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Original Research Article

Comparative Study of Unstable Proximal Femoral Fractures Treated with Proximal Femoral Nail (PFN) and Proximal Femoral Nail Anti-Rotation (PFNA)

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Abstract:

Background: Hip joint fractures are quite common in old age due to degeneration of the calcarfemorale, which is a nail inserted by nature. It cannot be healed early; hence, it needs proper technique to maintain the normal functions of the hip joint.

Method: Out of 30 patients aged between 50 to 70 years, 15 were inserted with proximal femoral nail (PFN) and 15 were inserted with proximal nail anti-rotation (PFNA). The helical blade of the whole PFN has two screws, one large, which stabilizes the fractured part of the femur, and another is anti-rotation, while the PFNA has a helical blade, which provides stability and anti-rotation mobility. Both surgeries were similar, but the instruments and techniques differed.

Results: In the comparative study, the mean value of duration was 40.28 (±5.11) in PFN and 34.19 (±5.02) in PFNA, t test was 5.29 and $p<0.002$. Blood loss (ml): 75.76 (±14.30) in PFN; 59.38 (±11.95) in PFNA; t test was 3.40 and $p<0.001$ Fluoroscopy images 27.45 (±3.44) in PFN, 16.28 (±3.11) in PFNA; the t test was 9.35 and $p<0.001$. Postoperative complications were more common in PFN. Moreover, loss of reduction >1 cm was also common in PFN technique. The final outcomes, like mortality, persistent pain, and use of walking aids, were also higher in PFN technique patients.

Conclusion: Among the both techniques PFNA is more performed because PFNA significant reduces duration of surgery time, loss of blood, Fluoroscopic imaging, and mortality rates. Hence, PFNA is a better option for hip joint fractures.

Keywords: PFN, PFNA, fluoroscopy, tronchanteric, helical blade, two screws.

Introduction

The incidence of tronchanteric for moral fractures is quite common in old age globally [1]. Hip fracture is a severe injury with several consequences, including mortality, morbidity, and reduced functional independence that decrease the quality of life and lead to considerable economic burden [2]. Normal ambulation after a hip fracture is virtually impossible until and unless the fracture has been treated properly. There are two types of internal fixation devices available: intermedullary nails and extra-medullary implants. The dynamic hip screws (DHS), an extra-medullary implant, have been recognized as the standard device for the comparison of surgical and clinical trials [3]. The proximal femoral nail anti-rotation (PFNA) system is an intramedullary nail implant designed as PFNA, and improved sliding properties of the femoral neck result in fewer perforations of the head and neck fragments and a better hold in osteoporotic bone [4]. Hence, intermedullary (IM) devices include proximal femoral nail (PFN) and proximal femoral nail anti-rotation. PFNA includes an IM nail, through which two screws are inserted in the neck of the femur. One is a large screw that stabilizes the fractures, allowing collapse, and the other is an anti-rotation screw used to provide rotator stability to the fracture PFNA, which uses a helical blade instead of two screws. The helical blade is believed to provide stability, compression, and rotational control of the fracture. Hence, an attempt was made to compare both techniques and their advantages and disadvantages.

Material and Method

30 (thirty) patients aged between 50 to 70 years admitted to the orthopaedic department of PMR Medical College, Chevella-501503, Telangana, were studied.

Inclusive Criteria: Acute unilateral tronchanteric fractures belonged to AO/ASIF. 31-A1-A2, 31-S3 were independent ambulates prior to injury and were selected for study.

Exclusive Criteria: Patients with pathological fractures, open fractures, polytrauma, and neuro-muscular disorders were excluded from the study.

Method: Out of 30 patients, 15 were selected for PFN and 15 for PFNA. Written consent was obtained from every patient. The surgical procedure was similar in both groups except for the techniques and instrumentation used in either system.

Types of fractures assessed as per the AO/ASIF classification system using orthogonal radiographs All patients were administered spinal or epidural anaesthesia and positioned supine on the fracture table prior to the closure of the fracture. The duration of surgery and loss of blood were noted.

Every patient received prophylactic antibiotics as a pre-operative dosage. Post-operatively, every patient in both groups with low molecular weight heparin, the first ten days post-operatively or during the stay at the hospital, whichever is shorter duration, followed aspirin for 4 weeks.

All patients were allowed to touch down weight-bearing ambulation using a walking frame starting from the first post-operative day until six weeks. Clinical and radiological assessment of fracture union or complication for every patient was carried out pre-operatively or post-operatively at 6 weeks, 3 months, 6 months, and 1 year. Functional evaluation was done at year post-operatively by using the Harris Hip score.

The duration of the study was May 2022 to June 2023.

Statistical analysis: comparison of operation details, post-operative complications, loss of reduction details, and final outcomes were carried out by using the t test and classified by percentage. The statistical analysis was done in SPSS software. The ratio of males and females was 2:1.

Observation and Results

Table 1: Comparison of operation details in both groups –

- Duration (time in minutes) 40.28 (±5.11) in PFN, 34.19 (±5.02) in PFNA, t test is 3.29 and p<0.002, (p value is highly significant)
- Blood loss (ml) – 75.76 (±14.3) in PFN, 59.38 (± 11.95) in PFNA, t test was 3.40, p<0.002 (p value is highly significant)
- Fluoroscopy Images – 27.48 (± 3.44) in PFN, 16.28 (± 3.11) in PFNA, t test was 9.35 and p<0.001 (p value is highly significant)

Table 2: Comparative of post-operative complication

- 2 (13.3 %) in PFN, 1 (6.6%) in PFNA, cut out Z-effect
- 2 (13.3%) in PFN and 1 (6.6%) in PFNA Re-operation
- Table-3: Comparative study of loss of reduction in both groups –
- 3 (20%) in PFN, 2 (13.3%) in PFNA Shortening > 1cm
- 2 (13.3%) in PFN, 1 (6.6%) in PFNA Varus Mal-alignment

Table 4: Comparison of Final out comes

- 2 (13.3%) in PFN, 1 (6.6%) in PFNA mortality
- 3 (20%) in PFN 2 (13.3%) in PFNA persistent pain
- 5 (33.3%) in PFN, 3 (20%) PFNA walking aids
- 8 (53.3%) in PFN, 9 (60%) PFNA return to pre-fracture status patients
- Harris Hip score (1 year post operating) – 42.7 (± 5.12) in PFN, 43.75 (± 6.30) in PFNA patient, t test was 0.33, p value is p>0.53 (p value is Insignificant)

Table 1: Comparison of operation details in both groups

Sl. No	Details	PFN (15)	PFNA (15)	t test	p value
1	Duration Time (in minutes)	40.28 (±5.11)	34.19 (±5.02)	3.29	p<0.002
2	Blood loss (ml)	75.76 (±14.30)	59.38 (±11.95)	3.40	p<0.002
3	Fluoroscopy Images	27.48 (±3.44)	16.28 (±3.11)	9.35	p<0.001

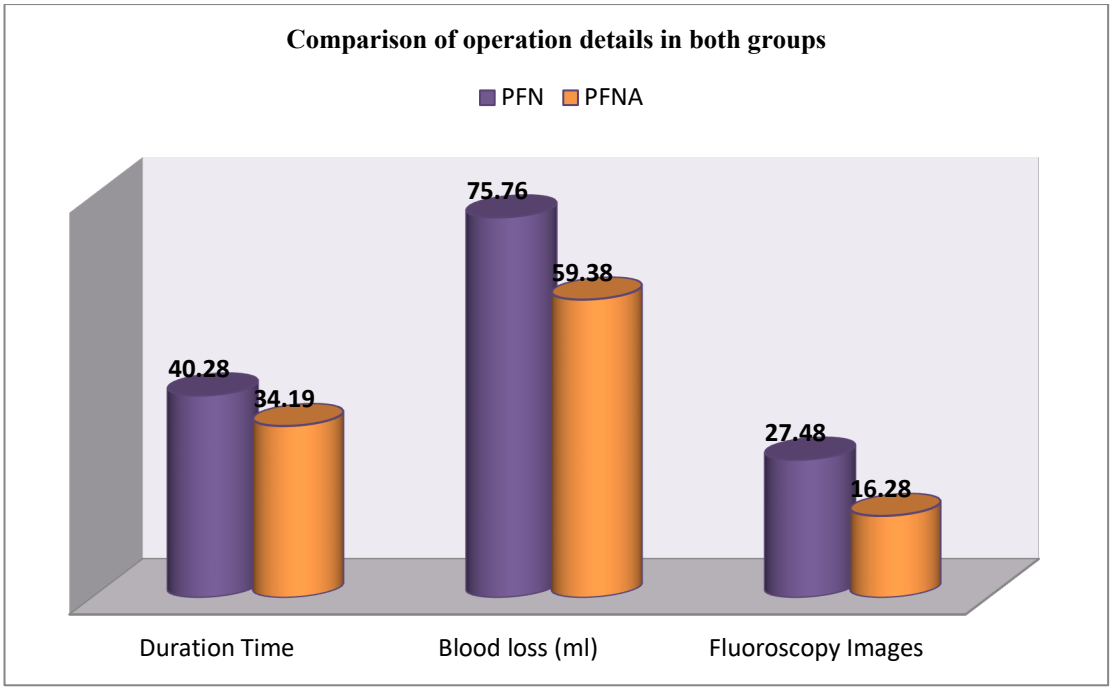

Figure 1: Comparison of operation details in both groups

Table 2: Comparative study of post-operative complications

Sl. No	Complications	PFN (15)	PFNA (15)
1	Cut out z-effect	2 (13.3%)	1 (6.61%)
2	Re-operation	2 (13.3%)	1 (6.61%)

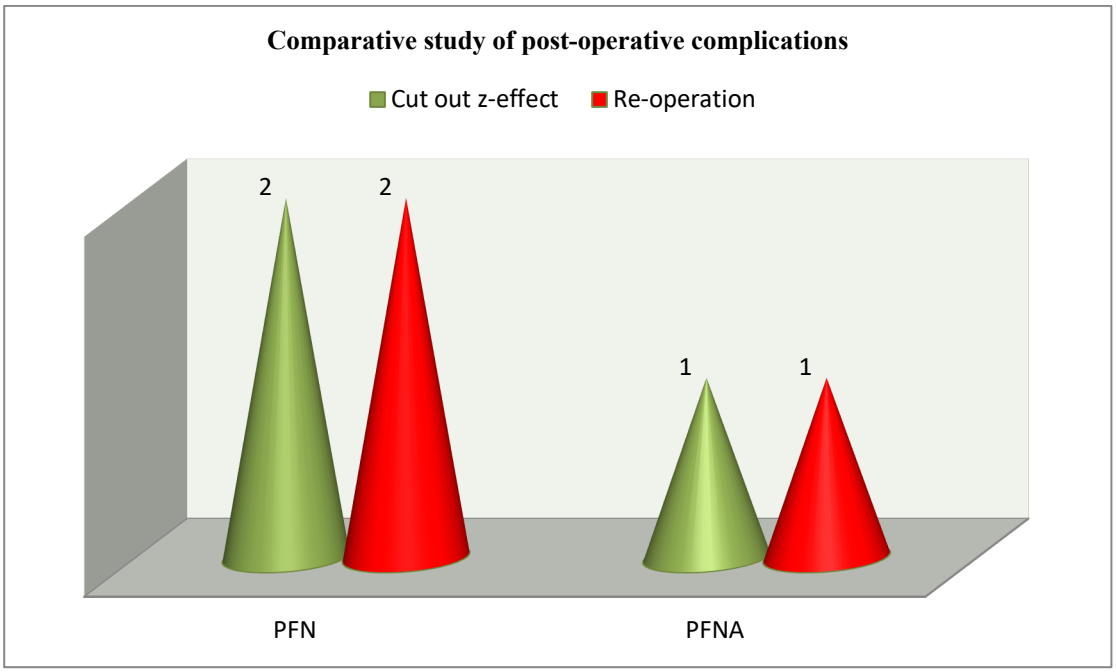

Figure 2: Comparative study of post-operative complications

Table 3: Comparative study of loss of reduction

Sl. No	Loss of reduction	PFN (15)	PFNA (15)
1	Shortening of > 1cm	3 (20%)	2 (13.3%)
2	Varus Mal-alignment	2 (13.3%)	1 (6.6%)

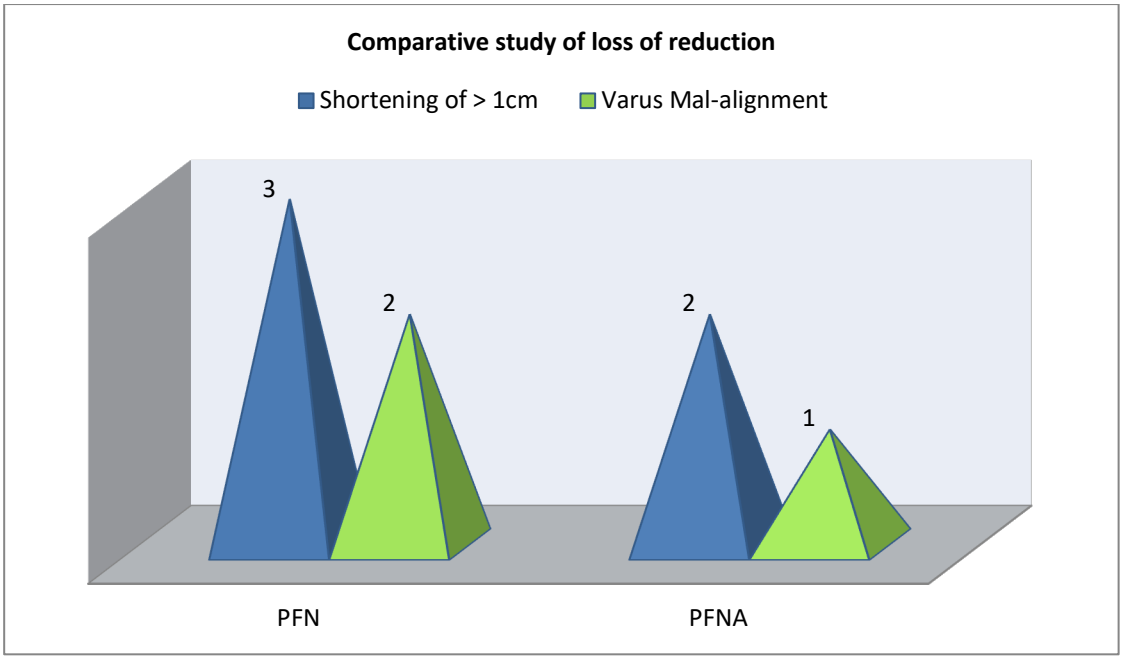

Figure 3: Comparative study of loss of reduction

Table 4: Comparative of Final out comes in both groups

Sl. No	Final out comes	PFN (15)	PFNA (15)
1	Mortality	2 (13.5%)	1 (6.6%)
2	Persistent pain	3 (20%)	2 (13.3%)
3	Use of walking aids	5 (33.3%)	3 (20%)
4	Return to pre-fracture status	8 (53.3%)	9 (60%)
5	Harris Hip score (1 year post-operatively)	42.7 (±5.12) (t test 032)	43.7 (±3.32) P value p>0.53 (Insignificant)

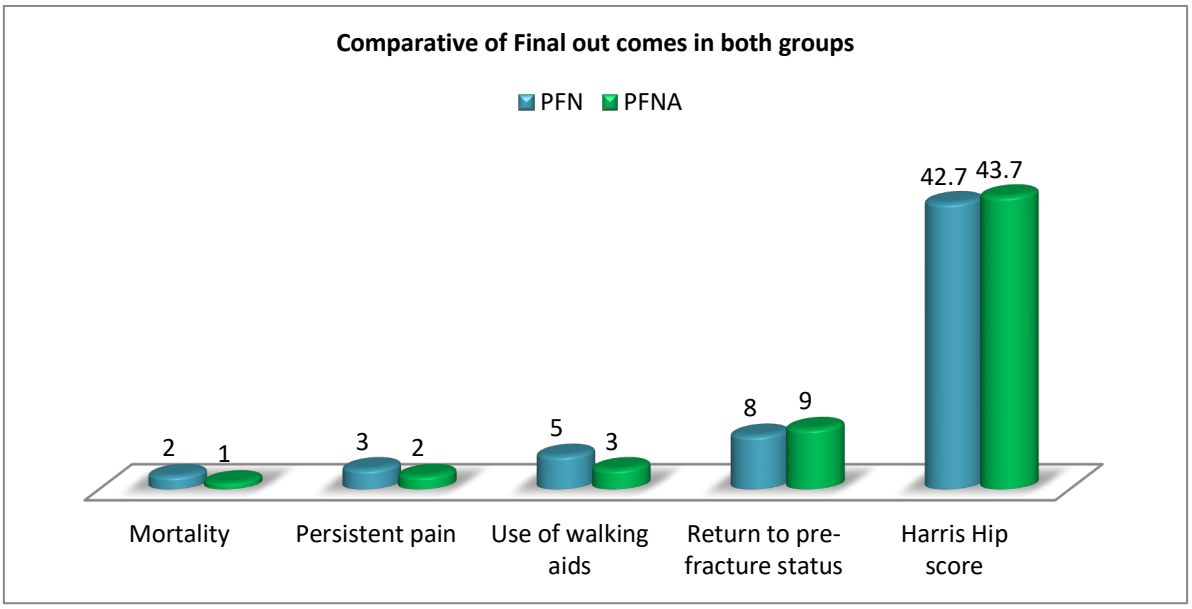

Figure 4: Comparative of Final out comes in both groups

Discussion

Present a comparative study between PFN and PFNA intra-tronchanteric fractures. The duration of surgery was Comparison of operation details in both groups Duration (time in minutes) 40.28 (±5.11) in PFN, 34.19 (±5.02) in PFNA, t test is 3.29 and p<0.002, (p value is highly significant). Blood loss (ml) - 75.76 (± 14.3) in PFN, 59.38 (± 11.95) in PFNA, t test was 3.40, p<0.002 (p value is highly significant). Fluoroscopy Images – 27.48 (± 3.44) in PFN, 16.28 (± 3.11) in PFNA, t test was

9.35 and p<0.001 (p value is highly significant) (Table-1).

Comparative post-operative complications: 2 (13.3 %) in PFN, 1 (6.6%) in PFNA, and cut-out Z-effect: 2 (13.3%) in PFN and 1 (6.6%) in PFNA re-operation (Table 2). Comparative study of loss or reduction in both groups – 3 (20%) in PFN, 2 (13.3%) in PFNA Shortening > 1cm, 2 (13.3%) in PFN, 1 (6.6%) in PFNA Varus Mal-alignment (Table 3). Comparison of Final Outcomes 2 (13.3%) in PFN, 1 (6.6%) in PFNA mortality, 3 (20%) in PFN, 2 (13.3%) in PFNA persistent pain, 5 (33.3%) in PFN, 3 (20%) PFNA walking aids, 8 (53.3%) in PFN, 9 (60%) PFNA return to pre-fracture status patients, Harris Hip score (1 year post-operation): 42.7 (± 5.12) in PFN, 43.75 (± 6.30) in PFNA patient; t test was 0.33; p value is p>0.53 (p value is insignificant) (Table 4). These findings are more or less in agreement with previous studies [6,7,8].

Delayed ambulation is related to the development of post-operative pneumonia, delirium, and an increased length of hospital stay and care time [9]. Closed fracture reduction preserves the hematoma, an essential element in fracture healing [10]. PFNA allows surgeons to minimise soft tissue dissection and therapy, reducing surgical trauma, blood loss, infection, and wound complications [11,12]. This may be due to the processed helical-shaped PFNA blade tail, which could result in reduced skin and fascia stimulation.

In addition, the PFNA insertion was a simpler and less invasive surgical procedure than the PFN technique. Moreover, using PFN (screw) or PFNA (helical blade) instrumentation, the degree of osteoporosis has to be given a more important base line or criteria because, as age advances, the calcar femorale present in the neck degenerates. Hence, severe osteoporosis may feel the burden of the implantation of instrumentation, which can lead to refracture. Assessment functional outcome post-operatively, Harrison A hip score will confirm the degree or gravity of osteoporosis.

Summary and Conclusion

Present a comparative study between PFN and PFNA in unstable fractures in the Telangana population. PFNA is associated with a reduction in the duration of surgery, intra-operative blood loss, the rate of post-fixation failure, and post-operation failures, which were the least common in PFNA techniques. But this study demands further genetic, nutritional, musculoskeletal, and pathophysiological studies because the exact mechanism of healing fractures of bone is still unclear.

Limitation of Study: Due to the tertiary location of the research centre, the small number of patients, and the lack of the latest techniques, we have limited findings and results.

This research paper was approved by the ethical committee of PMR Medical College, Chevella-501503, Telangana.

References

1. Ult MS, Krikler SJ – Compression of dynamic hip screw and gamma nail: a prospective randomised controlled Hrial J. injury 1995, 26; 615-8.
2. Dominmgo KJ, Ceilia D – Tronchateric fractures treated with a proximal femoral nail Int. Orthop 2001, 25; 298–301.
3. Kamel HK, Iqbal MA – Time to ambulation after hip fracture surgery in relation to hospitalisation outcomes J. Gerontology 2003, 58; 1042–45.
4. Kibbin MC – The biology of fracture healing in long bones J. Bone Joint Surg. Br. 1978, 60; 150–162.
5. Marsh TL, Slang TF – Fracture and dislocation classification in the ComPFNdium J. Orthop. Trauma. 2007, 21, 51–63
6. Jordan KM, Cooper C – Epidemiology of Osteoporosis Best Pract. Clin. Rhematol. 2002, 16; 795
7. Xu Yz Geng DC – A comparison of the proximal femoral nail anti-rotation device and dynamic hip screw in the treatment of an unstable pre-tranchonteric fracture J. Int. Med. Research 2010, 38 (4); 1266–75.
8. Halder SC – Gamma Nail for Peritronchanteric Fractures J. Bone Joint Surg. Br. 1992, 74 (3); 340–4.
9. Akinci O, Akalm Y – Comparison of long-term results of dynamic hip screws and AO 130-degree blades in adult tronchanteric region fractures Acta-orthop. Traumatol. Turc. 2010, 44 (6); 443-51.
10. SAdowski C, Lubbeke A – Treatment of reverse oblique and transverse inter tronchateric fractures with the use of an intermedallary nail, J. Bone Joint Surg. Am. 2002, 84 (3); 372-81.
11. Gull Berg B, Duppe H – Incidence of hip joint fractures in Malmo, Sweden Bone J. 1993, 14 (1); 523-529.
12. Duque GT, Demorthiero O – prevention and treatment of osteoporosis and hip fractures Minerva Med. J. 2009, 100; 79–97.