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Results of Trochanteric Fracture Fixation with PFN-AII in Elderly

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Abstract

Introduction : Fractures of the trochanter occur most commonly in old age people and account for 50% of all hip fractures. Management of these fractures remain a challenge to date especially when the bone is osteoporotic. Surgical treatment is the preferred method for the early mobilization of the patients. The objective of this study, mainly to know the results of PFNA2 in osteoporotic trochanteric fracture in elderly population.

Materials and methods : This is both prospective and retrospective study of 22 cases over 6 years. Intertrochanteric fracture of femur cases in elderly patients treated with PFN-AII after inclusion and exclusion criteria were studied. The assessment was done at 6 months and the results were analysed.

Results : The average age of patient was 68.3 years in the present study and the average time to surgery since injury was 2.4 days. Union time average was 11.2 weeks with very few complications. Results at 6 months was 18 had excellent, 3 good and 1 average with few complications.

Conclusion : PFN-AII is best suitable for intertrochanteric fractures in elderly in osteoporotic bone, no screw back out, no screw cut through, helps in early weight-bearing with good union rates and returns to preinjury level of activity.

Key words : PFN-AII, intertrochanteric fractures, elderly, nail

Introduction: Fractures of the trochanter are one of the common injuries in old age population and account for upto fifty percent of hip fractures.⁽¹⁾ These are fractures of fragility which results from minor to moderate injury ^(2,3).

These fractures are difficult to manage even today inspite of improved patient care, wonderful techniques in surgery, and implant design especially when the bone quality is poor⁽⁴⁾. Various surgical treatment options are available for treatment of theses fractures. Nonoperative management is reserved for patients with severe medical illness.

Surgical treatment is the preferred method for the early mobilization of the patients, this can achieved by anatomical reduction and stable fixation. The surgical goal is to make a mobile hip that is stable without pain.⁽⁵⁾

For more than a decade, the Dynamic hip screw has been utilized for the fixation of these fractures but it may not be the best implant in all cases.^(5,6) Control of excessive collapse and stability is important in these fractures. Some of the complications are unacceptable reduction, varus placement, improper placement of the implant, screw backout, implant screw cut through, migration of the fracture fragments and fracture around the implant.

Intramedullary nails achieve stable fixation at the fracture site including calcar support and prevent the excessive collapse.⁽⁷⁾ PFN with two proximal screws were introduced initially but it was associated with complications. Complications were more in osteoporotic bone in elderly, like Z-effect, screw backout, and cut through. PFN-A was introduced with a single helical screw to reduce the complications.

PFN-A was modified to PFN-AII to suit the Asian population by reducing diameter and mediolateral angle. Single helical screw is designed to condense the cancellous bone while introducing through neck, giving an extra anchoring, and leading to rotational stability and higher screw cut out strength⁽⁸⁾.

The aim of this study is to know the results of trochanteric fracture in elderly in and around rural Bangalore treated with PFN-AII.

Materials and methods : Both retrospective and prospective study of 22 cases over 6 years (from May 2017 to April 2023) with a minimum follow-up of 6 months was done at MVJ hospital at rural Bangalore in elderly patients with trochanteric fractures treated with PFN-AII with the following criteria

Inclusion Criteria: Age above 60 years, Boyd and Griffin type1 and 2, presented within three weeks of injury, good preoperative ambulation, and walking independently without any support. Exclusion Criteria: Age < 60 years, more than 3 weeks duration, intracapsular fracture, Boyd and Griffin III and IV.

All patients were investigated for comorbidities which were optimised before surgery. An anteroposterior X-ray of pelvis with both hips was taken in fifteen degrees internal rotation (Figure 1). CT with 3D reconstruction taken if needed.

Surgical Technique: Patients after administration of spinal epidural anesthesia, positioned supine on fracture table. Closed reduction done and confirmed with the C-arm in AP and lateral views and then sterile preparation was done.

An incision was made 3 to 5 cm just above the tip of the trochanter. Entry was made medial to tip of the greater trochanter in anteroposterior view where as in lateral view at posterior 1/3rd and anterior 2/3rd junction. Guide wire introduced into the canal, reaming done to know the nail size and the PFN-AII is carefully inserted manually using gentle to and fro motion of the zig into the medullary canal. Guide wire for the helical screw was introduced from lateral side and over the guide wire reaming of the lateral cortex was done. Appropriate size helical screw was hammered and the helical screw was positioned at central or lower central region and confirmed on both x-ray views. The tip-apex distance was maintained within 10 mm.

Compression achieved and confirmed on C-arm (Figure 2) care taken to achieve good reduction in valgus alignment. All nails were statically locked.

Post-Operative Protocol: Adequate analgesia was given with limb elevation, patients were allowed partial weight bearing with walker support after the second day as tolerated by the patient. Treatment for osteoporosis was started. For stable fractures complete weight bearing allowed with walker, and for fracture patterns which are unstable we allowed four to six weeks partial weight bearing and full weight allowed depending on clinical radiological signs of union.

Results: Every case was followed upto a minimum of 6 months and at the end all cases were assessed for outcomes by return of the functional status to pre injury activity level and graded as excellent, good, average and poor.

There were eleven patients in the age group between the age group sixty years to seventy years. Eight patients in the age group between 70 to 80 yrs. Two patients between 80 to 90 yrs and

one patient above the 90 yrs. (Table 1) There were 10 females and 12 males. In 9 patients injury was on right side and 13 were on left side. (Table 2) (Figure 4,5,6)

Table 1 : Age distribution

Age / Sex	Number of patients	Percentage
60 - 70 yrs	11	50 %
70 - 80 yrs	8	36.4%
80 - 90 yrs	2	9.1%
➤ 90 yrs	1	4.5 %

Table 2: Side distribution

Right side	9	40.9%
Left side	13	59.1%

The average time for surgery since injury was 2.4 days. Mean time of surgery was 40 minutes. Mean intraoperative loss of blood was about 130 ml. The average size of helical blade was approximately 90 mm size. Hospital stay average was 5 days. Average union 11.2 weeks. We had 18 cases excellent, 3 cases good and 1 case medium results. (Table 3) All the complications noted and treated accordingly.

Functional outcome, and return to preinjury level activity assessment, we had 18 cases excellent, 3 cases good, 1 case average results.

Table 3: Functional outcome

	Number	%
Excellent	18	81.9%
Good	3	13.6%
Average	1	4.5%
Poor	0	-

Complications included one case of mal positioned helical blade with varus reduction, two cases of protruding proximal part of the nail above the tip of the trochanter, of the two one patient had pain and abductor lurch for few months, there was one case of shortening of the limb less than 2 cm, there were no cases of DVT. We achieved union in all cases with no infection and at the end 82% of total patients reached the preinjury level of activity.

Figure 1: 77 year Female with right side intertrochanteric fracture



Figure 2: Next day of surgery



Figure 3: X-ray at 3 months of same patient



Figure 4: 70-year-old female patient with Right side intertrochanteric fracture with PFN-AII



Figure 5: 88-year-old male patient having Right side intertrochanteric fracture treated with PFN-AII



Figure 6: 72 years old female patient with Right side intertrochanteric fracture with PFN-AII



Discussion:

Osteoporotic trochanteric fractures in elderly considered as a special problem and there is risk of screw backout as there is no purchase in the bone. The difficulty is more when there is posteromedial comminution. Trochanteric fractures require good implant which provide stability, helps in early mobilization and suitable for osteoporotic bone. PFN-AII provides compression and at the same time it prevents excessive collapse. Introducing two screws in the head and neck as done in PFN may be difficult in small neck. PFN-A has the advantage of introducing a single screw which is helical and gives rotational stability.

In a study done by Soucanye de le⁽⁹⁾ stated that surgical fixation of intertrochanteric fracture with PFNA helps in rotational stability, compression of the fracture site with less complications rate.

Studies by Macheras et al.⁽¹⁰⁾, Kashid et al.⁽¹¹⁾, and Gururagavendra et al.⁽¹²⁾ concluded that PFNA II implant is better than PFNA in terms of preventing lateral cortex impingement in small trochanters, good fracture fixation, less surgical time, less c-arm exposure time and less intraoperative blood loss.

In this study we found out that the PFN-AII was useful in achieving rotational stability, controlled collapse, less surgical time, and good fracture fixation. We used short nails in all cases and there were no cases of implant failure or stress fracture.

Limitations of the study: above 60 years of age Harris hip score varies, the older the patient poorer the score which cannot be studied statistically.

Conclusion

PFN-AII is good in osteoporotic bone, stable for unstable intertrochanteric fractures, no screw back out, less screw cut through, helps in early weight-bearing walking, accommodates even in the small femoral neck, with good union rates and returns to preinjury level of activity.

Results may further be improved for better helical screw positioning if the length of the trochanter part of the nail is reduced in small trochanter

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