

# Functional outcome of intertrochanteric fractures treated with Proximal Femoral Nail Antirotation (PFNA).

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## ABSTRACT

**Objective:** To determine the functional outcome of intertrochanteric fractures treated with Proximal Femoral Nail Antirotation (PFNA).

**Methods:** This descriptive study was conducted in Unit I, Department of Orthopedic Surgery, Jinnah Hospital Lahore from 25<sup>th</sup> May 2019 to 4<sup>th</sup> November 2021. All patients with unstable intertrochanteric fractures fulfilling the inclusion criteria undergone Proximal Femoral Nailing(PFNA). Post operative functional outcome was assessed at 6<sup>th</sup> months using Harris hip score and were categorized as excellent, good, fair, and poor.

**Result:** The total number of patients in this study were 85. The mean age was 49.41±12.24 year. There were 56(65.88%) female patients and 29(34.12%) male. Left sided fracture was found in 44 (51.76%) patients whereas the right-side fracture found in 41 (48.23%) patients. Boyd and Griffin type III fracture was documented in 46 (54.11%) patients whereas the type IV fracture noted in 39 (45.88%) patients. The mean Harris hip score was 84.84±8.80. Excellent outcome was noted in 27(31.76%) patients and good in 38(44.71%) patients.

**Conclusion:** Unstable intertrochanteric fractures treated with Proximal Femoral Nail Antirotation(PFNA) produced excellent and good functional outcome in majority of our patients. We recommend PFNA as treatment of choice for unstable intertrochanteric fractures

**Keywords:** Boyd and Griffin, Intertrochanteric, PFNA, Proximal Femoral Nail.

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## INTRODUCTION

Proximal femoral fractures are common injuries sustained by elderly people due to osteoporosis and low energy trauma whereas in younger people these fractures are due to high energy trauma like road accidents.<sup>1</sup> Proximal femoral fractures include neck of femur fracture, pertrochanteric, intertrochanteric and subtrochanteric fractures or in combination.<sup>2</sup> Various treatment options are available including Dynamic Hip Screw(DHS),Proximal femoral locking plate, Gamma nail, interlocking nail and proximal femoral nail antirotation (PFNA).<sup>3,4</sup> Intramedullary implants are preferred over extra medullary implants in unstable fractures because early mobilization is ensured and there are less chances of hemorrhage, infection and implant failure.<sup>5</sup> Proximal femoral nail antirotation (PFNA) is now considered as the gold standard for treating type III and IV intertrochanteric

fractures.<sup>6</sup> Many studies have reported excellent and good functional outcome in intertrochanteric fractures treated with Proximal femoral nail antirotation (PFNA).<sup>7,8</sup>

The objective of our study was to determine the functional outcome of intertrochanteric fractures treated with Proximal Femoral Nail Antirotation (PFNA).

## METHODS

We conducted this descriptive study in Unit I, Department of Orthopedic Surgery Jinnah Hospital Lahore from 25<sup>th</sup> May 2019 to 4<sup>th</sup> November 2021. All adults patients with intertrochanteric fractures( Boyd and Griffin type III and IV fractures)<sup>9</sup> presenting within one week of sustaining the fracture were included in this study. Patients of poly trauma, bilateral fractures, open fractures, pathological

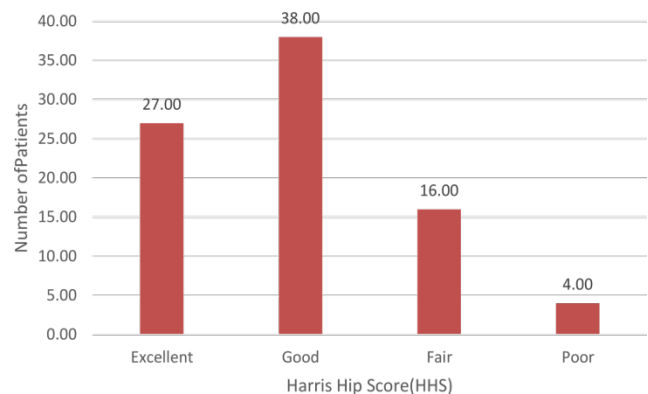
fractures and revision surgery were excluded. The study was approved by the Ethical Committee of our hospital. Informed written consent was obtained from all the participants. Complete history and physical examination was done. Relevant investigations were ordered. All the patients were operated by the principal author. General and spinal anaesthesia was used. Patients were operated with PFNA (PFNA with Helical screw 240mm@Zimmer) under image intensifier following same standard operative technique in all cases. In all cases lag screw was placed in the central and inferior position in neck of femur in AP view and central in lateral view with attainment of Tip Apex Distance(TAD) <20mm. The nail was locked distally in all cases. Post operatively all the patients were mobilized and rehabilitated under the supervision of qualified physiotherapist. Post operative visits were scheduled at 2 weeks initially and then monthly for six months. In each visit radiological union was assessed with radiographs and functional outcome with Harris Hip Score(HHS).<sup>10</sup> The final HHS at 6<sup>th</sup> months was documented and interpreted as excellent( 90 to 100),good( 80 to 90), fair( 70 to 80) and poor( <70).

All the data was entered and analyzed through SPSS version 23. The quantitative variables like age, duration of fracture and Harris Hip Score(HHS) was presented as mean±SD. The qualitative variable like gender, anatomical side, fracture types were presented as frequency and percentage. Data was stratified for age, gender, duration of fracture, anatomical side and fracture type. Post-stratification

Chi-square test and Independent Sample-t test was used to calculate P value. P value <0.05 was considered significant. Data was presented in graph and table where necessary.

## RESULTS

We operated 85 patients with PFNA. The mean age of our patients was 49.41±12.24 years (range 27 to 70 years). Majority (65.88%,n=56) of our patients were female while male patients were 29(34.12%).The mean duration of fracture was 4.66±1.74 days.(range 1 to 7 days). Our study showed that left sided fracture was found in 44 (51.76%) patients whereas the right-side fracture was present in 41 (48.23%) patients.



**Fig I.** Graph showing post operative function outcome as per Harris Hip Score.

**Table I:** Stratification and comparison of different variable in relation to functional outcomes as per HHS.

Variables	Stratification	Functional outcome(HHS)				P value
		Excellent	Good	Fair	Poor	
Age (years)	≤ 50	14(29.8%)	20(42.6%)	11(23.4%)	2(4.3%)	<b>0.488</b>
	>50	13(34.2%)	18(47.4%)	5(13.2%)	2(5.3%)	
Gender	Male	8(27.6%)	12(41.4%)	8(27.6%)	1(3.4%)	<b>0.409</b>
	Female	19(33.9%)	26(46.4%)	8(14.3%)	3(5.4%)	
Fracture duration (days)	≤ 4	17(28.8%)	26(44.1%)	12(20.3%)	4(6.8%)	<b>0.153</b>
	>4	10(38.5%)	12(46.2%)	4(15.4%)	0(0.0%)	
Fracture side	Left	6(13.6%)	27(61.4%)	8(18.2%)	3(6.8%)	<b>0.013</b>
	Right	21(51.2%)	11(26.8%)	8(19.5%)	1(2.4%)	
Type of fracture (Boyd and Griffin)	Type III	14(30.4%)	22(47.8%)	9(19.6%)	1(2.2%)	<b>0.720</b>
	Type IV	13(33.3%)	16(41.0%)	7(17.9%)	3(7.7%)	

Boyd and Griffin type III fracture was documented in 46 (54.11%) patients whereas the type IV fracture was noted in 39 (45.88%) patients. PFNA with closed reduction was performed in all cases. Radiological union was achieved in all patients at 15.4±3

weeks(range 12 to 20 weeks).At 6<sup>th</sup> months follow up the mean HHS was 84.84±8.80.The grading of functional outcome as per HHS is shown in graph I. Majority(76.47%,n=65) of our patients had excellent and good outcome. Data stratification and

comparison (table I) revealed no statistically significant difference in HHS for age, gender, duration of fracture and fracture type ( $P > 0.05$ ). Right sided PFNA however showed better HHS than left sided PFNA ( $p < 0.05$ ). Superficial surgical site infection was noted in 03 (2.35%) patients and resolved with dressing and antibiotics. Varus position of the screw was noted in 2 (3.52%) patients.

## DISCUSSION

In this study 85 patients of intertrochanteric fractures were treated with PFNA. The mean Harris hip score at 6<sup>th</sup> month was  $84.84 \pm 8.80$ . Excellent outcome was noted in 27 (31.76%) patients and good in 38 (44.71%) patients. Onta *et al*<sup>1</sup> treated 37 patients with PFNA and documented mean HHS of 84.73 with 35.1% patients had excellent outcome, 45.9% good, 13.5% fair and 5.4% poor functional outcome. These authors concluded that PFNA is minimally invasive technique with less operative time, blood loss and radiation exposure as compared to DHS. Garabadi<sup>12</sup> treated 70 cases with PFNA. At one year follow up he documented Excellent functional outcome in 62, good in 4 and poor in 2 patients. Radaideh and colleagues<sup>13</sup> treated 50 patients with PFNA, The mean follow up period was 18 months. The mean HHS at final follow up was  $79.34 \pm 9.10$ . These authors concluded that PFNA should be the first line of treatment for unstable intertrochanteric fractures because it provides stable fixation, technically easy with reduced blood loss and excellent radiological and functional outcome. Sharma and Mahajan<sup>14</sup> treated 25 patients with PFNA and 23 with PFN. The mean HHS was 78.85 in PFNA and 75.37 in PFN ( $p = 0.54$ ). These authors noted that implant related complications were statistically less in PFNA than in PFN ( $p = 0.02$ ). Ye *et al*<sup>15</sup> treated 90 patients with PFNA and at one year follow up noted mean HHS of  $80.5 \pm 9.8$ . Excellent functional outcome was noted in 26, good in 37, poor in 18 and bad in 9 patients. These authors concluded that PFNA should be the ideal implant to treat unstable intertrochanteric fractures because it had higher union rates, less operative time and early post operative mobilization. Sahin and Erturer<sup>16</sup> treated 45 patients with PFNA. The mean follow up period at 17.3 months revealed mean HHS of 77.8 with very good outcome in 11 (24.4%), good in 19 (42.2%), moderate in 9 (20%) and poor in 6 (13.3%) patients. In one local study Shah and Aslam<sup>17</sup> treated 35 unstable intertrochanteric fractures with PFNA and noted union in all patients without any significant major complications. These authors however did not

use HHS for post operative functional outcome. In another local study by Khan and Ali<sup>18</sup> 20 patients were treated with PFNA and 20 with Sliding Hip screw (SHS). These authors noted better union rate in PFNA (95%) than in SHS (85%). The functional outcome was better in PFNA than in SHS group. The complications were more in SHS group than in PFNA group. Kumar<sup>19</sup> treated 30 patients with PFNA (helical blade) and 30 with PFNA (screw) and documented no significant difference in the outcome between the two implants ( $P > 0.05$ ). However the author noted that PFNA helical blade was associated with less operative time, minimum per operative bleeding and less radiation exposure than PFNA screw fixation.

In our study Superficial surgical site infection was noted in 03 (2.35%) patients and resolved with dressing and antibiotics. Varus position of the screw was noted in 2 (3.52%) patients. Variable frequency of complications of PFNA have been reported in literature. Shah and Aslam<sup>17</sup> noted superficial surgical site infection in 2 (5.7%) patients. Ye *et al*<sup>15</sup> reported secondary varus in 02 patients, screw cut out in 1 patient and femoral shortness in 10 patients. Sahin and Erturer<sup>16</sup> noted secondary varus in 2 (4.4%) patients, screw cut out in 1 (2.2%) and femur shortness in 9 patients. Revision surgery were performed in 4 (8.9%) patients. Garabadi<sup>12</sup> documented, migration of blade in 8 patients and varus collapse in 2 patients and nonunion in 2 patients. Radaideh and colleagues<sup>13</sup> did not document any implant related complication at 18 months follow up. Zhang<sup>20</sup> reviewed the record of 295 patients who were treated with PFNA and concluded that optimum fracture reduction and central position of the screw on lateral view were the two significant technical factors that could avoid mechanical failure of PFNA. Hao *et al*<sup>21</sup> noted implant failure in 6 (13.3%) patients. These authors claimed that improper fracture reduction and lack of posteromedial support are the predictors of implant failure in their series. Singh<sup>22</sup> reported complication rates of 1.7% in patients treated with PFNA. Singh considered fracture reduction, Tip Apex Distance (TAD), neck shaft angle and Cleveland index as the most important predictors of implant failure in his series.

Our study had few limitations. Our study design was descriptive. We had small sample size and short follow up period. We recommend further studies to verify the usefulness of PFNA in unstable intertrochanteric fractures.

## CONCLUSION

Unstable intertrochanteric fractures treated with Proximal Femoral Nail Antirotation (PFNA) produced excellent and good functional outcome in majority of our patients. We recommend PFNA as treatment of choice for unstable intertrochanteric fractures. Optimum fracture reduction and accurate placement of helical screw in the neck of femur are however mandatory for achieving a stable fixation and fracture union.

**Conflict of Interest:** None

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