

## Comparative Evaluation of PFNA2/PFNA in Trochanteric Fractures: A Prospective Study

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### Abstract

**Purpose:** Trochanteric fractures commonly occurring in elderly and notorious for their morbidity and complication. With the aim of early mobilization and minimization of complications we did this prospective comparative study of PFNA2 and PFNA.

**Methods:** We had 38 cases in each group. All the cases were operated by same set of surgeon/assistant. Our mean follow up was 30.6 weeks.

**Results:** The results were evaluated in respect of operating time, blood loss, and mobilization of patients and union time. We had less blood loss, lesser operating time, better functional outcome and minimal complications with PFNA2. Mean HHS in PFNA2 group was  $87.32 \pm 11.67$  and  $83.23 \pm 11.45$  in PFNA group.

**Conclusion:** We found PFNA2 a better implant compared with PFNA in management of Trochanteric fractures.

**Keywords:** Trochanteric fracture, Randomized, Prospective, Comparative, (PFNA@/PFNA)

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### Introduction

Trochanteric fractures have long been associated with elderly. The common age group being patients above 60 years.[1,3] However nowadays no age is immune. Due to road traffic accidents (RTA) or other severe injuries our younger population is also affected. it has been predicted that the yearly incidence of trochanteric fractures in the world will reach 1.6 million by 2025 and 2.5 million by 2050. In 1990 our Asiatic population contributed 26%, likely to rise to 32% in 2025 and 38% in 2050.[4] Unstable trochanteric and sub trochanteric fractures poorly respond to conservative

treatment resulting in mal-unions and non-unions. The inherent instability of these fractures demand accurate reduction and stabilization by surgical intervention[5]. A variety of implants both extra medullary (DHS, DCS) and intramedullary (PFNA and PFNA2) are in common use. DHS-works on the principle of controlled collapse and needs longer immobilization. PFNA with its 6<sup>0</sup> angulations fits well in the medullary cavity but placing two screws in the neck often becomes difficult in our Asiatic populations. It is often associated with Z effect and backing out of the screws

in the osteoporosed bones[6]. Theoretically PFNA2 has been attributed to compaction of the helical blade in the neck and the head bone, larger contact area and lesser cut-out/ back out chances – especially with the recently added locking bolt/cap to the helical blade. A single helical blade PFNA2 is technically better for small size femoral neck in Asiatic Population. At the same time biomechanically helical blade in PFNA2 has better cut out resistance level than screws[7].

With above pretext we conducted this prospective study between July, 2018 to June, 2021 to evaluate the various aspects of PFNA and PFNA2 in trochanteric fractures.

### Material and Method

We included a total no. of 76 cases in this study. They were randomly divided in two groups. **Group A: PFNA2 – 38 cases & Group B: PFNA – 38 cases.**

Intra-operative findings i.e. time, blood loss/transfusion, guide wire breakage, iatrogenic fractures etc. were recorded. Post operative evaluation at 3, 6, 12 and 24 weeks were conducted in respect to clinical radiographic and functional assessment. The minimum follow up was 24 weeks and the mean follow up 30.6 weeks.

### Results & Observations

The commonest age group involved was above 60 years with a female preponderance (osteoporosed / poor bone mass). The mean operative time in the PFNA2 was  $30 \pm 7$  minutes whereas in the PFNA group it was  $55 \pm 15$  minutes. The blood loss in the PFNA2 group was less than 100 ml in 34 cases and more than 100 ml in only 4 cases. On the other hand in the

PFNA group only 7 cases has blood loss of less than 100 ml. None of the patients in PFNA2 group has breakage of wire or iatrogenic fractures whereas PFNA group breakage of guide wire occurred in 2 cases and iatrogenic fractures in 1 case. In the PFNA2 group 16 patients were allowed weight bearings within in 12 weeks remaining 22 patients were allowed full weight bearing by 24 weeks. None of these cases required any secondary procedure/ bone grafting. In the PFNA group only 8 cases were allowed weight within 12 weeks whereas 28 cases took upto 24 weeks for weight bearings. 2 cases required secondary procedure/bone grafting after 24 weeks. Breakage of nail was observed in 1 case in the PFNA2 group at 16 weeks but the patient was walking. On radiographic examination a varus mal union in progress was observed. The patient was advised revision but refused. At 24 weeks fracture united even with the broken nail in 10<sup>0</sup> varus. Superficial infection was observed in 1 case. In the PFNA group there was one case of breakage of nail with breakage of screws. Back out of screws was seen in one case whereas in 1 case screw cut out through the head. Superficial infection was present in 4 cases at the time of stitch removal, managed with dressing and antibiotics. One patient developed deep infection and was managed with wound debridement, IV antibiotic and secondary closure. At the end of 24 weeks final evaluation was done as per Harris Hip Score, In the PFNA2 group it was excellent in 16 cases good 12 cases, fair-9 , poor- 1 case. In the PFNA group it was excellent 10 cases, good-12, fair-13 and poor- 4 cases. Mean HHS in PFNA2 group was  $87.32 \pm 11.67$  and  $83.23 \pm 11.45$  in PFNA group.

Total No. of Cases: 76

<b>Table 1: Demographic</b>
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<b>Age (in Years)</b>	<b>20 to 40</b> (5 /6.57 %)		<b>41 to 60</b> (22 / 28.94 %)		<b>More than 61+</b> (49 /64.47%)	
<b>Sex</b>	<b>Male</b>	<b>Female</b>	<b>Male</b>	<b>Female</b>	<b>Male</b>	<b>Female</b>
	<b>4 (80%)</b>	<b>1</b> (20%)	<b>8</b> (36.36%)	<b>14</b> (63.63%)	<b>23</b> (46.93%)	<b>26</b> (53.06%)

<b>Table 2: Intra Operative Observation</b>		
	<b>PFNA2</b>	<b>PFNA</b>
<b>Total Cases</b>	<b>38</b>	<b>38</b>
<b>Blood Loss</b>		
<b>&lt; 100 ml</b>	<b>34(89.47%)</b>	<b>7(18.42%)</b>
<b>≥100 ml</b>	<b>4(10.53%)</b>	<b>31(81.58%)</b>
<b>Guide wire breakage</b>	<b>0</b>	<b>2(5.26%)</b>
<b>Iatrogenic fracture</b>	<b>0</b>	<b>1(2.63%)</b>

<b>Table 3: Post-Operative Evaluation ( Weight Bearing)</b>		
	<b>PFNA2</b>	<b>PFNA</b>
<b>Total Cases</b>	<b>38</b>	<b>38</b>
<b>Period</b>		
<b>Within 12 weeks</b>	<b>16(42.10%)</b>	<b>8(21.06%)</b>
<b>13 week -24 weeks</b>	<b>22(57.90%)</b>	<b>26(68.42%)</b>
<b>&gt; 24 weeks</b>	<b>0( %)</b>	<b>4(10.53%)</b>
<b>Secondary Procedure</b>		
<b>Bone Grafting</b>	<b>0( %)</b>	<b>2(5.26%)</b>

<b>Table 4: Complications</b>		
<b>Complications</b>	<b>PFNA2</b>	<b>PFNA</b>
<b>Breakage of nail</b>	<b>1(2.63%)</b>	<b>1(2.63%)</b>
<b>Breakage of helical blade/screw</b>	<b>0</b>	<b>1(2.63%)</b>
<b>Back out/cut trough</b>	<b>0</b>	<b>2(5.26%)</b>
<b>Superficial Infection</b>	<b>1(2.63%)</b>	<b>4(10.53%)</b>
<b>Deep Infection</b>	<b>0</b>	<b>1(2.63%)</b>
<b>Malunion</b>	<b>1(2.63%)</b>	<b>3(7.89 %)</b>

<b>Table 5: Final Grading as per Harris Hip score</b>		
<b>Grade</b>	<b>PFNA2</b>	<b>PFNA</b>
<b>Excellent</b>	<b>16(42.11%)</b>	<b>10(26.31%)</b>
<b>Good</b>	<b>12(31.58%)</b>	<b>12(31.58%)</b>
<b>Fair.</b>	<b>9(23.68%)</b>	<b>13(34.22%)</b>
<b>Poor</b>	<b>1(2.63%)</b>	<b>3(7.89%)</b>



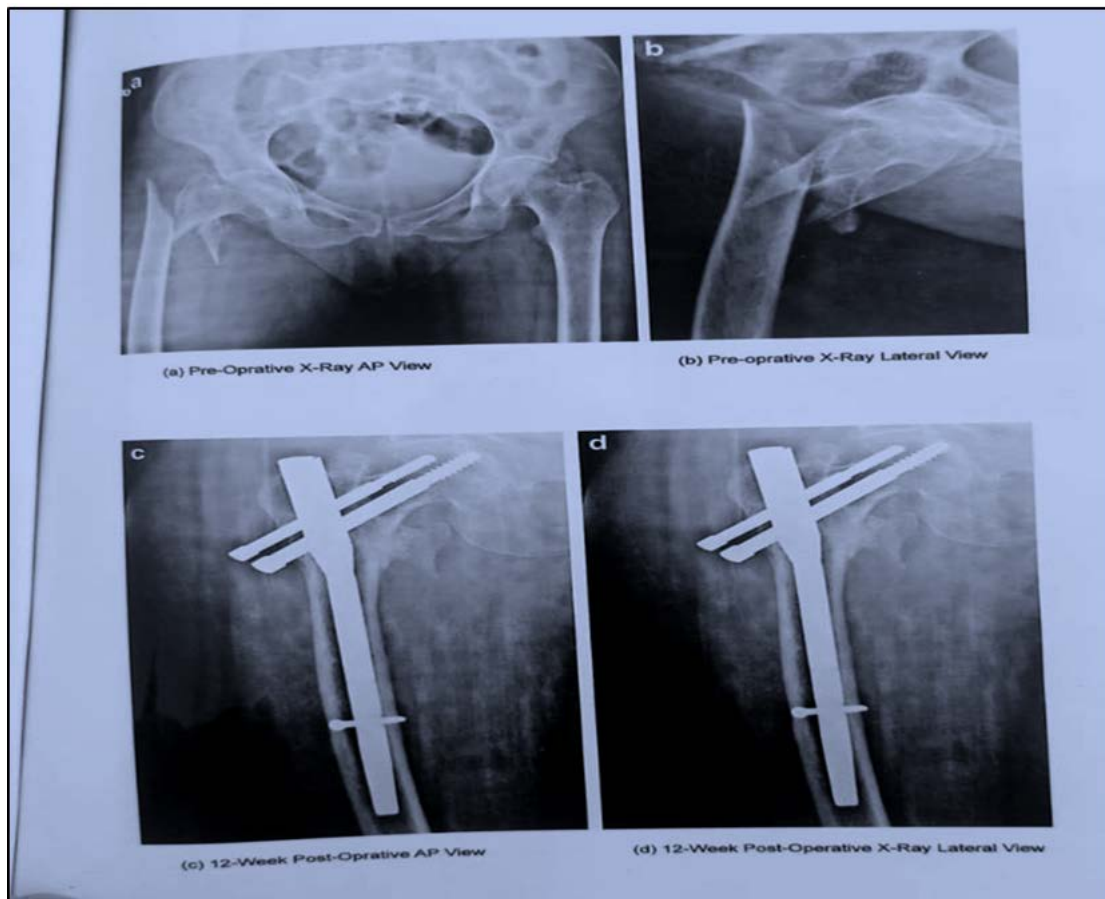
Figure 1: Pre-Operative Graph (15.03.2019 )



Figure 2: Post-Operative Graph (13.07.2019 )



Figure 3: Post-Operative Graph (23.07.2019)



**Figure 4: Post-Operative Graph(27.02.2020)**

### Discussion:

Techocentric fractures are notorious for their high morbidity and a variety of complication due to prolonged immobilization. Gone are the days of conservative treatment and early mobilization is today's aim of treatment. Extra-medullary implants such as DHS with its mechanism of controlled collapse are good for stable fractures but not for unstable fractures. Integrity of the lateral wall is a pre requisite for DHs. Lateral wall fractures and reverse / fractures are better managed with intramedullary implant – PFNA2 and PFNA with their biomechanical advantage.[11] However in highly comminuted and old trochanteric fractures cemented hip arthroplasty have shown good results.

With its 6° angulations PFNA2 and PFNA fits well in our Asiatic femur. The Helical blade in PFNA2 has several advantages- it compacts the weak cancellous bone of the

femoral neck and head (which is removed in PFNA screw) has a larger contact area with bone than conventional screws and a better biomechanical stability.[8]

Vajpayee in his 76 cases (PFNA screws and Blades) reported no difference in respect to operating time, blood loss, period of hospitalization and functional outcome.<sup>14</sup> In their series of 62 cases treated with PFNA and PFNA2 Loo et al observed that 83.9 % cases were able to attain pre-trauma mobility status within 6 months after surgery. They had 3 cases of lateral protrusion (back out of helical blade) but no cut out of the head. Recent addition of locking head cap is expected to better manage this problem. Harshbardhan et al[9] reported less operating time, minimal blood loss and early weight bearing and lesser time union with PFNA2.[11] Paradis C et al[10] has also got better result in PFNA2 as compared to than PFNA.

Our results are closer to Harshwardhan et al and Shashikant et al[9]. Our cases were managed by single team. However our limitation is small sample size.

More randomized controlled studies with larger sample size should be done to make a consensus and authentic recommendation for the management of these fractures. A good intra operative reduction, optimal position and length of the neck screw/helical blade and the nail are still the most important pre-requisite for the successful outcome of this fractures.

Finally we conclude that PFNA2 is better implant than PFNA in the management of unstable trochanteric and sub-trochanteric fractures in respect to operating time, blood loss, union rate and complications.

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