

Short Proximal Femoral Nail A2 Vs Long Proximal Femoral Nail A2 For The Management of Intertrochanteric Fractures in Elderly

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Background: Elderly hip fractures are a very frequent orthopaedic issue. Although various treatment methods have been suggested in past for the management of intertrochanteric fractures in geriatric population, it still remains controversial as regards the treatment of choice to manage these fractures. The current study demonstrates the efficacy of proximal femur-intramedullary nail antirotation (PFNA2) of Asia in managing fractures of intertrochanteric. Our study will be based upon the comparison of effectiveness and shortcomings we encounter while using short proximal femoral nail A2 vs long femoral nail A2 for managing fractures of intertrochanteric. **Methods & Materials:** The above research has been done at IMS and SUM hospital between November 2016 to November 2019. 87 individuals having fractures are chosen. Group-a had 45 patients treated with short PFNA2, group-b had 42 patients, who were treated with long PFNA2. All fractures were classified as per Orthopedic Trauma Association (OTA) AS 31A1, 31A2, 31A3. All the patients were evaluated on immediate post-operatively, 1st, 3rd, 6th and 12th month using Harris hip score.

Results: Current study shows that the frequently occurring fracture modes is trivial trauma followed by fall, which was observed within 58 out of 88 cases, which comes out to be 65.5% of reason behind the fracture. Average operative loss of blood was 226.5ml within PFNA2 group, whereas it was 124.5ml in the short PFNA2 group. The factor regarding union was better in the short PFNA2 (10.2 weeks) than the long PFNA2 group (20.1 weeks). However, limb shortening was found to be more in the short PFNA2 as against the long PFNA2. Anterior femoral canal impingement was found to be more with long PFNA2 (5 cases) compared to short PFNA2 (1 case).

Conclusion: Observing the above findings for method of managing trochanteric fractures, short PFNA2 emerges as a better choice vs long PFNA2, if proper preop planning is used leading to less soft tissue damage and as a result high rate of union, especially in the Asian population who have a small femur.

Keywords: Hip fractures, intertrochanteric fractures, PFNA2, Long, Short.

1. INTRODUCTION:

The most frequently occurring fracture around the hips within the elderly is Intertrochanteric fractures. Closed reduction with intramedullary nailing has revolutionized the ease of management of these kinds of fractures. The unstable variety fractures have a disruption of the posteromedial cortex due to comminution with reverse oblique types (1-4). Extramedullary and intramedullary implants can be used for treatment, but the role of

intramedullary implants are superior(5,6). Femoral shaft fractures, failure of fixation, femoral canal impingement are some of the commonly described complications associated with implants(7). Therefore, in this regard we have used a short PFNA2 with a proximal diameter of 15mm for easy insertion and decreases the risk of further femoral fracture(8). The ergonomics of this nail are 5 degrees mediolateral angle for the ease of entry and distal tip flexibility to reduce stress riser. Various kinds of cephalomedullary nails such as gamma nail, InterTan and PFNA were used clinically. The latest generation PFNA2, specially designed for Asian population, is commonly used for geriatric inter/per trochanteric fractures. Some clinical studies have reported that the short term clinical outcomes of PFNA2 are satisfactory in most patients, providing an anatomy matched with the narrower and shorter femurs of Asian population, contributing to less complications. The PFNA2 long nail additionally for secondary dynamization. The PFNA2 nail is available in 4 sizes:- Small length 170mm, Small length 200 mm, Medium length 240mm, Large length 260mm-420mm. Inserting the PFNA2 blade reduces the bone size superior anchorage & increases reliability, that are very vital for the osteoporotic bone and prevention of varus collapse respectively. PFNA2 blade apart from providing superior resistance against cutout in comparison with the conventionally used counter parts, the PFNA2 blade is automatically locked to improve rotational stability of the blade and femoral head. The current study aims for correlating functional outcome short PFNA2 (antirotation) & long PFNA2 (antirotation) within the terms of blood loss, surgical time, functional outcome and other modalities.

2. METHODS:-

A prospective randomised study was done at our institute from November 2016 to November 2019. 87 patients with trochanteric fracture who presented to our hospital emergency or OPD were selected and randomly allotted to 2 groups designated to group a (short pfnA2) and group b (long pfnA2). Patients above 60 yrs of age, who sustained trochanteric fractures after trivial trauma were included in our study. Patients with pathological fractures of any cause, those with multiple limb fractures and Patients having other femur fractures of ipsilateral side were excluded from our study.

Surgical procedure-

The patients were positioned on the traction table and under fluoroscopic guidance, longitudinal traction was given and the fracture fragments were reduced. Intraoperatively, care was taken for the factors like duration, surgical procedure time, amount of blood loss. Patients were immediately resorted to active and passive movements in the post operative period. Partial to full weight bearing was started as per the patients general condition and associated comorbidities permitted. DVT prophylaxis was continued until the patient was satisfactorily mobilized. All the individuals with fracture are checked on 1st, 3rd, 6th & 12th month.

3. RESULTS:-

87 patients were evaluated as per group a (short PFNA2) and group b (long PFNA2). The study was done at our institute from November 2016 to November 2019. Female patients formed the majority in this study for both the groups. The average age for the group a (short PFNA2) is 75 yrs (66-84 yrs) & 77 yrs (range: 69-85 yrs) for group b (long PFNA2). Same number of 32-A1 group of fractures in the either group were found. Most patients were operated within 3 days of sustaining trauma. The amount of blood loss was 226.5ml in group b (long PFNA2) compared to only 124.5ml in group a (short PFNA2). The operative time lasted for 48 mins (36-70) mins in the short pfnA2 group whereas it was 78 mins (54-102) mins in the long PFNA2 group. No distinct were identified within the post operative results in each group, however there is some degree of shortening in 2 patients from the short PFN group. 3

patients from the long PFNA2 group received blood transfusions vs 1 patients receiving blood transfusion in the short PFNA2group.The mean stay for both the groups were around 9 days in the hospital and none had anypost operative wound infection.

Table 1(PREOP DATA):-

Variables	Total	Short PFNA2	Long PFNA2	P Value
Number	87	45	42	-----
Gender(M/F)	27/60	15/30	15/27	0.627
Age (Average)+/-Sd	76.6+/-8.2	75.2+/-8.3	77.3+/-9.8	0.807
AO#(31-A1/2/3)	27/48/12	15/24/6	12/21/9	0.531
Injury & Operation Interval	2.4+/-1.8	2.1+/-1.2	2.4+/-1.5	0.747

Table 2(INTRAOP DATA):-

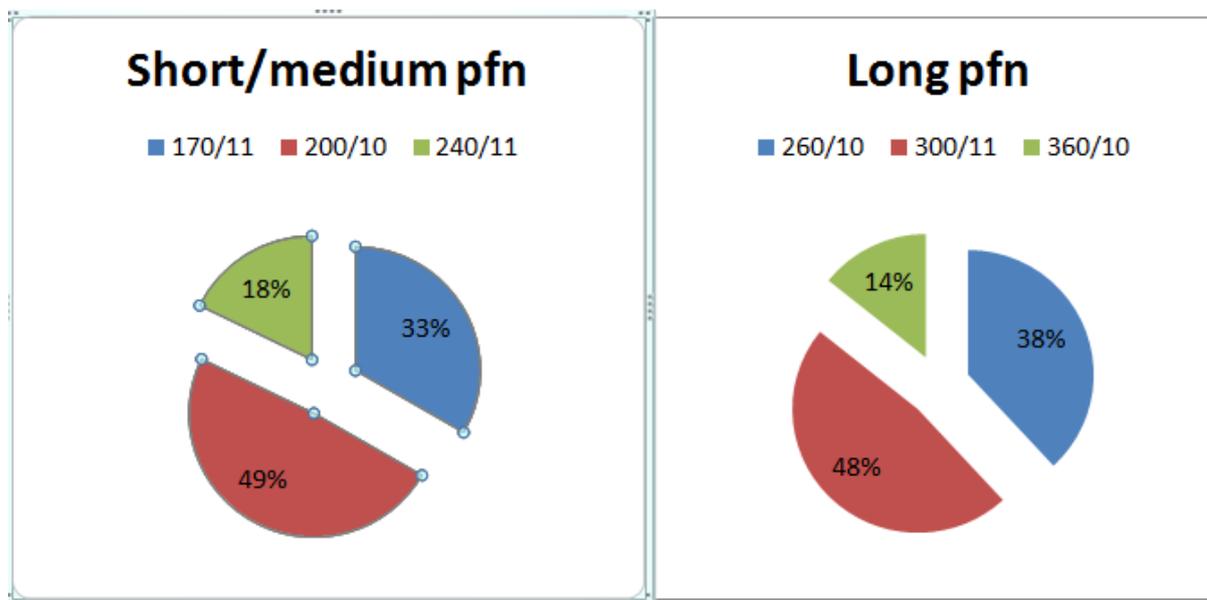
Variables	Total	Short PFNA2	Long PFNA2	P Value
Number	87	45	42	-----
Time required for Surgery(Minutes)+-SD	73.6+/-24.0	48.7+/-13.7	78.8+/-24.7	0.0015
Intra-op Blood Loss(ml)	186.6+/-135.5	124.5+/-107.4	226.5+/-185.8	0.0036
Open Reduction Of Fractures	---	0	3	-----

Table3(POST OP DATA):-

Variables	TOTAL	SHORT PFNA2	LONG PFNA2	P VALUE
Number	87	45	42	----
Blood Transfusion	4/87	1/45	3/42	0.210
Hospital Stay	11+/-5.1	10.2+/-5.1	12.3+/-4.8	0.933
Mortality	0/87	0/45	0/42	-----
Femoral Canal Impingement	6/87	1/45	5/42	0.00
Coxa vara at 12months	0/87	0/45	0/42	-----
Screw backout	0/87	0/45	0/42	-----
Pain(Hip Score) at 12months		8.55+/-1.782	6.30+/-1.086	0.00

Movement(HipScore) at 12 months		44.43+/-3.822	39.42+/-4.119	0.00
Screw cutout	4/87	1/45	2/42	0.168
Reoperation		1/45	4/42	0.00
LimbShortening 12months	at 4/87	4/45	1/42	0.00

Pic-1(DIMENSIONS OF IMPLANT SHORT/MEDIUM VS LONG)



Five patients had re-operations.4 from the long PFNA2 group(B) and 1 from the short PFNA2 group(A).3 patients had presented with screw cutout(2 from long PFNA2 and 1 from shortPFNA2) which was later managed with bipolar hemiarthroplasty. One patient from the long PFNA2 group,had a fracture at the distal locking site and another from the same group had an anterior femoral impingement causing break in the anterior cortex,the former was managed with a locking plate and the latter with a retrograde IM nail.Limb length discrepancy was noticed in 4 cases from group-A and 1 case from group-B.

Pic-2(PRE AND POST OPERATIVE IMAGES LONG PFNA2)



Pic-3(PRE AND POST OPERATIVE IMAGES SHORT PFNA2)



4. DISCUSSION:-

Elderly osteoporotic hip fractures are a very frequent and serious orthopaedic issue(9). The number of cases of fragility fractures around hip is increasing significantly with time, thus increasing the cost burden.(10). Around 85% of trochanteric fractures are sustained following a fall(11). Bone mineral densitometry (BMD) associated with area of trochanteric femur, acquired by DEXA scan, is the best indicator for predicting trochanteric fractures(12). A theoretical model that has been used to study fractures around the hip joint states that a trochanteric fracture generates 621 MPa stress. Highest value of stress generated was from screw void meant for distal locking. The proximal and distal forces involved which are responsible for causing the fracture also adds significant value in such fracture occurrences. The angle of insertion of the nail is presumed to be a contributing factor for such incidences (13). Lag screw cut out is also documented to be such a factor for these fractures, which can be managed by placing the implant in a proper tip apex distance i.e. 25mm, thus preventing a screw cut out(14,15). The lag screws which are placed eccentrically, ultimately land in varus collapse and rotational cut out. So here the role of antirotation comes into play which negates the above mentioned deforming force. The aspect of blood loss is also important, as the reaming in a longer nail would definitely open the medullary canal and therefore more blood loss would be inadvertent. The correct position and entry of nail is also important because the Asian population have more femur's anterior bowing with comparatively shorter length of femur. The population with osteoarthritis demand a longer nail insertion as the entry point is more aligned. The big debate encompassing use of a DHS vs PFNA seems to have some answers, with PFNA having superiority in terms of results, fluoroscopic exposure and the amount of blood loss. So PFNA is definitely a better choice. However, with regards to the mortality, there were no significant differences. The key element of PFNA is the helical blade system which prevents problems such as screw cut out and screw cut through, when placed with an apt surgical technique. The helical blade failure may be linked to the fact that, when a patient goes to ambulatory phase, there are torsional forces acting on the blade which contribute to such failures. These forces can cause periosteolysis around the implant which is also termed as the "windshield effect".

The newer techniques of computer assisted technology has enabled the surgeon in placing blade correctly during operating such fractures. A warning signal is sent through the software if the need arises. Another issue of a subtrochanteric extension was noticed, therefore many surgeons still prefer a long PFNA than the recommended standard short PFNA so that they don't land up in a phrase "better safe than sorry". The additional use of a CT or a MRI for preoperative planning of subtrochanteric fracture is still a matter debate.

5. CONCLUSION

Observing the above findings for method of managing trochanteric fractures ,short PFNA2 emerges as a better choice vs long PFNA2,considering shorter surgical and anaesthesia time,low incidence of femoral canal impingement and less blood loss ,leading to less soft tissue damage and as a result high rate of union, especially in the Asian population who have a small femur.

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