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## Comparative study to evaluate the results of short proximal femoral nail and proximal femoral antirotation 2 in unstable intertrochanteric fractures in elderly

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### Abstract

**Introduction:** Intertrochanteric fractures are common osteoporotic fractures in adults above 70 years with high mortality and morbidity if not adequately treated. Common techniques for fixation of intertrochanteric fractures are sliding hip screw and plate or intramedullary nailing. PFNA2 is newer intramedullary load bearing device allowing early rehabilitation. We decided to compare the results of PFNA2 with PFN.

**Methods:** Prospective follow up study carried out at MIMER Medical College Talegaon (D) from June 2016 to December 2017. 53 patients with unstable intertrochanteric fractures were included after randomization and operated on fracture table in supine position with PFNA2 and PFN. We measured operative time, duration of hospital stay, modified Harris hip score, image intensifier time, complications at 6, 12, 24 and 36 weeks after surgery.

**Results:** Operative time, duration of hospital stay was almost same in PFNA2 and PFNA but image intensifier time was less in case of PFNA2 with significant P value. Varus malunion was less in PFNA2.

**Conclusion:** Both PFN and PFNA2 are equally effective for treatment of osteoporotic intertrochanteric fractures in elderly as they allow short incision, less blood loss and allow early rehabilitation with less mortality and morbidity. However PFNA2 gives less radiation exposure and more stability and should be the implant of choice in elderly osteoporotic patients if they can afford slightly higher cost of this new nail.

**Keywords:** Intertrochanteric, intramedullary, nailing, proximal, antirotation, helical

### Introduction

Intertrochanteric fractures are common osteoporotic fractures in adults above 70 years with high mortality and morbidity if not adequately treated. Now a days early mobilisation is encouraged to decrease complications like pneumonia, bed sores, cardiovascular events etc. [1] Mortality in intertrochanteric fractures is about 15 to 20 percent. Recently operative management is fast picking up to decrease these complications [2].

Unstable intertrochanteric fractures are those intertrochanteric fractures with loss of posteromedial buttress, comminution of greater trochanter, reverse obliquity, intertrochanteric extension to neck etc. [3, 4, 5]

Common techniques for fixation of intertrochanteric fractures are sliding hip screw and plate or intramedullary nailing. Dynamic hip screw technique requires wide surgical exposure with prolonged hospital stay, increased risk of infection and decreased chances of mobility to avoid complications like varus malunion, implant cut out etc, though it has stood the test of time [6]. Intramedullary nailing has advantages of short incision, less operative time, rapid rehabilitation and thus decreased medical complications [7]. Intramedullary nailing can be done with older Gamma nail (now given up practically), short or long proximal femoral nail or proximal femoral nail antirotation 2 (latest) [8, 9]. PFNA 2 is intramedullary load bearing device allowing early rehabilitation. It has single helical blade with a large surface area and is claimed to provide optimal anchoring into osteoporotic bone compared to standard proximal femoral

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nail even in patients with relatively small femur bone.<sup>10</sup> Hence we decided to compare the results of PFNA2 with PFN to confirm or contradict this claim if possible.

### Material and Methods

We carried out prospective follow up study at MIMER Medical College Talegaon (D) from June 2016 to December 2017. 53 patients with unstable intertrochanteric fractures who presented to emergency department at college hospital were selected for study. Local ethical committee approval was taken and written informed consent from patients was obtained. Patients were allotted to two groups, one with PFN and the other with PFNA2 after randomization.

We performed both surgeries on traction table in supine position under image intensifier control aiming for closed reduction as far as possible. For PFNA2 170-240 mm long, 10-12 mm diameter with proximal diameter of 16.5 mm and mediolateral angle of 5 degrees was chosen. Helical blade of 14 mm diameter was inserted into femur without drilling. For PFN 180 to 240 mm long, 10-12 mm diameter with proximal diameter 17 mm and mediolateral angle of 6 degrees was used. 2 bolts of 8 mm and 6.4 mm were inserted into neck of femur in PFN. Both nails were dynamically or statically locked distally. Both types of nails were inserted using percutaneous technique as far as possible. Patients were given preoperative and postoperative analgesics and IV antibiotics as usual. Postoperatively patients were mobilized at the earliest. We measured operative time, duration of hospital stay, modified Harris hip score, image intensifier time, complications etc. Postoperative AP and Lat xrays were taken in which reduction and fixation were noted. Patients were

followed up at 6, 12, 24 and 36 weeks after surgery clinically and radiologically. Data was represented as mean and standard deviation for continuous variables or percentages and frequency for discrete variables. Student paired t test was used for continuous variables and chi square test was used for discrete variables.

### Results

There were 18 males and 9 females in PFNA2 group whereas there were 17 males and 9 females in PFN group. P value was 0.922.

Mean age in PFNA2 group was 73.2 yrs and 75.27 yrs in PFN group. This was also not significant statistically.

Operative time was 38.15 min in PFNA2 group and was 41.15 min in PFN group. P value was 0.08. Duration of hospitalization was 9.2 days in PFNA2 group and 9.05 days in PFN group. This was also not statistically significant.

Image intensifier time was 20.63 min in PFNA2 group and 25.89 min in PFN group. P value was 0.00. Modified Harris hip score was 71.41 (60-78) in PFNA2 group but 78.01 (72-80) in PFN group. P value was significantly better in PFN A2 group.

### Patient demographics and P value between the two groups

Type of Nailing	Male	Female	Mean Age	P value
PFNA2	18	9	73.2	0.922
PFNA	17	9	75.27	

### Findings

Type of Nailing	Operative time	Duration of Hospitalization	Image Intensifier	Modified Harris Hip Score
PFNA 2	38.15 min	9.2 days	20.63 min	71.41 (60-78)
PFNA	41.15 min	9.05 days	25.89 min	78.01 (72-80)
P Value	0.08		0.00	

### Complications

Type of Nailing	Screw cut out Or back out	Z effect	Nail break	Varus malunion More than 5 deg
PFNA 2	4	-	1	4
PFNA	4	1	1	10

### Discussion

Intertrochanteric fractures are more common in elderly (above 70) yrs due to osteoporosis. Unless operated early they have high morbidity and mortality<sup>[8]</sup>. DHS and plate fixation was gold standard in treatment until advent of PFN<sup>[9, 10]</sup>.

PFN nail has advantages like short incision with less blood loss, less operative time and early rehabilitation with decreased morbidity<sup>[11]</sup>.

After invention of new design of PFN-(PFNA 2) claims have been made of its superiority<sup>[12]</sup>.

In our study there was no difference in operative time and duration of hospitalization in both PFN and PFNA 2 groups.

Image intensifier time was significantly less in PFNA 2 group which can be explained by the fact that there is only one screw in PFNA 2 and thus less use of image intensifier. This can be an advantage as radiation exposure is increasingly recognized hazard in Orthopaedics<sup>[12]</sup>.

Modified Harris hip score was better in PFNA 2 group as compared to PFN group which signifies better outcome. Although screw and nail complications occurred in both groups varus malunion was significantly less in PFNA 2 group. This can be explained by helical blade use in PFNA 2.

Helical blade has significantly higher torque for rotation of the femoral head as compared to lag screw in PFN.<sup>[12, 13]</sup>. Insertion of helical blade compacts the cancellous bone in head and neck. Also helical shape increases the contact surface area. Thus the increased stability could lead to less varus deviation and rotation and this was reflected in less varus malunion in PFNA2 group. These effects are seen in osteoporotic elderly patients.

### Conclusion

Both PFN and PFNA2 are equally effective for treatment of osteoporotic intertrochanteric fractures in elderly as they allow short incision, less blood loss and allow early rehabilitation with less mortality and morbidity. However PFNA 2 gives less radiation exposure and more stability and should be the implant of choice in elderly osteoporotic patients if they can afford slightly higher cost of this new nail.

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