



## International Journal of Orthopaedics Sciences

ISSN: 2395-1958  
IJOS 2019; 5(2): 88-91  
© 2019 IJOS  
www.orthopaper.com  
Received: 28-02-2019  
Accepted: 30-03-2019

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### Intertrochanter fractures treated with PFNA in patients with age more than 70 years: A study of 42 cases

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DOI: <https://doi.org/10.22271/ortho.2019.v5.i2b.20>

#### Abstract

Intertrochanteric fractures commonly occur in elderly patients. The main aim of surgery is to mobilize the patient early. The most commonly used extramedullary implant is the sliding hip screw while intramedullary implants include the Gamma nail, the intramedullary hip screw, the proximal femoral nail, the ACE trochanteric nail and PFNA (pfn antirotational) designed by AO in 2004. We aim to assess functional and radiological outcome of intertrochanteric fractures treated with PFNA in patients with age more than 70 years. This is a study of 42 fresh intertrochanteric fractures in patients with age more than 70 years where osteosynthesis was done using PFNA during the period of March 2016 to February 2017 at SSG hospital, Vadodara. During follow up clinical and radiological assessment was done. At final follow up functional outcome was assessed using Harris hip score. During follow up 7 patients died due to associated comorbid conditions and 35 patients were available till final follow up. At final follow up according to Harris hip score 27 patients had excellent result, 5 had good result, 2 had fair and one had poor result. PFNA is a good implant in osteoporotic intertrochanteric fractures due to less surgical duration, less blood loss, ease of fixation and low rate of complications.

**Keywords:** PFNA, Intertrochanter fracture in elderly, Harris hip score

#### Introduction

Intertrochanter fractures commonly occur in elderly patients with osteoporosis and its incidence will continue to rise due to the increasing life expectancy. Many methods have been recommended for the treatment of intertrochanteric fractures [1]. The main aim of surgery is to mobilize the patient early. It is crucial to use an implant that is minimally invasive, allows early weight bearing and has low complication rates [2, 3]. Complications associated with pertrochanteric fractures are primarily related to the implant used rather than the union process owing to the strong healing potential of cancellous bone in the intertrochanteric region [4]. Surgeon can control fracture reduction, implant selection and implant placement, all of which must be optimized to ensure the success of the surgical intervention. The most commonly used extramedullary implant is the sliding hip screw while intramedullary implants include the Gamma nail, the intramedullary hip screw, the proximal femoral nail, the ACE trochanteric nail and PFNA (PFN Antirotational) designed by AO in 2004 [5, 6].

Although PFN proved to be superior to extramedullary devices for unstable intertrochanteric fractures; screw cut-out, back out, varus collapse and rotational instability continued to be significant postoperative complications, with up to 31% complication rates being reported in literature [7]. The PFNA was designed to achieve better stabilization of the femoral head and neck by using a single helical blade rather than a screw system for fixation. The helical blade is said to increase the bone-implant interface and result in compaction of cancellous bone, thereby providing excellent stability of fixation [8]. The blade, which can be inserted without reaming out bone from the head/neck fragment, seems to provide additional anchoring, particularly in osteoporotic bone. Biomechanical studies have proven that the helical blade, by compaction of cancellous bone around it, has superior resistance to rotation and varus collapse [3]. We aim to assess functional and radiological outcome of intertrochanteric fractures treated with PFNA in patients with age more than 70 years.

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**Methods**

This study includes 42 fresh intertrochanteric fractures in patients with age more than 70 years where osteosynthesis done using PFNA during the period of March 2016 to February 2017 at SSG hospital, Vadodara. Patients having other fracture in lower limb, polytrauma patients and pathological fractures were excluded.

All fractures were classified according to AO classification. Data was prospectively collected and analyzed for clinical, radiological and functional results. All patients were operated under spinal anaesthesia. Preoperatively neck shaft angle of opposite side taken and accordingly measured size angle nail was used for fixation. On table reduction was graded according to garden alignment index (GAI) [9, 10], Cleveland zones [11] and tip apex distance (TAD) [12] was used to evaluate the placement of helical blade in the femoral head [9]. Intra operatively data for reduction of fracture, tip apex distance, size of nail was measured. The length of nail was 240mm. Single distal locking was done. After first dressing on third postoperative day gradual mobilization of knee and non-weight bearing exercises were started. All patients were called for follow up 4 weekly till 24 weeks. During follow up clinical and radiological assessment was done. At final follow up functional outcome was assessed using Harris hip score.

**Observations and Results**

We have prospectively studied 42 patients of intertrochanteric fractures of age more than 70 years. During follow up 7 patients died due to associated comorbid conditions and 35 patients were available till final follow up. The mean age was 76 years (range 71-88). The female to male ratio was 1.3:1 (20F, 15M). 20 had left while 15 patients had right sided

fracture. 31A2 type was most common fracture pattern. Nine patients had 11A1, 17 had A2 and 9 had A3 type of fracture. The commonest angle of nail size used was 130 degree (Table no.1). In all patients close reduction was done with percutaneous manipulation of fracture fragments when needed. Commonly used blades were between 85-100 mm. In 19 patients reduction was very good according to GAI. In 12 patients reduction was good, in 3 acceptable and in one patient reduction was graded as poor. In 2 patients fixation was in varus. The mean tip apex distance was 16.8mm (range 12-26mm). The commonest size of nail used was 10mm\*240mm. The mean injury surgery interval was 5.34 days. (Range 3-9 days) The mean hospital stay was 15.54 days (Range 12-20 days). 20 patients had associated comorbid conditions. (Table no. 2) The mean surgical duration in 31A was 35 minutes, in 31A2 36 minutes in 31A3 43 minutes. Figure 1 shows good healing of fracture with PFNA.

**Table 1:** Shows different size of neck shaft angle of nail used.)

Neck shaft angle	No of patients	Percentage
135	12	34.28
130	20	57.14
125	3	8.57

**Table 2:** Shows associated common comorbid conditions in study age group of patients.)

Associated comorbid condition	No of patients	Percentage
Hypertension	9	25.71
Ischemic heart disease	5	14.28
Diabetes mellitus	3	8.57
Copd	2	5.71
Asthma	1	2.85



**Fig 1:** Shows pre-operative, post-operative, follow up and final follow up xry

During follow up one patient had superficial skin infection one had palpable proximal locking blade (Figure 2) and one patient had screw back out. None of the patients had implant failure, cut through of screws. In all patients the fracture was united during follow up. The mean time for fracture union was 13.58 weeks (range 12-20).



**Fig 2:** Show preoperative, postoperative, follow up and final follow up xry)

At final follow up 7 patients had slight pain, in four patients on the anterior aspect of thigh and rest had pain at greater trochanteric area. Five patients had slight limp at final follow

up. In this study 5 patients required cane for support while walking. Thirty patients were able to walk unlimited distance. Only 5 patients had to use support while climbing. Except for one, all patients were able to enter public transport. Two patients had terminal restriction of flexion, which affected their squatting to some extent, rest had almost full movements. At final follow up according to Harris hip score 27 patients had excellent result, 5 had good result, 2 had fair and one had poor result.

**Discussion**

Intertrochanter fractures are usually low velocity injuries in elderly. They commonly occurred from domestic fall. Prevalence of osteoporosis increases in both males and females in geriatric age which can result in fragility fractures like compression fractures in spine, lower end radius fracture and intertrochanter fracture. With increasing age comorbid conditions also rise and fractures of intertrochanter causes loss of mobilization of patients and restrict them to bed. Previously intertrochanteric fractures were treated conservatively but due to advances in modern orthopedics

fixation of this fractures provides early mobilization, resulting in decreased morbidity associated with bed ridden patients. Main problems in doing operative intervention in this age group of patients are high risk of anesthesia and associated perioperative mobilization problems. With decreasing the total time for anesthesia and surgical duration the morbidity associated with these fractures can be reduced. PFNA which has single blade and single distal locking provides reduction of time for fixation, c arm exposures and suturing time. Thus overall operative time reduces and total dose of anesthetic agent required for surgery is reduced. This results in less perioperative morbidity. Blade is fixed without so much reaming, causing preservation of natural cancellous bone for union and hammering of blade provides compaction of cancellous bone.

According to literature, the perioperative and postoperative technical complications described in the trochanteric fractures treated with the gamma nail were solved with the development of the PFNA [13-15]. In a study by Aguado-Maestro *et al.*, there were 200 patients of pertrochanteric fractures treated with PFNA, they found that helical blade device reduced the rate of cut through and cut out in pertrochanteric fractures and accurate placement of the helical blade was a key factor to prevent mechanical failures and they reported the incidence of cut out was 1% [16]. While the cut-out rates were found to be 2% in a study by Takigami *et al.*, 4.7% in a study by Sahin *et al.* and 7.9% in a study by Zhang *et al.* [17-19]. The rates of femoral head perforation were found to be 1.4% in a study by Karapınar *et al.* and 1.2% in a study by Simmermacher *et al.* [20, 21]

When there is poor reduction of fracture, the vicious cycle starts going in direction of poor implant placement resulting in high failure rate. In the current study reduction was satisfactory in 88.5% of patients. Ideal TAD was achieved in more than 90% of patients. Only 2.8% had implant related complications in this study. The limitations of this study was small sample size, limited age group for selection of patient and less duration of follow up. Large sample size and multicentre study with long follow up protocol may help to produce better outcome variables.

## Conclusion

PFNA is a good implant in osteoporotic intertrochanteric fractures due to less surgical duration, less blood loss, ease of fixation and low rate of complications.

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