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A PROSPECTIVE STUDY TO EVALUATE FUNCTIONAL OUTCOME IN TROCHANTERIC FRACTURES USING PROXIMAL FEMORAL NAIL ANTIROTATION (PFN-AII) IN ELDERLY

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Abstract:

Background: The best surgical strategy for extra-capsular proximal femoral fractures (PFFs) is controversial in the elderly. Poor bone quality and neck screw instability can adversely affect the results with currently available fixation devices, which predominantly consist in dynamic hip screw-plates and proximal reconstruction nails.

Hypothesis: The helical blade of the proximal femoral nail antirotation (PFN-AII) achieves better cancellous bone compaction in the femoral neck, thereby decreasing the risk of secondary displacement.

Materials and Methods: A prospective study was conducted to assess the results of 20 elderly patients with trochanteric fractures [8 – stable (AO; 31-A1) and 12 – unstable (AO; 31-A2 and A3)] treated with PFNAII from December 2015 to April 2017. Follow up functional and clinical assessments were done

Results: The average age of the patients was 75.75 ± 6.42 (71–82) years. The fractures were closely reduced and fixed with PFNA-II. All of the fractures healed in an average of 14 weeks. The mean operation time was 46.68 ± 7.44 (30–77) minutes, and the mean blood loss was 115.77 ± 45.04 (50–300) ml. One patient was reoperated because of a poor blade position. At the time of the final follow-up, 80.7% of the patients returned to their pre-injury activity levels. PFNAII might be one treatment choice to solve the mechanical problems associated with these fractures because of its improved fixation strength, simpler technique, shorter operation time and reduced blood loss.

Conclusion: Good results with relatively low complication rates can be achieved by PFNAII in trochanteric fractures in the elderly. Attention to implant positioning, fracture reduction and a good learning curve is mandatory for successful outcomes.

Keywords: Helical blade, intramedullary implant, PFNAII, trochanteric fractures.

Introduction

Proximal femoral fractures (PFFs) account for a substantial proportion of trauma surgery procedures and carry high mortality rates of 5% after 1 month and 15% after 6 months[1]. The main challenge with extra-capsular PFFs is instability in the event of comminution and rupture of the posteromedial cortex, as seen in complex pertrochanteric fractures, intertrochanteric fractures, trochanteric fractures extending into the diaphysis, and subtrochanteric fractures[2]. The introduction of dynamic screw-plates and proximal intramedullary reconstruction nails has transformed the management of extra-capsular PFFs. Whether one of these devices is superior over the other remains controversial, particularly as their introduction coincided with a decline in complication rates due to increasing surgeon experience[3]. The rate of reoperation for mechanical complications of any type remains as high as 8%[4]. Mechanical complications include hardware-related fractures and blade cut-out with a risk of acetabular penetration[4,5]. Greater fracture instability and osteoporosis severity are associated with a higher risk of mechanical complications[4,5]. The proximal femoral nail antirotation1 (PFN-AII) was designed to minimise the risk of mechanical complications, and preliminary results suggest that this goal may have been achieved[6,7]. We hypothesized that the helical blade of the PFN-AII resulted in better cancellous bone compaction in the femoral neck, thereby decreasing the risk of secondary displacement.

Material and Method

20 patients with trochanteric fractures treated with the PFNAII from 2015 December to 2017 April were reviewed. Independently mobile patients over 65 years admitted with a trochanteric fracture following a low velocity fall were included in the study. High velocity fractures (road traffic accidents, fall from a height of more than 5 feet), polytrauma patients, pathological fractures, intracapsular fractures, and patients presenting more than 2 weeks after injury were excluded. Fractures were classified according to the AO classification, 31. A1–A3. Data was prospectively collected and analyzed for clinical and functional results.. The institutional review board approved the study and informed consent was obtained from patients prior to surgery

A standard surgical technique for nail and blade insertion recommended by the manufacturer (PFNA–II, India) was followed. The procedure was carried out on a fracture table with boot traction . Initial fracture reduction was attempted on the fracture table under image intensifier. Percutaneous fracture-reduction techniques were used if satisfactory reduction in two planes could not be achieved before the nailing procedure. The nail was locked distally in the dynamic mode for stable fractures (A1) and in the static mode for unstable fractures (A2 and A3).

Weight bearing as tolerated was allowed routinely from the day after surgery irrespective of the fracture subtype. Thromboembolic prophylaxis with subcutaneous low molecular weight heparin was used for 3 days postoperatively. Patients were discharged when they were able to walk confidently with assistance.

Follow up assessments were conducted at 6 weeks, 3 months and 6 months. Final analysis was performed between May and July 2017. At followup, visual analog scores (VAS), the mobility scores described by Parker and Palmer .

Results

The average age of the patients was 75.75 ± 6.42 (71–82) years. The fractures were closely reduced and fixed with PFNAII. All of the fractures healed in an average of 14 weeks. The mean operation time was 46.68 ± 7.44 (30–77) minutes, and the mean blood loss was 115.77 ± 45.04 (50–300) ml. One patient was re operated because of a poor blade position. At the time of the final follow-up, 80.7% of the patients returned to their pre-injury activity levels.

The mean VAS score at the final followup was 1.5±0.89. Slight-to-moderate abductor weakness was seen in 06 patients (MRC grades III and IV). Abductor limp was seen in 04 patients. The mean Parker and Palmer mobility score was 5.3±1.2

Figure 1: PFN-AII device in 80 year old female patient: 3 month follow-up

Figure 2: PFN-AII device in 78 year old female patient: 3 month follow-up

Discussion

PFNA II incorporates the use of the helical-shaped blade to achieve fixation into the femoral neck unlike the use of screws in the earlier generation IM devices. The blade insertion technique compacts cancellous bone that makes it suitable for osteoporotic fracture situations.[8] The blade concept has also been shown *in vitro*to be biomechanically superior to screws in terms of axial and rotational stability.[9,10]

Only low velocity falls were included in the study, which is an indirect measure of osteoporosis. A cut out rate of 0.7% indicates an excellent outcome compared with the previously reported rates of 2–4% with IM devices.[11] Despite the theoretical advantages of the blade being anti-varus collapse and anti-rotation, varus collapse was the most common complication seen in the study accounting for 2/3 of all complications. 84% of all varus collapse occurred in patients with either an unsatisfactory blade position or poor reduction or both.

Majority of patients were pain free at the last followup. Minimal limp was seen in 4 (20 %) patients at the last followup which may indicate damage to the abductors during surgery and a degree of shortening. 80.7% of the patients available for followup regained their preinjury status. 90% of the patients were community ambulant with or without assistive devices at the last followup indicating that majority of the patients had benefitted from the procedure.

There were no femoral shaft fractures and the overall reoperation rate of 5 % is comparable with the reported rate of 1.2–10%.[12,13] Apart from inherently unstable fractures, poor fracture reduction and unsatisfactory blade position in the femoral head are the chief factors in determining the complication rates. Attention to these factors and improvement in the learning curve can play a significant role in improving outcome and reducing complications with IM osteosynthesis using the PFN-AII.

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Conflict of Interest: None

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