

Functional and clinical outcome of the proximal femur intramedullary nail antirotation system (PFNA-II) for intertrochanteric fractures

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Abstract

Background: Functional and Clinical outcome of the proximal femur intramedullary nail antirotation system (PFNA-II) for intertrochanteric fractures Intertrochanteric femoral fractures are among the most often encountered fractures by Orthopaedic surgeon. The incidence of this fracture in elderly increases with advancing age and increased life expectancy. There are several modalities of management for IT fracture. PFN is currently the go to implant for surgeons. Our study aims to evaluate the functional and clinical outcome of the proximal femur intramedullary nail antirotation system (PFNA-II) for intertrochanteric fractures. **Materials and Method:** This prospective study was conducted at Department of orthopaedics, Melmaruvathur Adhiparasakthi Institute of Medical science, Melmaruvathur who attended in OPD. The study comprises of 110 cases of Intertrochanteric fractures were treated with PFNA-II that fitted into the inclusion criteria were operated in our institution. After obtaining approval from ethical committee and informed consent from the patient this study was started. **Results:** Out of 110 patients 94 patients underwent closed reduction and only 6 patients required limited open reduction. There were 31 male patients and 69 female patients. At the end of 2 years follow up, the mean Harris hip score 80.6 ± 16.9 (range 65-100). The score was excellent in 40 patients, good in 49 patients and moderate in 15 patients and poor in 6 patients. **Conclusion:** Intertrochanteric fractures especially in the elderly patients are significant life event. PFNA-II offers the advantages of Minimally invasion, less blood loss, shorter operative time, faster post operative recovery, early weight bearing and reduced re-operative rate which are all definitely elderly friendly.

Key Words: Intertrochanteric femoral fractures, proximal femur intramedullary nail, Harris hip score

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Received Date: 19/11/2019 Revised Date: 05/12/2019 Accepted Date: 12/01/2020

DOI: <https://doi.org/10.26611/10201312>

Access this article online

Quick Response Code:	Website: www.medpulse.in
	Accessed Date: 19 January 2020

INTRODUCTION

Functional and Clinical outcome of the proximal femur intramedullary nail antirotation system (PFNA-II) for

intertrochanteric fractures Intertrochanteric femoral fractures are among the most often encountered fractures by Orthopaedic surgeon. Many operative implants are available for the management but none has been satisfactory. Trochanteric fracture is one of the commonest fracture encountered in orthopedics and also the most devastating injury of the elderly. The incidence of this fracture in elderly increases with advancing age and increased life expectancy. Growing number of population and the road traffic accidents have resulted in an enormous increase in these type of fractures [1, 2] in younger patients. High-energy trauma like RTA and fall from height and accounts for only 10% percent. Older patients suffering from a minor fall can sustain fracture in this area because of weakened bone due to osteoporosis

or pathological fracture and this account for 90% of the fractures. There are several modalities of management for IT fracture. PFN is currently the go to implant for surgeons. Our study aims to evaluate the functional and clinical outcome of the proximal femur intramedullary nail antirotation system (PFNA-II) for intertrochanteric fractures.

MATERIALS AND METHODS

This prospective study comprises of 110 cases of Intertrochanteric fractures were treated with PFNA-II that fitted into the inclusion criteria were operated in our institution. Patients with open injury, pathological fractures, less than 60 years of age and fracture requires osteotomy to make it stable were excluded. After obtaining approval from ethical committee and informed consent from the patient this study was started. Based on OTA classification these fractures were classified as 31A1, 31A2, 31A3. There were 33% in 31A1 and 51% in 31A2 and 16% in 31A3 and out of those 72 patients had accidental fall and 28 had road traffic accident. Most the patients had comorbidities, hence based on ASA scoring system there were 37 patients under ASA1, 42 patients under ASA2, 21 patients under ASA3. Our institution is situated in semi urban area with a rural background. Patients often come to the institution after trying other modalities of native treatment. The study was basically conducted to find out the age incidence, sex distribution, side incidence, mode of injury, fracture anatomy, the operative technique itself and the results obtained and complications if any. Following inclusion and exclusion criteria were used.

METHODS

All patients who were admitted with intertrochanteric fractures were immobilized with skin traction. They were evaluated for various co morbid conditions and cardiopulmonary status routinely. All surgeries were performed by skilled orthopaedicians. Patient were placed on fracture table, most patients underwent closed reduction only few patients required limited open reduction of intertrochanteric fractures. Under fluoroscopic guidance all fractures were fixed with Asian proximal femoral nail antirotation. Post operative rehabilitation were started from day 2. Isometric quadriceps exercise and ankle pump exercise were encouraged. Patients x-rays were reviewed and they were started on partial weight bear walking. The duration for part load depends on the patients X-ray reviewed. All patients were made to walk on full weight bearing after fracture is united clinically and radiologically. The time duration for surgery from closed reduction to wound closure is defined as the operative time. The blood loss, incision length, part load time and

operative time were monitored. Patients were followed for the period of 2 years. Clinical and radiological evaluations were done at 4 weeks and 6 weeks and at 3, 6, 12, 24 months postoperatively. A Harris hip score of 90 to 100 was considered excellent, 80 to 89 was considered good, 70 to 79 was considered moderate, and ≤ 69 was considered poor.

INCLUSION CRITERIA

- 1 . Patient who has been diagnosed as having Intertrochanteric fractures .
- 2 . Patients more than 20 years of age.
- 3 . Patient who are fit for surgery.

EXCLUSION CRITERIA

- 1 .Less than 20 years .
- 2 .Patients with compound fractures .
- 3 .Patients unfit for the surgery.
- 4 .Patients with pathological fractures.
- 5 . Previous wound or bone infections, operatively treated fractures, or retained hardware in the same extremity.
- 6 . Patients who discontinued follow up / expired later post operatively.

Evaluation of patients:

Upon arrival the patients were assessed clinically and were stabilized haemodynamically. Patient s were examined and investigated with X - ray pelvis with both hips AP and Lateral view (whenever possible). Following radiographs patients were admitted to orthopaedic wards and were maintained on skin traction over a Bohler - Braun frame was applied to all cases till surgery.

PRE-OPERATIVE OPERATIVE



Figure 1:

Pre op anaesthetic and physician fitness done. Adequate blood reserved in blood bank. Shaving of affected extremity, written informed consent of patient and relatives for internal fixation taken. All the patients were kept fasting overnight. All the patients were operated using a Proximal femoral nail on a fracture table in supine position or lateral position under image intensifier control using standard techniques.

C-Arm during Surgery:**Figure 2**

Patients were discharged on the tenth post - operative day following sutures removal, of their post operative period was uneventful. Patients were assessed clinically and radiologically on the 2nd post - operative day, at 6 weeks, 3 months and then between 6 months to 1 year depending upon the fracture union . These findings are documented according to a detailed proforma which was exclusively prepared for the study. Healing was judged by both clinical (pain and motion at fracture site) and radiological (bridging callus filling the fracture site or trabeculations across the fracture site) criteria and functional outcome was reviewed according to the Harris Hip score (modified).

**Figure 3****Figure 4****RESULTS**

Out of 110 patients 94 patients underwent closed reduction and only 6 patients required limited open reduction. There were 31 male patients and 69 female patients. Mean age group of this study was 72.4 ± 11.0 . It took averagely 2.5 days from injury to surgery (range 2-10days).The most important in elderly patient was mean operative time which was around 28.9min (range 20-45 min).The average intraoperative blood loss was 52.8ml (range 40-70ml) and total incision length was 5.5 ± 2.2 (range 5-10cm). The PFNA-II used had three different diameters. It was used according to patient femoral canal size.9 mm nail was used in 42 patients and 10mm nail was used in 50 patients and 11mm nail was used in 8 patients. No patients were excluded from the study during the follow up for 2 years. Radiological evaluation of patients showed neck shaft angle of $135^\circ \pm 8^\circ$. No patient had varus collapse. The average loading time varied away with different fracture groups. It was around 12.9 days for 31A1 (8-15 days), 22.8 for 31A2 (20-28 days) and 31A3 had more delayed loading time of 40.4 days (30-60days). It took 13 ± 2.5 weeks averagely for a fracture to heal (10-20 weeks).we didn't experience any complication such as a non union, varus collapse or cut through of blade. Among 110 patients 55 experienced anterior thigh pain after suture removal, among 55, 28 patients experienced thigh pain for one year. No patients had pain after one year. All patients were given anti inflammatory medications for 2 weeks and encouraged physical therapy for 6 weeks. At the end of 2 years follow up, the mean Harris hip score 80.6 ± 16.9 (range 65-100). The score was excellent in 40 patients, good in 49 patients and moderate in 15 patients and poor in 6 patients(table 2 and 3)

FUNCTIONAL OUTCOME

Case 1



Case 2



Standing

Squatting

Case 3



Flexion

Sitting in Crossed Legs

COMPLICATIONS

Limp: In our study, 97 of the patients had a normal gait by one year. 13 patients in our study had a limp on the affected side.

Coxa vara:

In our study, 91 of the patients had a neck-shaft angle of 130° or more. 12 patients had varus angulation of 5°, 4 patients had varus angulation of 10° and 3 patients had varus 15°.

Varus angulation of up to 15° is acceptable and does not need re-doing.

Shortening:

In our study, 87 of our patients had no shortening. 21 patients developed shortening of 1 cm.

Anterior thigh pain:

9 patients suffer anterior thigh pain, in 3 patients we sought the reason for this was mild heterotropic ossification in proximal end of the nail. In rest of the reason may iatrogenic injury to gluteus or tensor fasciae latae. All the patients were treated symptomatically with analgesics and responded well to that. No patients required surgical intervention.

Infection

Among the 110 patients 4 patients encountered superficial infection, all treated with wound wash and appropriate antibiotic therapy after culture, all responded well.

Cut-outs

We didn't encounter any cutouts.

Avascular necrosis of head of femur and Non-union

No cases of AVN (Avascular necrosis) of femoral head and non-union were noted in our study.

DISCUSSION

In our study, 84% patients had excellent and good outcome and 16% patients had fair and poor outcome at the end of one year follow-up. This is comparable with other studies in the literature. In Ming Hui Li *et al.*⁴ study, 81.57% had excellent and good outcome and 18.43% had fair and poor outcome. In Jin-Song Pu *et al.*⁵ study, 77% had excellent and good outcome and 23% had fair and poor outcome. In WL Loo *et al.*¹⁰ study, 83.9% had excellent and good outcome and 16.1% had fair and poor outcome. Our study shows 84% favorable functional outcome but 16% of the patients suffered from the known complications and did not returned to their pre fracture mobility status. We found PFNA-II, is the first choice of implant for elderly because, in our study, 95% of the patients under went closed reduction and internal fixation. The surgical time was minimal which avoids prolonged and anaesthetic and surgical complications, which may be life threatening in elderly. Since it is an intra-medullary device, there is a good postero-medial support, which is important for stability of the fracture, for early mobilization of the aged patients, which can avoid devastating complication DVT and bed ridden complications like, bed-sore, abdominal and chest symptoms. We didn't access for osteoporosis, in our study because all the patients were osteoporotic and we didn't encounter with any cut-outs. Lastly, there is very minimal blood loss, which avoids blood transfusion and its consequences. Coming to the weakness of the study in supporting the implant it requires a larger sample size would be required to explore the result on to the general population. Preoperative walking ability of the patients

was not determined which may affect the final functional status achieved. Osteoporotic nature of the proximal femur is not considered which may affect the implant fixation and complications like blade cut-out, but recent studies are against this.

CONCLUSION

Intertrochanteric fractures especially in the elderly patients are significant life event. PFNA-II offers the advantages of Minimally invasion, less blood loss, shorter operative time, faster post operative recovery, early weight bearing and reduced re-operative rate which are all definitely elderly friendly.

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Source of Support: None Declared
Conflict of Interest: None Declared