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A comparative study between proximal femoral nail and proximal femoral nail antirotation in treatment of unstable inter trochanteric fractures in elderly

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Abstract
Introduction: Unstable intertrochanteric fractures are those intertrochanteric fractures with loss of posteromedial buttress, comminution of greater trochanter, reverse obliquity, intertrochanteric extension to neck. PFN and PFN A are two implants which have been commonly used to stabilize these fractures. Each of these implants has its own advantages and disadvantages. Our study was undertaken in an attempt to compare these two types of Intra-medullary devices.
Material and Methods: A prospective follow up study was carried out at Dr. D.Y. Patil medical college, Pimpri, Pune from June 2017 to December 2018 with 25 being the sample size, randomized into 2 groups to undergo CRIF (Closed Reduction and Internal Fixation) of trochanteric fractures with either a standard PFN or PFNA. Out of the 25 patients, 13 underwent fixation with PFN (proximal femoral nail) and the remaining 12 with PFNA (proximal femoral nail antirotation) and follow-up was done at 06 weeks, 12weeks, 24weks and 1year.
Conclusion: From the study we can reason that, when the fracture is united, functional result is identical in the both category. Be that as it may, contrasted with PFN, utilization of PFNA altogether lessens the operative span, measure of blood loss and number of intraoperative fluoroscopic imaging and certain implant related complications and furthermore the duration of stays in the tertiary care center.

Keywords: Proximal femoral nail, Proximal femoral nail anti rotation, unstable trochanteric fracture

Introduction
Because of increment in mean age worldwide there has been an impressive increment in the occurrence of proximal femoral fracture (1) Now a days early activation is urged to diminish entanglements like pneumonia, bed wounds, cardiovascular occasions and so on [2]. Mortality in intertrochanteric fracture is around 15 to 20 percent. As of operative intervention is quick grabbing to diminish these intricacies [3]. Unstable intertrochanteric fracture are those intertrochanteric fracture with loss of posteromedial cortex, comminution of greater trochanter, reverse obliquity, intertrochanteric extension to neck etc. [4-6]. Normal strategies for management of intertrochanteric fracture are sliding hip screw and plate or intramedullary nailing. Dynamic hip screw system requires careful introduction with extensive dissection of soft tissue with longer clinical stay, expanded danger of disease and diminished odds of versatility to maintain a strategic distance from complexities like varus malunion, implant cut out and so forth, however it has stood the trial of time [7]. A few investigations have reasoned that DHS is not proper for unstable trochantric fracture and recommended other modalities of management. The quality of the bone implant construct rely on the numerous components some them are as per the following bone quality, section geometry, reduction technique and quality of reduction. Of these elements, we can just control the nature of the reduction, decision of type of implant and its placement [8, 9]. Comminuted fracture are biomechanically much more stable when fixed with nail without shortening of abductor lever arm or change in proximal femoral biomechanics and anatomy. PFNA 2 is intramedullary load bearing implant permitting early recovery. PFN and PFNA are the intramedullary impalnt, most routinely utilized for intertrochantric fracture these days.

PFN comprise of an intramedullary nail with two screws of which one is the lag screw settling the fracture as it collapses and other is antirotation screw giving the rotational stablity, then again PFNA uses a solitary helical cutting screw rather than the routinely utilized two screws which is observed to give additional stablity, compression and rotational control of the fracture and it compacts the bone amid inclusion into the neck giving higher cut out quality, when contrasted and other implant, there by essentially diminishing possibility of failure of implant in osteoporotic bone of old patients [10]. In our examination we have made an endeavor to analyze both the intramedullary devices.

Material and Methods

A prospective follow up study was done at Dr. D.Y. Patil Medical College, Pimpri, Pune from 1st June 2017 to 1st December 2018. In our examination we have incorporated every one of the patients who were of age 60yrs or above with unstable intertrochantric fracture. Patients who were prohibited from the investigation incorporate those having stable kind of intertrochantric fracture, polytrauma, open break and serious cardiovascular or pulmonary deficiency. Between July 2018 and December 2018, 45 patients with trochanteric fracture were workedup and evaluated, of which 25 patients were incorporated into our case study based on the premise of consideration criteria. These patients where at that point separated randomly into two gathering of which 13 patients were treated with CRIF with PFN and other 12 patients where treated with CRIF with PFNA. The two nails were dynamically or statically secured distally and the nails were placed utilizing percutaneous procedure so far. Acute unstable intertrochantric fracture in our investigation were divided depending on radiograph as per AO/ASIF classification. Patients matching the above criteria managed with one of the two methodology where, following regional anesthesia patient was placed on fracture table. Three course of anti-biotics of which first, 30mins before technique and other were given post operatively. All the patients underwent clinical and radiological judgment of fracture morphology and union rate, first post-operatively which is repeated at 11/2 months, 3 months, and 6months.Neck shaft angle of the operated hip was contrasted with normal hip for the reduction quality post-operative on antero-posterior radiograph. A difference of less than 5 degree, between 5 and 10 degree and more than 10 degree in contrast with normal hip was considered as good, acceptable and poor reduction [11]. Tip apex distance (TAD) was used to contrast the reduction quality post operatively as described by Baumgaertner MR [12]. A TAD of less than 25 mm was considered satisfactory for both the implant and was calculated on immediate post op x rays. Functional assessment was done using Parker and Palmer mobility score [13]. The final follow up score was contrasted with the pre injury mobility score as a measure of return to mobility. Final assessment was done at 1year and Harris Hip Score was calculated to contrast hip function post surgery. Measurable contrast between continuous variable and categorical variable were evaluated utilizing Student t-test and Chi square test respectively.

Results

The mean age of patients in PFN and PFNA bunches was 66.3 ± 13.7 and 69.2 ± 8.3 years individually and did not vary altogether (p =0.53).

Table 1: Demography and salient characteristics

Salient characteristics	PFN	PFNA	P Value
Age (mean) (in yrs)	66.3	69.2	0.53
Male (%)	61.5	50	0.56

The mean procedure time was altogether lower in PFNA bunch when contrasted with PFN gathering (47.9 minutes versus 37 minutes, (p=0.002). Mean blood loss was additionally essentially lower in PFNA bunch when contrasted with PFN gathering (97.31 ml versus 50.0 ml ($p<$ 0.001). The mean number of C arm pictures taken intra operatively was altogether lower in PFNA bunch when contrasted with PFN gathering (58.7 versus 40.9, $p<$ 0.001) as appeared Table 2 and Figure1

Table 2: Intra operative details

Intra op details	PFN	PFNA	P Value
Mean Duration (mins)	47.9	37	<0.001
Blood loss in ml	97.3	50	<0.001
Images(no)	58.7	40.9	<0.001

In PFN group 11 out 13(77%) cases had good reduction on the other hand 11 out of 12 (91%) cases had good reduction and none of the patients had poor reduction as per our criteria (table or fig 3 and 4). Tip Apex Distance (TAD) when contrasted in both group was well within normal limits of 25mm was found to be 15.69mm (11.3mm to 27.5) for PFN group is was 21.84mm (13.9mm to 29.8mm). The average TAD of 23.6mm was noted in PFN cases with implant failure where as in five cases having TAD more than 25 mm in PFNA group, no implant failure was noted.

Fig 3: Fracture treated with PFN with follow at 1 year showing union.

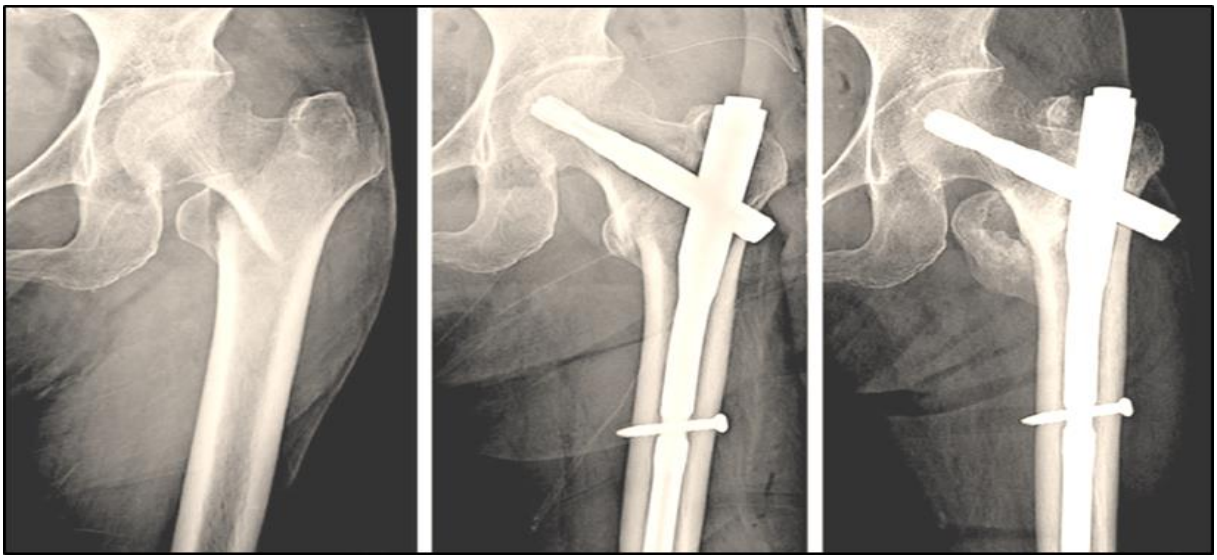

Fig 4: Fracture treated with PFN with union at 10 months follow up.

The post operative parkers mobility score at the final follow up was similar in both groups (5.10 in PFN vs 5.63 in PFNA) and the difference was not significant stastically and 6 out of 13(46%) in PFN and 5 out of 12 (42%) in PFNA group returned to the pre injury level (Fig /Table 5). The average Harris Hip Score which was calculated at the final follow up were identical and did not show any significant statistical difference, on an average it was found to be 78.07 for the PFN group and 80.83 in PFNA group as shown in table/fig 6.

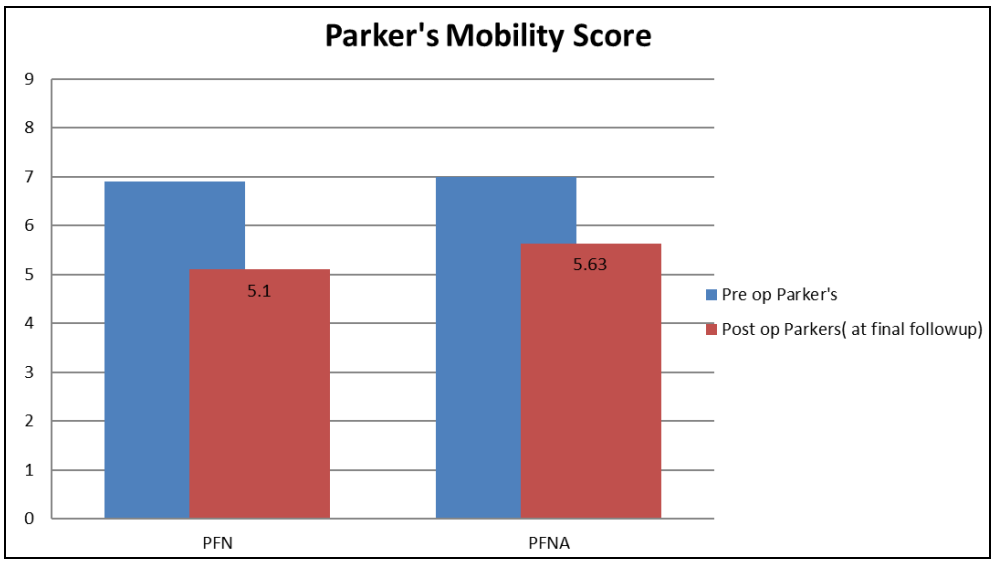

Fig 5: Parkers mobility score

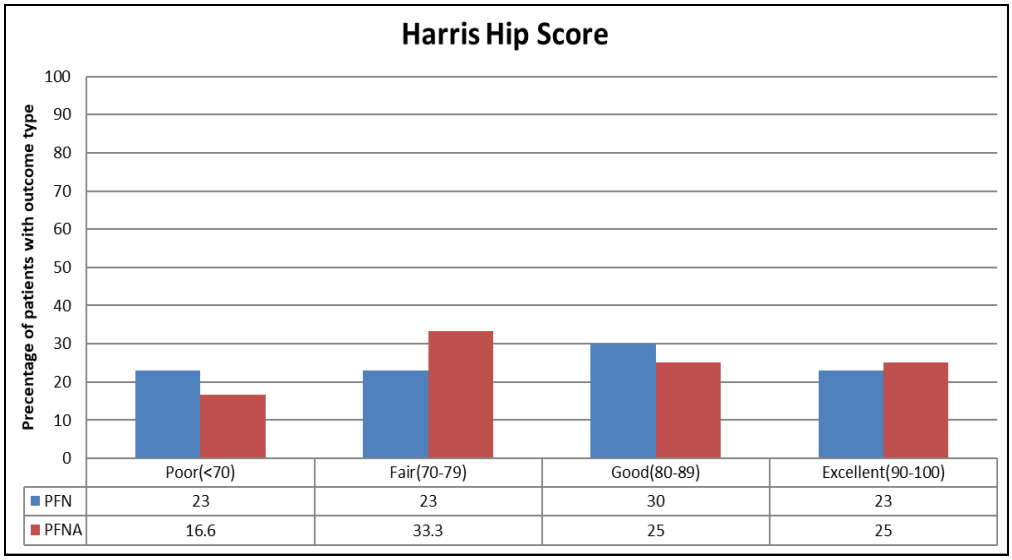

Fig 6: Harris hip score, showing the percentage of patients with type of outcome on final followup in both groups.

Among the 13 worked cases by PFN, two case had procedure site infection and was none among PFNA cases. The mean clinical stay (postoperatively) was lower in PFNA bunch when contrasted with PFN gathering, and was statistically significant (6.1 ± 1.2 days versus 5.7 ± 0.8 days, p =0.02). Post procedure implant related complications /outcome were seen more among the cases worked with PFN when contrasted with PFNA (Table 3), the difference in the implant related outcome were statistically significant.

Table 3: Complications

Complications	PFN, n (%)	PFNA [n (%)]	Total
Z-effect	1 (7.6%)	0	1(4%)
Reverse Z Effect or Medial migration	1(7.6%)	1(8.3%)	2(8%)
Screw back out	0	0	0
Screw cut out	1(7.6%)	0	1(4%)
Implant breakage	1(7.6%)	0	0
Total	4	1	5

Discussion

Clinical examinations have additionally demonstrated that osteoporosis is related with substandard results in trochanteric fracture [14]. Along these lines, different techniques are being utilized in endeavor to improve consequences in osteoporotic intertrochanteric fracture, including cement supplementation and enhancements in implant design [15]. The look for a perfect implant for these osteoporotic fracture proceeds and is proven by the assortment of nail structures accessible today. A critical development in improving fixation in these fracture was that of a helical cutting screw. The thought behind the advancement of the helical cutting edge was its biomechanical precedence in the setting of osteoporosis [16]. This investigation was led on 25 patients with temperamental/acute trochanteric fracture who were dealt operatively utilizing either PFN or PFNA at our tertiary center. The patients in both the group were equivalent regarding demography and the fracture type. The mean span of medical procedure was fundamentally lower in PFNA category when contrasted with PFN category. This was for the most part as a result of the utilization of a solitary helical cutting blade in PFNA when contrasted with the utilization of a lag screw and de-rotation screw with the PFN. The mean blood loss was altogether lower in PFNA bunch when contrasted with PFN gathering. The less blood loss in PFNA bunch is ascribed to diminished length of medical procedure and littler entry point for the insertion of PFNA when contrasted with longer procedure time and longer cut for introduction of lag screw and de-rotation screw in PFN group. Be that as it may, the measure of blood loss was not extreme enough to require a blood transfusion regardless. Quantity of intraoperative fluoroscopic pictures taken indicated fundamentally lower scores for PFNA when contrasted with PFN. The purposes behind this are equivalent to that for expanded length of medical procedure if there should arise an occurrence of PFN. Zeng *et al.* found that PFNA use was related with a critical decrease in length of medical procedure, minimal complication, post procedure insert failure rate, and intra procedure blood loss when contrasted with PFN [17]. Takigami *et al.* additionally discovered that the procedure time and blood loss were lower with the utilization of PFNA when contrasted with PFN [18]. The discoveries of our investigation as for length of medical procedure, measure of blood loss and radiation exposure are equivalent with above examinations. The mean term of clinic remain (postoperatively) differed between the two gatherings rendering the utilization of PFNA to be a much better intramedullary insert in correlation than the PFN. There were no instances of post-operative DVT/thromboembolism, peri insert fracture or insert collapse in both category. Postoperative adverse outcome including wound infection, cut out/z-effect, non-union and reoperation rates were comparable or similar between them. In our investigation result doesn't demonstrate any measurably huge contrasts in the utilitarian results between the two inserts.

Conclusion

From the study we can reason that, when the fracture is united, functional result is identical in the both category. Be that as it may, contrasted with PFN, utilization of PFNA altogether lessens the operative span, measure of blood loss and number of intraoperative fluoroscopic imaging and certain implant related complications and furthermore the duration of stays in the tertiary care center.

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