN-A has 6 degree valgus angulation at the proximal end, so as to match the anatomy of the greater trochanter. This modification greatly reduces the intraoperative complication like diaphyseal fractures. No patient in our study had diaphyseal fracture, however diaphyseal fractures were noted in the similar studies conducted by Landivoisin *et al.* [10] (2.6%), Domingo LJ *et al.* [11] (5.6%), Herrera *et al.* [12] (9.6%). The average operating time noted was 49.69 min which was comparable to de Landivoisin *et al.* of 30-90 min. There was little blood loss. Gavaskar *et al.* [13] reported minimal blood loss in patients undergoing surgery with PFN-A. The average time required for the union in our study was 12.47 ± 2 weeks.

The limitation of this study was the lack of a control group, less sample size, shorter follow-up period.

Conclusion

Our study suggests that the PFNA is a better implant in elderly patients with severe osteoporosis as there is the shorter operating time and easier placement of the helical blade and also allows for early mobilization. The main benefits being the shorter surgical time and the decreased need for fluoroscopy. It has an excellent functional outcome and least failure rates.

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