

## Original Research Article

# Outcome following proximal femoral nailing with helical head screw for intertrochanteric and subtrochanteri fractures

Sudharsana Reddy Palle\*, Santhosh Srinivasan, Dhanarajan Gokul Raj

Department of Orthopedics, Sri Ramachandra Medical College, Chennai, Tamil Nadu, India

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**\*Correspondence:**

Dr. Sudharsana Reddy Palle,  
E-mail: [srp.1656@gmail.com](mailto:srp.1656@gmail.com)

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### ABSTRACT

**Background:** Intertrochanteric fractures are seen commonly in two patient groups, older osteopenic patients after a low-energy fall and younger patients involved in high-energy trauma. Early surgical intervention is advocated in the majority of these patients to reduce the complications associated with long-term immobilization.

**Methods:** In this study proximal femoral nailing with helical head screw is used to achieve initial stability and early mobilization of the patients to avoid complications. In 60 patients undergoing proximal femoral nailing with helical head screw for intertrochanteric fractures the results of surgery were meticulously followed.

**Results:** The patients were assessed clinically and radiologically for time of union rate of infection stability and implant failure. All fracture in our study unites within 8 months following surgery.

**Conclusions:** Our study concludes that proximal femoral nailing with helical head screw is the best method of treatment for intertrochanteric fracture as it leads to lesser complications.

**Keywords:** Proximal femoral nail, Intertrochanteric fractures, Subtrochanteric fractures, Proximal femoral fractures

### INTRODUCTION

Proximal femur fractures are always a challenging situation for any orthopaedic surgeon. In these patients the goal of treatment is to achieve fracture union and early mobilization of the patient in elderly patients the need to minimize mortality and morbidity takes over precedence. The biomechanical property of the fixation device and stability achieved by using such devices plays a major role in achieving these goals.<sup>1</sup> Helical blade in proximal femoral nail (PFN) offers additional biomechanical stability by preventing rotation and ensuring cancellous bone compaction. In patients with osteoporotic trochanteric fractures, there is decreased rate of construct failure and reliable fixation with low mechanical complications.<sup>2</sup>

The aim of this study was to analyse the functional and radiological outcome of intertrochanteric fractures and subtrochanteric fractures treated with PFN with helical blade.

### METHODS

This was a prospective study conducted in Sri Ramachandra University, Chennai. The study included 60 patients with proximal femoral fractures who were treated with PFN using a helical blade during June 2016 to March 2018 by senior orthopaedic consultants in our institute. Our study had 38 male patients and 22 female patients. Mean age in our study group was 62.59 years. Of the 60 patients, 34 were intertrochanteric and 26 were subtrochanteric fractures. Intertrochanteric were classified using Boyd and Griffin and Seinsheimer

classification was used for subtrochanteric fractures. We included all patients with intertrochanteric and subtrochanteric fracture above the age of 50. Patients with multiple co-morbid and polytrauma were not included. The results of our patients were analysed by radiological union and functional outcome was assessed by Schatzker and Lambert criteria.

**Surgical technique**

The patient is placed supine and is on fracture table. Closed reduction of the fracture is performed under C-arm guidance with the help lateral skin incision over the trochanter entry made with bone awl. Serial reaming of the femur was done starting from 8 mm reamer in all patients. Proximally the femur was reamed up till 13 mm to accommodate the proximal part of the nail. Fractures were stabilized with PFN with helical blade screw. Distal static locking was done for all patients. Thorough wound irrigation and hemostasis was obtained before closure of the wound.

**Rehabilitation**

All patients above 60 years received post-operative thrombo prophylaxis in the form of low molecular weight heparin from the 2nd post-operative day for 10 days following which oral anticoagulants were continued for four to six weeks in high risk. Regular wound inspection was done on 2nd, 5th, 9th and 12th post-operative day. Post-operative imaging were taken on the 2nd day. Suture removal was done on day 12. Patients were mobilized with toe touch weight bearing with walking aid from 10th post-operative day. Gradual increase in weight bearing was done until the patients were able to walk pain free and without aid at the end of six weeks.

**RESULTS**

This study involved sixty cases of intertrochanteric fractures of either sex above the age of 30. All cases were treated by intramedullary fixation with a PFN. The age distribution was from 35 to 84 years (average 62 years). The largest group of patients was from 61 to 70 years (24) (Table 1).

**Table 1: Distribution of patients according to age in years.**

Age of the patient (yrs)	Number of patient N (%)
31-40	2 (3.3)
41-50	6 (10)
51-60	6 (10)
61-70	24 (40)
71-80	18 (30)
81-90	4 (6.6)

**Table 2: Distribution of cases according to sex.**

Sex	N (%)
Male	38 (63.33)
Female	22 (36.66)
Total	60

**Table 3: Distribution of cases according to functional results.**

Functional outcome	N (%)
Excellent	81-100 38 (63.33)
Good	61-80 12 (20)
Fair	41-60 8 (13.33)
Poor	<40 2 (3.33)

There were 38 males (64%) and 22 females (36%) in the study (Table 2).

Thirty-three patients (55%) sustained the fracture due to a fall and 27 patients (45%) due to road traffic accident. Most of the patients who sustained the fracture due to fall were older in age and had osteoporosis.

Average operating time was 85 min (45–95 min) after anesthesia. Closed reduction was achieved in 44 patients whereas 16 patients required open reduction. The average hospital stay was 10.5 days. It was more in patients with co-morbid conditions and complications with highest being 16 days.



**Figure 1: Excellent results of case 1, type 2 Boyd and Griffin. (A) Pre-operative, (B) post-operative immediate and (C).after six months**



**Figure 2: Excellent results of case 2, type 2 Boyd and Griffin. (A)Pre-operative, (B) immediate post-operative and (C) after six months.**



**Figure 3: Good results of long proximal femoral nail used in case 3, type 4 Boyd and Griffin subtrochanteric extension. (A) Pre-operative, (B) traction and internal rotation and (C) post-operative.**

### Complications

During the study we noted 12 complications. 6 patients presented post-operatively with superficial infections and were promptly treated with antibiotics for three weeks. 6 patients presented with delayed union due technical failure of improper reduction. We did not encounter any patients with deep venous thrombosis or pulmonary embolism.

According to criteria set by Schatzker and Lambert excellent outcome were obtained in 38 patients (63.33%), good outcome in 12 (20%), fair results in 8 patients (6.67%) and poor outcome 2 patients (3.33%) (Table 3).

### DISCUSSION

The treatment of proximal femoral fractures with PFN depends on various factors such as the general health of the patient, time from fracture to treatment, fracture pattern and the stability of initial fixation. There is no role for conservative management in proximal femoral fractures as advocated by Clanton et al in our present times.<sup>1</sup>

Dynamic hip screw is considered the gold standard for treatment due to its favorable results and low rate of complications when used in the management of stable

fractures.<sup>3</sup> Along with the requirement of a larger exposure, it has been associated with intra- and post-operative varus collapse especially when used in unstable and reverse oblique fractures, ultimately leading to medialization of the shaft and deformity.<sup>4</sup>

Intramedullary devices have been shown to be biologically stronger and can withstand higher static and cyclical loading than dynamic hip screw.<sup>5</sup> A medial buttress provides adequate reduction in implant stress and fatigue.<sup>6</sup> PFN also acts as a buttress in preventing the medialization of the shaft. The implant compensates for the function of the medial column.<sup>7</sup>

The entry point of the PFN is at the tip of the greater trochanter, so it reduces the damage to the hip abductors unlike the gamma nail which is inserted through the pyriformis fossa and with a derotation screw reduces the chances of cutout as compared to the gamma nail.<sup>6,8,9</sup> The hip screw and the anti-rotation cervical screw of the PFN adequately compress the fracture, leaving between them adequate bone block for further revision should the need arise.

In our study, we used the cephalomedullary interlocked nailing PFN with a helical blade for head-neck fixation which offers more rotational stability than the first generation PFN.<sup>10</sup> We used the standard PFN for more

proximal fractures, and the long PFN for more distal fractures. Sub trochanteric fracture may be fixed by either a standard or a long implant. These fractures are associated with higher failure rates when they are fixed with normal length PFN. The reasons for this is due to intrinsic instability of the sub trochanteric fractures .the fracture presents a more difficult reduction because the proximal fragment has a tendency to flex anteriorly due to the action of the psoas muscle and shorter distance from locking screw hole to the fracture site.

We had 60 patients of which 26 patients had sub trochanteric fracture. These fractures required a long PFN (length 300-400 mm) fixation and 34 patients were treated with the regular length PFN (length 180-240 mm). The advantages of intramedullary device over extra medullary ones are less extensive surgical approach and thereby reducing the operative time and intraoperative blood loss.<sup>11,12</sup>

In our study the average operative time was 77 minutes and an average blood loss of 190 ml per patient. This reduced operating time and less blood loss during surgery led to no perioperative and postoperative blood transfusion. At 6 months follow up 45 (75%) patients in our study had no pain.

In our study with intramedullary nailing using the proximal femoral nail antirotation prevented post-operative varus/valgus collapse at the fracture site. At one year follow up we had 25 patients (41.6%) had no loss of flexion, 30 patients (50%) had flexion loss not more than 20 degree.

In this study, we found that at an average of 4 months, 47 patients (78.3%) showed complete radiological union at the fracture site. The average radiological union time for intertrochanteric fractures was 19.7 weeks and sub-trochanteric fractures was 20 weeks which was similar to previous studies.<sup>6-8</sup>

## CONCLUSION

In conclusion we would like to state that proximal femoral nail is a better option in unstable intetrochanteic fractures as it offers better control of rotation, length and a proximal purchase during fixation. It provides various advantages like reduced operating time, blood loss and minimal soft tissue insult. Restoration of medial cortical continuity and preservation of lateral wall in intramedullary nailing gives good results in unstable intertrochanteric fractures. PFN with helical blade long is an effective treatment for sub trochanteric fractures.

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