



Original Research Article

PFNA-II in Peritrochanteric Femur Fractures: Experiences in Osteoporotic Elderly Indians

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ABSTRACT

Background: Management of peritrochanteric fractures in elderly osteoporotic requires stable fixation with early mobilisation as elderly patients suffer high complication rate due to associated co-morbidities and recumbency. PFNAII is a relatively newer implant with the biomechanical advantage of helical blade providing bone compaction and better anchorage in femur head.

Patients and Methods: In this case series, we evaluated functional outcome of PFNAII in fixation of peritrochanteric fractures, with an average follow up of 22 months, in osteoporotic elderly Indians patients. Patients with pathological fracture, open fracture, multiple injuries, age less than 60 years, Patients with previous hip surgeries and non affordable for implants were excluded. 78 patients aged >60 years were operated with PFNAII. 46 fractures were unstable. 69 patients had one or more co-morbidities. 70 patients had osteoporosis of Grade I, II or III as per Singh's Osteoporotic Index.

Results: Post-operatively 72/78 patients had acceptable alignment. All the patients were mobilized early. Post-operative morbidities were minimal. Average time to union was 14+/- 3 weeks. 50 patients recovered pre-op mobility by end of 6 months. There were no cases of varus collapse, blade cut out, nail fracture and non-union. 6 patients had asymptomatic backing out of blade. Anterior thigh pain occurred in 4 patients, 16 patients had abductor lurch while walking.

Conclusion: In surgeon's experience, procedure was easy to perform with minimal intraoperative and post-operative complications. Efficacy of implant is good. Cost is a limiting factor for routine usage. As the implant provides exceptional advantage in osteoporotic bones, appropriate selection of patients can help in proper allocation of resources.

Keywords: Geriatric hip fracture, Peritrochanteric/Intertrochanteric fracture, PFNA II, Helical Blade, Osteoporosis.

INTRODUCTION

The peritrochanteric femoral fracture is common in elderly patients. The incidence has increased markedly in recent years. [1,2] Treatment of peritrochanteric fractures in elderly patients is a huge challenge for many trauma surgeons, mainly

because many such patients have severe osteoporosis and medical disorders that increase the risks associated with surgery and anaesthesia. The goal of surgery is stable fixation, which allows early full weight bearing mobilization of the patient and rapid return to pre-fracture activity

level. Early mobilisation counters post-operative complications that can occur due to recumbency at such old age. [3,4]

Choice of fixation for intertrochanteric femur fracture can be extramedullary or intramedullary. Most of the literature recommends use of an intramedullary device, especially in an unstable fracture due to improved biomechanics of an intramedullary construct. [5-8] Several clinical and biomechanical studies have analysed the results of different implants such as the dynamic hip screw [DHS], the Gamma nail [GN] and the proximal femoral nail [PFN]. Those devices have suffered a variety of complications like cut-out, screw back out, implant breakage, femoral shaft fractures and subsequent loss of reduction. [9-17] the complications are increased in elderly osteoporotic bones. The proximal femoral nail anti-rotation [PFNA] system was introduced by AO and was further refined as PFNAII in 2009. The major development is the helical blade which is supposed to compress the surrounding cancellous bone in the femoral neck. In clinical and biomechanical studies it has been shown that helical blade has a significantly higher cut-out resistance than other commonly used screw systems. [18-20] The PFNAII blade may thus be a more biomechanically suitable implant for unstable trochanteric fractures.

To our knowledge, there are few studies on the PFNAII available in the elderly Indian population. The purpose of this study is to report our results of PFNAII fixation in peritrochanteric femur fractures in osteoporotic elderly Indian population.

MATERIALS AND METHODS

PATIENTS: This prospective analysis comprises of 78 patients with peritrochanteric femur fractures, who were treated with PFNAII during the period from June 2012 to August 2014 by a single surgeon. Only patients with age > 60 were included in the study. Clinical and radiographic examinations were conducted

on admission to the hospital, and fracture was classified according to AO/OTA classification. Patients were categorized according to Singh's index of osteoporosis. [21] Comorbidities of the patients were noted. All the patients were followed upto a minimum of 9 months and maximum of 36 months, average follow up being 22 months. Early and late complications were noted. Pre fracture and 6 months postsurgical ambulatory status were analysed using Parker and Palmer mobility score. [22] Harris hip scoring of the patients was done preoperatively and 6 months post operatively. For retrospective preoperative Harris Hip Score there were certain criteria for which scoring was not possible and scores could be obtained out of 91. These scores were then equalised for out of 100.

SURGICAL PROCEDURE: All patients were taken for surgery within 48 hours of admission after pre anaesthetic check-up and cardiology fitness. Manufacturer's instructions of the PFNAII were followed. All the patients were operated by a single surgeon. Spinal or general anaesthesia were used in all patients. Prophylactic antibiotics were given 30 minutes before commencing surgery. All fractures were treated on fracture table by closed reduction or limited open reduction under C-arm fluoroscopy control. Limited open reduction technique refers to levering the fracture using a bone lever through a small incision that will be used for inserting the hip blade. The operative time, overall fluoroscopy exposure and duration of hospitalization were recorded. Blood loss during surgery was evaluated as fall in haemoglobin after surgery.

The reposition of the proximal fragment relative to shaft of femur was evaluated by the Garden alignment index and the position of the blade was evaluated by the tip apex distance [TAD]. [23]

POST OPERATIVE PROTOCOL AND FOLLOW UP: In bed physiotherapy was started on the same day. Patients were mobilised on post-operative day 1 with the

help of walker on partial weight bearing or as soon as they were comfortable. Total of 3 doses of Intravenous antibiotics followed by oral antibiotics for 5 days were given. No pre or post-operative thromboprophylaxis was used for our patients. Radiography was done immediate post operatively, then at follow-ups at 6 weeks, 3 months and 6 months post discharge and thereafter at 6 month intervals.

RESULTS

Of the 78 patients, male: female ratio was 31:47, left: right ratio was 36:42. Mean age of the patients was 69.4 years. Most common mode of injury was domestic fall. 32 belonged to the stable group [31A1.1-3], 46 belonged to the unstable group [31A2.1-3 and 31A3.1-3].^[11] All fractures were closed. 69 patients had one or more associated co-morbidities.

On post-operative radiographs, 72/78 patients had fracture reduction as acceptable as per Garden's alignment index. 74/78 had Tip-apex distance within 25mm on AP and lateral radiographs. In most cases the placement of the PFNAII nail was perceived as "ideal", in the lower half more to the centre of the femoral neck. In 5 patients, minor fracture of lateral cortex near the greater trochanter occurred during

nail insertion or helical blade insertion for which no additional treatment was done as these were undisplaced and mostly just breach of a single cortex. Most commonly a 240 mm nail was used. Long nails were used in extremely comminuted fractures.

Mean duration of surgery [reduction + incision to closure] was 48 minutes. Mean number of fluoroscopy exposure were 27. Post-operative drop in Haemoglobin level was less than 1gm/dl in 61 patients and 1-2gm/dl in remaining 17 patients, mean = 0.93gm/dl. 18 patients were monitored in ICU for 1 day, the reason being their fragile condition due to old age and multiple co-morbidities. 3 patients had a prolonged ICU stay for 4-5 days as they developed post-operative metabolic abnormalities, but recovered and discharged in medically fit condition. 1 patient died on post-operative day 1 due to sudden cardiac event. Mean duration of stay in hospital was 4.3 days, with 61 patients being discharged on post-operative day 3. Local complication occurred in 3 patients in the form of superficial infection which subsided with antibiotics. Systemic complication in the form of electrolyte imbalance occurred in 3 patients, UTI in 3 patients, respiratory infection in 2 patients. All the systemic complications were managed medically.

Table 1: Results.

Characteristics	Stable type [32]	Unstable type [46]	Total [78]
Sex [M:F]	14:17	17:30	31:47
Age [mean]	68.3	70.1	69.4
Mini open reduction	0	26	26
Garden's Alignment Index			
-acceptable	32	40	72
-not acceptable	0	6	6
TAD>25mm	0	4	4
Duration of surgery [mean]	45	50	48
Fluoroscopic exposures [mean]	19	32.5	27
Drop in haemoglobin [mean]	0.89	0.96	0.93
Hospital stay [mean]	3.5	4.85	4.3
Time to union [mean]	12.8	15.2	14.2

Of the 78 patients, 12 patients died by the end of 6 months. Remaining all 66 patients were available for follow-up. Average time taken for fracture union was 14 ± 3 weeks. Bridging of three cortices in AP and lateral views was considered as union. 50 patients achieved pre trauma

mobility by the end of 6 months. Majority of the patients retained their functions as shown by Harris Hip score. Late complication in the form of abductor lurch was found in 16 patients, anterior hip or thigh pain occurred in 4 patients. 6 cases had partial backing out of hip blade.

Backing out of blade was seen radiologically but no patient had symptoms of impingement. No patients exhibited postoperative non-union, varus, nail fracture

or perforation of hip blade through the joint. In few patients, who could be followed for a longer period, there was no trend towards development of any complication.



Fig 1: Case one



Fig 2: Case two



Fig 3: Cut section of cadaveric femoral head after insertion of Helical blade.

DISCUSSION

In our series, we did not encounter any case of varus collapse and blade cut-out, suggesting a good purchase of helical blade. During insertion of helical blade, it compacts the trabecular bone around it and decreases its susceptibility of yielding to strain. A study done on cadaveric bones by Goffin et al [19] concludes that bone compaction caused during insertion of helical blade is significantly important in bones with lower density and provides additional mechanical anchorage to the blade and decreases chances of cut outs.

There have been other biomechanical studies that conclude the superiority of blade over screws with regard to minimising chances of cut out. [18] Though there have been a few cases reported where cut out or joint perforation has occurred, but most of these seem to have occurred due to improper placement of screw. [24-26] In our series, majority of the patients had severe osteoporosis, but with correct placement of blade we did not have any case of implant failure. So, our experience suggests that the helical blade, when properly placed, is well suited for osteoporotic patients. Due to the biomechanics of an intramedullary implant, it provides better stability in unstable fractures [5-8] and thus better clinical and functional outcomes. Other surgeons have also reported good clinical results in their clinical series/studies. [20, 27-35]

On reviewing the literature for reports of other implants in treatment of peritrochanteric fractures, we found the rate of complications of screw cut-out, varus collapse, loss of reduction and implant breakage to be higher than we experienced for PFNAII. [11-13,15-17]

In surgeon's experience, the operative procedure for the PFNAII was relatively easily performed with minimal intraoperative complications. Easier steps lead to quicker surgery and an overall reduction of operative time, fluoroscopic exposure, blood loss, hospital stay and minimal post-operative complications. In our study the systemic complications were less than encountered in other studies on intertrochanteric femur fracture fixation. This could be attributed to early mobilisation of the patients. There is more and more recent literature coming up advocating early ambulation, especially in old age, so as to prevent systemic complications due to recumbency. [3,4] We did not receive any complications due to early weight bearing suggesting a stable construct. There was abductor lurch seen in 16 patients, which can be attributed to damage to abductor insertion site during nail insertion. Most patients recovered their pre

injury walking ability, and fracture healing occurred in all by the end of 6 months, suggesting good efficacy of the implant.

To conclude, authors believe that PFNAII provides reliable fixation in intertrochanteric fractures. If fracture is reduced well with good medial cortical contact and placement of implant is appropriate, clinical results and functional outcome are good.

But, regular usage of the PFNAII is restricted due to high cost which acts as a deterrent in developing countries like India. So, appropriate selection of patients can help in proper utilisation of resources. Most of the implant related complications occur in the osteoporotic elderly segment. So, use of PFNAII, particularly in osteoporotic peritrochanteric fractures can decrease the overall burden of such fractures.

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