

Treatment of intertrochanteric femoral fractures with a proximal femoral nail (PFN): a short follow up

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ABSTRACT

Proximal femoral nails have been introduced relatively recently but have begun to compete the traditional DHS. The mechanical strength of the nail and less invasive procedure have made the procedure preferable. This is a short retrospective review of 26 cases operated in the last 2 years. A retrospective review of 26 cases operated in the last two years which have completed at least a year of follow up with us. All have been treated using a PFN for unstable intertrochanteric fractures of femur. A radiological assessment was made with serial X-rays. The operating time was found to be short, less blood loss was seen during surgery and few early complications were noted. All cases were relatively free from long term complications. PFN is a suitable implant for unstable intertrochanteric femoral fractures needing open reduction internal fixation. It has low per operative and post operative morbidity.

Keywords: PFN, Intertrochanteric fractures, femur.

INTRODUCTION

Surgical fixation of intertrochanteric femur fractures remains the standard of care. However, the best method of surgical fixation is debatable. Fracture fixation with a compression dynamic hip screw (DHS) and side plate device has long been the gold standard, but new implant designs for intramedullary nails and even for external fixation have recently challenged compression hip screws as the best method of treatment for intertrochanteric fractures. Problems related to peri-implant fracture about first-generation short intramedullary nails used for intertrochanteric fracture have, at the very least, been significantly improved by new designs. External fixation, as a result of new advances in design of external fixation pins that reduce pin tract complications and improve pin fixation strength, has recently been shown to be a reasonable alternative treatment option. Design of compression hip screw devices also continues to evolve. Plate constructs that provide biaxial dynamic compression, lag screws with improved purchase, devices with multiple lag screws, and those designed for percutaneous insertion are among the many recent innovations to compression hip screw design. Details and comparative results of these new implants, as well as the application of injectable materials for the treatment of intertrochanteric femur fractures are under discussion these days. The proximal femoral nail (PFN) is a recently introduced intramedullary system, designed to improve treatment of unstable trochanteric fractures of the hip.¹ Many series comparing the treatment of unstable pertrochanteric fractures of femur have found out proximal

femoral nail to be more stable and able to withstand the load of earlier weight bearing than a dynamic hip screw.² Lesser exposure along with smaller operating time and low blood loss are other advantages that a PFN implant has over the conventional DHS.^{3,4}

The negative influence of an unstable trochanteric or subtrochanteric fracture on the quality of life has been found to be significant regardless of the surgical method employed for treatment³. Intertrochanteric fractures are composed of different anatomic patterns that vary in their degree of stability following open reduction and internal fixation. A particularly unstable group is classified as AO/OTA 31-A3, with the fracture pattern described as reverse oblique or transverse.⁴ Among patients treated with an intramedullary nail have been found to have shorter operative times, fewer blood transfusions, and shorter hospital stays compared with those treated with a 95° screw-plate.⁴

We used Proximal Femoral Nail (PFN) in some of our cases over the last two years and have gone over these cases recently. The analysis is retrospective and follow up period is from 1 year to 18 months.

MATERIALS AND METHODS

This is a multicentered study done at two institutions, Postgraduate Medical Institute, Lahore and Sindh Govt. Lyari General Hospital, Karachi. All cases operated over the last two years from Feb'05 to Feb'07 for unstable fractures of proximal femur using the PFN, were reviewed retrospectively. Hospital record files were used

Table-1: Results of surgery (18 months after surgery)

Total No: 26	Range	Average	Percentage
Age	35-70 years	57.24years	
Sex Males:	14		53.8%
Females:	12		46.2%
Mode of Injury Fall at Home	16		61.5%
Road Traffic Injury	10		38.5%
Days in Hospital before Surgery	1-35 days	7.72 days	
Time of Operation	40-90 min	61.64 min	
Blood Transfusion Pre-Op 3			11.5%
Post-Op 1			3.8%
Image Intensifier usage 21			80.8%
Portable xray 5			19.14%
Period of healing of fracture	12-20 weeks	15.4 weeks	
Complications Infection 1			3.8%
Anti-rotation screw 3			11.5%
Trochanteric Bursitis 1			3.8%
Deformation 1			3.8%
Shortening > 2cm 2			7.7%

o choose the patients who were called back for review if needed. Serial X-rays if available were used o assess progress of union postoperatively. All X-rays were reviewed by the same observer who was not blinded to surgical intervention performed. Only cases where X-rays (Fig. 1 and 2) at least 1 year after surgery were available for review or the patient who could come back for review were included.

Operative Technique:

All the patients were operated under Image Intensifier guidance. The patients were put in lateral position with the affected side up. A small incision over the greater trochanter area was made and the tip of greater trochanter was opened using the femoral awl. Using the guide wire and the cannulated reamers the proximal femur was prepared to receive the relatively wide bore PFN. Having seated the nail in the proximal femur the compression/anti-rotation screws was introduced under fluoroscope guidance. The distal interlocking screws were placed through the jig provided with the instrumentation. The

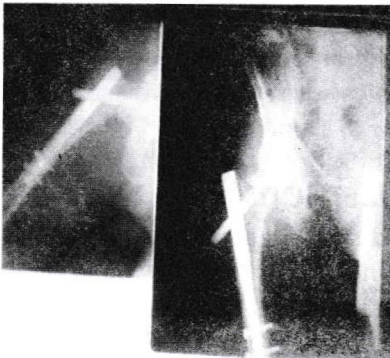


Fig: 1

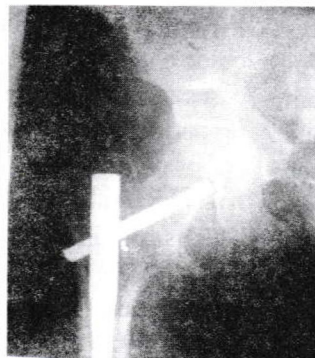


Fig: 2

Radiographs of two cases taken six weeks after surgery.

final position were checked under the image intensifier. The patients were given 2nd generation I/V antibiotics as prophylaxis. All were encouraged to start non weight bearing crutch mobilization the very next day. Low molecular weight Heparin were used to prevent deep vein thrombosis. All were discharged on 2nd post operative day except when needed for other compelling reasons. Blood was transfused both pre and post operatively where needed especially in cases with anemia.

In out patients serial X-rays were taken at monthly intervals and gradual weight bearing was started around 6 weeks after surgery. All were followed up for one year after operation.

RESULTS

In all 32 patient records were available for review but only 26 were included in final analysis (Incomplete records-4, Refusing to come for review-1, Dead-1). Most (23) had been operated by the same surgeon and three by others. All had concluded their treatment and had returned to their routine life.

All patients who had been operated had returned to their work or pre-injury status. There was good radiological union accompanied by appropriate clinical findings. There were more males in the study group than females. The average age of the study population was 57.24 years (range: 35-70 years). Most had injured themselves through domestic falls at home. Others 10/26 were injured in a road traffic accident. There was a rather long waiting time before surgery after admission (due to heavy workload, delayed presentation of patients for treatment and earlier treatment by bone setters) Table-1. Average waiting time for surgery was 7.72 days (range: 1-35 days). The average time spent on surgery was long in earlier cases but got better in later cases 61.64 min (range: 40-90 min). Many had anemia before surgery hence had were transfused blood before surgery but only one (3.8%) needed blood transfusion after surgery.

One patient developed superficial wound infection which settled with I/V antibiotics selected as per culture studies. Three patients had displacement of antirotation screws during follow up at some stage (11.5%). One patient c/o pain over the trochanter area during follow up. There was one case of deformation of trochanteric screw after weight bearing was started. All were ambulant at the time of final compilation of results.

DISCUSSION

The findings of Meidel *et al.* indicate that the Gamma Nail showed good results in both trochanteric and subtrochanteric fractures.³ The rate of technical failure in patients with unstable trochanteric fractures was 6.5% (6/93) (including intra-operative femoral fractures) in the Standard Gamma Nail group and 5.2% (5/96) in the Medoff Sliding Plate group.⁴ Our study group showed these complications to a lesser extent. Patients treated with an intramedullary nail have had shorter operative times, fewer blood transfusions, and shorter hospital stays compared with those treated with a 95° screw-plate. Our operation time is far lesser than that quoted by other studies.^{5,6} In the experience of Menezes *et al.*, out of a total of 129 patients available for follow-up failure of fixation occurred in three patients (2.0%), and a femoral shaft fracture occurred in one patient (0.7%).⁷ No such event has been noted by us as yet but our follow up is very short as time passes by we may note other problems. Fixation failures included one cutout, one delayed fracture healing, and one lateral displacement of the antirotation screw. In other studies total re-operation rate was high (12.0%) mainly because of hardware removals, which occurred in 13 patients (8.6%). Stratification of results showed that hematomas and iliotibial tract irritation occurred more commonly with lesser surgical experience.^{8,9} We have a very small group of patients hence cannot comment on problems related to learning curve of the procedure but we have noted our operating time decreased with increase in experience. Mattsson and coworkers have found that augmentation of fixation with calcium phosphate cement in unstable trochanteric fractures provides a modest reduction in pain and a slight improvement in the quality of life during the course of healing when compared with conventional fixation with a sliding screw device alone.¹⁰

Generally, the results of treatment of unstable trochanteric fractures were comparable for the PFN and Gamma Nail. The pitfalls and complications were similar, and mainly surgeon or fracture-related, rather than implant-related.¹ Many workers conclude that augmentation with calcium phosphate cement in unstable trochanteric fractures provides a modest reduction in pain and a slight improvement in the quality of life during the course of healing when compared with conventional fixation with a sliding screw device alone.^{5,9} We have not used any of such measures in this group but find justification for the same to be rather weak in most cases.

Our operating time was short and we did not have to transfuse lot of blood post operatively. In other studies the intra-operative blood loss was lower with the PFN (220 ml v 287 ml, $p = 0.001$).⁸ We did not make any direct measurements of blood lost during surgery and accept this as a limitation of our findings. Post-operatively, more lateral protrusion of the hip screws of the PFN (7.6%) was documented, compared with the

gamma nail (1.6%, $p = 0.02$) in the series published by Schipper *et al.*⁸ Most local complications were related to suboptimal reduction of the fracture and/or positioning of the implant.⁸ Functional outcome and consolidation were equal for both implants. They infer results of treatment of unstable trochanteric fractures were comparable for the PFN and Gamma Nail however the complications that occur are similar, and mainly surgeon- or fracture-related, rather than implant-related.⁸ Our findings do not support these suggestions but we did have one case of trochanteric bursitis but failed to find any gross lateral displacement of femoral screw in the later X-rays of this case.

Though small scale and of rather short duration of follow up our findings show that PFN has advantage over the conventional Dynamic Hip Screw. A shorter operating time, lesser blood loss, decreased need for transfusions, ease of operating and lesser post operative problems point to the promise the implant shows. There is need for more RCT studies on the topic.

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