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Functional outcome of intertrochanteric fracture fixed with proximal femoral nail anti-rotation (PFNA2)

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Abstract

Introduction: Intertrochanteric fractures are the most common geriatric fractures associated with osteoporosis requiring surgical intervention. For fixation of these fractures, use an intramedullary nail coupled with a dynamic femoral head/neck stabilisation implant. Many classes of nails incorporating a single compression screw, an extramedullary device, or a compression screw coupled with an anti-rotation screw like the proximal femoral nail have become famous for treating unstable fractures. In this study, we studied the outcome of PFNA2 fixation devices.

Material and Methods: This is a prospective cohort study of unstable IT fragility fracture of femur treated with PFN A2. All successive patients are diagnosed with unstable intertrochanteric Boyd and Griffin type 2, 3 and 4 fractures of the femur.

Results: We found that the average RUSH score at the end of 6 months was 23.8, and the functional outcomes were assessed with HHS with excellent functional outcomes in 20 cases, good in 3 and fair in 2. Complications were varus angulation and infection, one each.

Conclusion: PFN A2 has a good functional outcome at the end of 1 year.

Keywords: Hip fracture, bone turnover markers, CTX, PINP, Vitamin D

Introduction

One of the most grievous injuries in the elderly is an intertrochanteric fracture. These Fractures become more common as people get older ^[1]. These individuals are restricted to home ambulation and rely on others for basic and instrumental daily activities. Trochanteric fractures account for 50% of hip fractures in the elderly; 50% of these fractures are unstable varieties of trochanteric fractures. These patients have comorbid conditions such as osteoporosis, diabetes, hypertension, and renal failure. Nonoperative treatment is primarily reserved for poor medical candidates and non-ambulant individuals with minor postfracture discomfort. The purpose of treatment is to attain accurate or acceptable results, and operational treatment has largely superseded conservative approaches. Anatomical reduction and stable fixation with an internal device to allow patients to be mobilised earliest so as to avoid issues associated with extended recumbency. Intertrochanteric fractures have a significant portion of health care and resources but remain a challenge to date, even with significant improvements in the implant design, surgical technique, and patient care ^[2]. Anatomical reduction for fixation of fracture is important rather than malalignment, which is the primary cause of intertrochanteric fracture complications because cancellous bones make up the intertrochanteric area and unite well ^[3]. The fracture fragment-implant assembly's strength is determined by several parameters, including. a) The quality of the bones, b) The geometry of fragments, c) Decrease, d) Implant design and placement, and e) implant placement ^[4]. Fracture reduction and choice of the implant are only the sole parameters a surgeon can control. There are numerous treatment methods available for these fractures. For more than a decade, the Dynamic hip screw extramedullary device had been utilised for fixation of these fractures, albeit it may not be the best implant in all cases ^[5, 6]. Intramedullary load sharing device - PFN helps in early postoperative mobilisation, weight-bearing and ultimately, the early fracture union. PFNA-II is impaction class PFN, and proximal fixation is done with a helical blade instead of the conventionally used two screws.

The helical blade is believed to be helpful in osteoporotic bone and gives better compression and stability, also the rotational control at the fracture site. Theoretically, as it is based on impaction, it compacts the bone during fixation into the neck, thus providing higher cut-out strength compared to the other devices. The difference is that the mediolateral angle is reduced from 6 to 5 degrees. Hence there is less chance of implant failure, especially in elderly osteoporotic bones. Thus, PFN Anti-rotation-II is a newer class of PFN which reduces the complications associated with conventional PFN. This study analysed the clinical, radiological and functional outcomes of surgical management of unstable intertrochanteric fractures by PFN-A2.

Method

This prospective study was carried out between October 2019 and September 2021 in the Department of Orthopaedics. A total of 25 patients were included in the study with unstable intertrochanteric fractures, which were treated surgically by proximal femoral nail - A2. All the patients were followed up regularly at two weeks and then 3, 6, and 12 months respectively. On follow-up, patients were evaluated for clinic-functional outcomes using Modified Harris Hip Score. As per inclusion criteria, patients older than 50 and having unstable intertrochanteric fractures fixed with PFN A2 were included in the study. Patients with ages less than 50 years with other associated fractures were not included in the study. Patients were evaluated radiologically for fracture pattern per Boyd n Griffith criteria, the Singhs Index for osteoporosis and routine blood investigation. All the patients were operated on within

48 hours of admission, and early rehabilitation was started from day one.

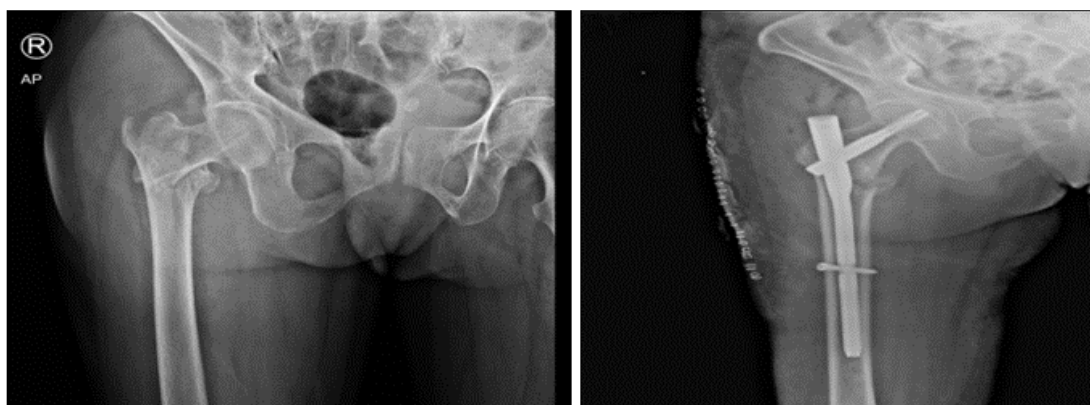
Results

A total of 25 patients with unstable intertrochanteric fractures were incorporated in the study who underwent surgery using proximal femoral nail anti-rotation 2 (PFN-A2). Of these 25 cases, 15 were males, and 17 were females. Patients from age 50 to 91 years were included in the study. The average radiological union for unstable intertrochanteric fractures by the RUSH score at the end of 6 months was 23.8, minimum score 10, maximum score 29, and median score 25. The complications associated with our study were varus angulation and infection. Harris Hip scores for 25 patients were calculated at the end of 12 months, and the functional outcome was assessed: excellent in 20 cases, good in 2, fair in 2, and poor in 0 cases.

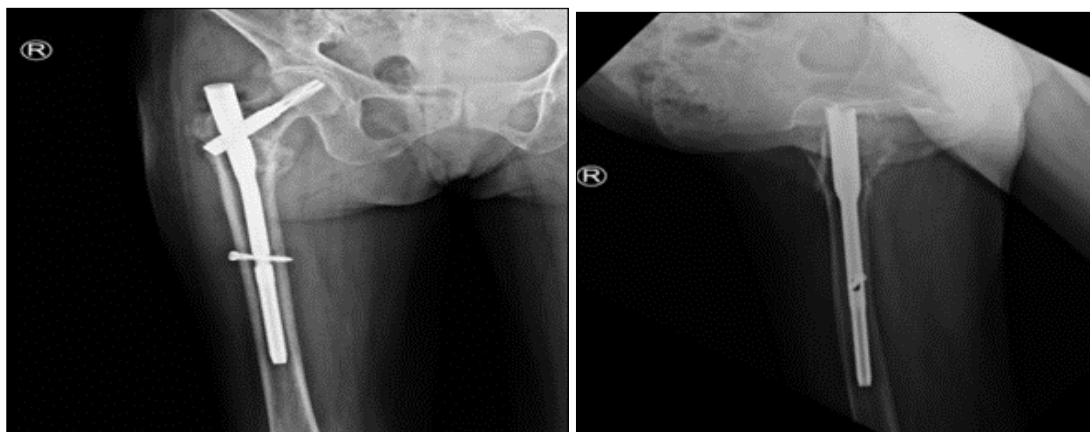
The secondary outcome was, Mean duration of surgery which was 93.2 minutes from anaesthesia to finish time ranging from 70-150 minutes. Mean hospital stay was 6.9 days ranging from 3 days to 14 days till suture removal. The average blood loss was about 100ml ranging from 50- 200ml.

Table 1: Outcome Measure

Parameter	Value
Mean duration of surgery	93.2 minutes
Mean Hospital Stay	6.9 days
Average Blood Loss	110 ml
RUSH score at six month	23.8
HHS at six month	Excellent-20, Good- 3 Fair-2



Preoperative Fracture IT femur treated with PFNA (Fig A2 & B2)



Follow-up at the end of 6 Months, Fracture Union seen In Both AP and Lat View (Fig C2&D2)

Fig 1: Preoperative and Postoperative outcome with one-year follow-up following fracture healing

Discussion

The orthopaedic surgeon faces a tremendous problem when dealing with unstable intertrochanteric fractures. pertrochanteric fractures constitute a technical challenge in fracture reduction, and the use of a surgical implant may fail primary fracture fixation. The most crucial factors in determining the severity of an intertrochanteric fracture were the medial and posteromedial fracture fragments. In today's world, experts have discovered that the lateral femoral wall is an important predictor of re-operation following a trochanteric fracture. Biomechanically, Proximal Femoral Nail fixation with a trochanteric entrance point outperforms extramedullary implants. Controlling axial telescoping and rotational stability was critical in unstable intertrochanteric fractures. The proximal femoral nail anti-rotation-2 was a new implant for the treatment of unstable intertrochanteric fractures. There are multiple benefits of PFNA2 over PFNA as the Proximal nail diameter decreases from 17mm to 16.5mm, the Mediolateral angle is reduced from six degrees to 5 degrees, and a flat proximal lateral floor becomes tailored tip reducing impingement of the femoral cortex. Bhatti *et al.* [7] compared proximal femoral nails with dynamic hip screws and stated that their PFN has less blood loss and shorter hospital stays. Much less morbidity in comparison with Dynamic Hip Screws. Klinger *et al.* [8] did a study have a look at volatile intertrochanteric fractures. It concluded that PFN had reduced operation time, shorter medical institution stays, better price of the affected person with early complete weight-bearing, and fewer complications than compared with Dynamic Hip screw. On the contrary, Tornetta *et al.* [9] concluded that in patients older than 65, there is no difference between functional outcomes if fractures are fixed with a Gamma nail or a compression hip screw. Walking ability was better with the intramedullary device than the extramedullary device. Simmermacher *et al.* [10] stated that PFN is a superior implant and helps prevent femoral head penetrations for the fixation of unstable trochanteric fractures. E. Soucanye de Landevoisin *et al.* [11] said that PFNA in osteoporotic trochanteric fractures has advantages as it helps to prevent rotation and aid in cancellous bone compaction.

This proximal femoral nail impaction class design may diminish the rate of complications associated with the cephalomedullary implant, provided the implantation procedure is strategically followed, and fracture reduction is adequate. Macheras *et al.* [12] concluded that PFNA II prevented lateral cortex impingement PFNA, imparting rapid and solid fixation of the risky pertrochanteric fractures. Manoj *et al.* [13] compared PFN and PFNA and stated that both have a similar functional outcome. Still, the duration of surgery, fluoroscopy time and perioperative blood loss are reduced in PFNA class. Similarly, Gururagavendra *et al.* [14] concluded the same studying between PFN and PFNA.

Comparing one implant over another requires a larger sample size involving a multicentric study. In our research PFN A2 (Impaction class) nails were used for unstable intertrochanteric fracture fixation; these nails prevent collapse and rotation of the neck. The stress on the tip of the nail is assumed to be less, and a smaller nail size can be used. The anti-rotation screw at the proximal aspect of the nail increases the biomechanical stability of the fracture fixation. According to Harris Hip scores, out of 32cases, the functional outcome was excellent in 24, good in 5, fair in 3 and poor in 0 cases. PFN-A2 have biological advantages in terms of restoration of the abductor-lever-arm mechanism, decreased tensile strain on the implant and maintenance of controlled fracture

impaction. Limitations of the study were a smaller sample size, limited duration of postoperative follow-up to comment on the biomechanical stability of the implant, and no control group for comparison.

Conclusion

This study shows that the Proximal Femoral Nail A2 is a better option for the treatment of unstable intertrochanteric fractures of the hip in terms of high union rates with good lateral wall support and reducing postoperative morbidity and better functional quality of life, especially in osteoporotic individuals.

References

1. Xu YZ, Geng DC, Mao HQ, Zhu XS, Yang HL. A comparison of the proximal nail anti-rotation device and dynamic hip screw in the treatment of unstable pertrochanteric fracture. *J Int Med Res.* 2010;38(4):1266-75.
2. Halder SC. The Gamma nail for peritrochanteric fractures. *J Bone Joint Surg Br.* 1992;74(3):340-4.
3. Akıncı O, Akalın Y, Reisog˘lu A, Kayalı C. Comparison of long-term results of dynamic hip screw and AO 130 degrees blade plate in adult trochanteric region fractures. *Acta Orthop Traumatol Turc.* 2010;44(6):443-51.
4. Sadowski C, Lu˘bbeke A, Saudan M, Riand N, Stern R, Hoffmeyer P. Treatment of reverse oblique and transverse intertrochanteric fractures with use of an intramedullary nail or a 95 degrees screw-plate: a prospective, randomised study. *J Bone Joint Surg Am.* 2002;84(3):372-81.
5. Haidukewych G, Israel A, Berry D. Reverse obliquity fractures of the intertrochanteric region of the femur. *J Bone Joint Surg Am.* 2001;83:643-50. Kashid MR *et al.* *Int J Res Orthop.* 2016 Dec;2(4):354-3.
6. Cooper, Campion, G. Campion, and LJ 3rd Melton. Hip fractures in the elderly: a world-wide projection. *Osteoporosis international a: Simmermacher RK, Bosch AM, Van der Werken C.,* 285-289.
7. Bhatti Arshad Power, Dominic Qureshi, Sheeraz Khan, Ish Tan. Simon A prospective trial of proximal femoral nail versus dynamic hip screw for complex and unstable intertrochanteric fractures of the femur VL- 86 - BJO - *Journal of Bone and Joint Surgery.*
8. Klinger HM, Baums MH, Eckert M, Neugebauer R. A comparative study of unstable per and intertrochanteric femoral fractures treated with Dynamic Hip Screws and trochanteric buttress plate vs. Proximal Femoral Nail *Zentralbl Chir.* 2005;130(4):301-306.
9. Paul T, William R, Charles MCB, Margaret MQ, Michael M. Rockwood and green fractures in adults (8th edn), chapter. 2019;50:2705.
10. Simmermacher RKJ. The new proximal femoral nail antirotation (PFNA) in daily practice: Results of a multicentre clinical study *Injury.* *Int J Care Injured.* 2008;39(8):925-939.
11. Soucanye de LE. Proximal femoral nail antirotation (PFNATM) fixation of extra-capsular proximal femoral fractures in the elderly: Retrospective study in 102 patients. *Orthopaedics & Traumatology: Surgery & Research.* 2012;98:288-295.
12. Macheras. Does PFNA II avoid lateral cortex impingement for unstable peritrochanteric fractures? *Clin Orthop Relat Res.* 2012;470(11):3067-3076.
13. Kashid MR, Gogia T, Prabhakara A, Jafri MA,

Shaktawat DS, *et al.* Comparative study between proximal femoral nail and proximal femoral nail antirotation in management of unstable trochanteric fractures. *Int J Res Orthop.* 2016;2(4):354-358.

14. Gururagavendra P, Sathish D, Jayakumar S, Devadoss A. Randomised comparative study in management of unstable intertrochanteric fracture with PFN V/S PFN A2 - functional and radiological outcome. *Int J Orthop Sci.* 2018;4(4):866-874.