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Research Paper

Proximal Femoral Nail - A Minimally Invasive Method for Stabilization of Subtrochanteric Femoral Fractures

Medical Science

KEYWORDS : Proximal Femoral nail, Subtrochanteric femoral fracture, minimally invasive surgery

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ABSTRACT

Rapid progress in the field of implants in the quest of ideal fixation of subtrochanteric femoral fractures have made various options available like Fixed-angled nail plate, Angled blade plate, Dynamic Hip Screw etc. The present study aims to study the role of standard PFN as a minimal invasive device in the management of these fractures. 40 cases of closed fractures of age 20 or above were evaluated from 2010 to 2012. Full weight bearing in 73.4% of the cases was possible at 8weeks postoperatively. 96.7% of cases achieved pre-injury walking ability at the end of 24 weeks of follow up. The current study shows that PFN is an evolving approach to treat subtrochanteric femoral fractures in a minimally invasive way and indicates PFN to be a safe and successful method.

INTRODUCTION

Regardless of the type of fractures, the proximal femoral fractures can lead to substantial morbidity and mortality. The spectrum is however extending to involve the younger age because of high energy physical trauma and rapid industrialization with resultant complex pattern of injury in the working class of people... Subtrochanteric fractures occur between the lesser trochanter and the isthmus of the diaphysis of the femur. The common problem for these fractures has been malunion, delayed union or non-union. Internal fixation is the treatment of choice for treating subtrochanteric femoral fractures of the femur with the following aims, To obtain best possible anatomic reduction, To get stability for early mobilization and early weight bearing, To reduce the complication associated with prolonged recumbency for maximal functional restoration.

Proximal Femoral Nail - A minimally invasive method The Arbietsgemeinschaft fur osteosynthesefragen (AO/ ASIF) in 1996 designed a new intramedullary device – the Proximal Femoral Nail (PFN) to overcome the technical difficulties and complications encountered with the earlier designs of the intramedullary proximal femoral nails, most importantly, the Gamma Nail6. The two main design differences between the PFN and other such devices are the introduction of an anti-rotational 6.5 mm of hip pin to reduce the incidence of the implant cut out, secondly the fluting of the nail tip, i.e., the tip has a smaller diameter and is specially shaped to reduce the stress at tip.

MATERIAL AND METHODS

A total of 40 patients of age 18 or above of either sex were evaluated. Only fresh cases with closed subtrochanteric fractures were included in the study. Compound fractures, pathological fractures and polytrauma were excluded from the study.

All patients at admission were subjected to initial management and resuscitation followed by a detailed history, clinical examination and relevant investigations. Preoperative assessment of neck shaft angle, medullary canal size and any proximal femoral deformity was made.

The patients were positioned supine on the fracture table maintaining the 'heel to toe' relationship with C-Arm positioned in such a way so as to visualize the proximal femur in lateral and A-P planes. To overcome the difficulty in access to the tip of trochanter and for unimpeded access to the medullary cavity of the proximal femur, the trunk was abducted at waist by 10° to 15° to the contralateral side or the affected limb was adducted to 10° to 15°. All patients were treated by proximal femoral nail under C-Arm. All patients were followed up, initially AT 1,2,4,6 month postoperatively. Further follow up was advised at 6 weekly intervals for the patients who showed complications associated with PFN and / or its technique. Weight bearing was gradually increased as per the radiological evaluation of the fractured site and the results were evaluated using HARRIS HIP SCORE.

OBSERVATIONS AND RESULTS

Significant male predominance (82.5%) was observed as compared to females (17.5%).. Road traffic accidents were the commonest mode of injury seen in 45% of the cases. However fall from height also accounted for some of these fractures. High energy trauma (RTA and fall from height) thus accounted for majority of the cases (90%). Two peaks were observed in relation to the age sustaining these fractures. The first peak was in age group of 61 to 80 years (50%) followed by a second peak in age group of 21 to 40 (40%). The youngest

patient was 24 years of age while the oldest was of 80 years of age.

The most common type of subtrochanteric femoral fracture was Seinsheimer7 type II (35%). In majority of the cases (93.3%) the surgery was undertaken within 10 days of injury. The average duration of surgery from skin incision to skin closure was 72.25 minutes. The average stay in the hospital was 6 days. Full weight bearing in 95% of the cases was at 16 weeks postoperatively. The average radiological union rate in our series was 5.12 month with 2 non union. 95% of cases achieved pre-injury walking ability at the end of 24 weeks of follow up.

The technique related complications were the commonest complications - varus reduction (3 cases), difficult placement of neck screw/hip pin (2 cases), difficult distal locking (4 cases) and intra articular migration of neck screw was encountered in 1 case. Other complications were non union (2 cases), back out (2 cases) infection(2 case) and lag screwbreakage(2 case) shortening in 17 cases.

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All 40 patients were evaluated with HARRIS HIP SCORE as below

Results	No. of patients (%)
Excellent	17(42.5)
Good	9(22.5)
Fair	9(22.5)
Poor	5(12.5)

DISCUSSION

In younger and adult injury was caused by high velocity(67.5%). Out of the two young adults who had a low velocity trauma one was of very poor socioeconomic strata and the other was a chronic alcoholic. In elderly age group low velocity trauma(32.5) causes this fracture (weakened osteoporotic bone may be the cause). The peak of young patients can be explained by their active outdoor life exposing them to road traffic accidents. The male to female ratio was 3:2 highlighting the more aggressive lifestyle in males. High energy trauma constituted (RTA & fall from height) 63.3% while the low energy trauma constituted 36.7% of cases. This is explained by higher vehicular accidents and poor road conditions in our country. The average stay in the hospital was 6 days. Varus reduction occurred with use of a short lag screw. Shattering of the greater trochanter occurred due to over hammering of the nail.

The overall results being satisfactory, our experience in the current study indicates PFN to be a safe and successful method. Varus collapse, difficulty in placement of neck/hip pin screws and intra articular migration of neck /hip pin screw might be the complications in very few cases which can be minimized by minimizing the technical errors while screw insertion.

Proximal Femoral Nail (PFN) combines the intrinsic advantages of the closed intramedullary nail (less operative time, less exposure, less disturbance to the fracture milieu) and those of Dynamic Hip Screw (collapse of the fracture fragments to augment stability and healing). Distinct practical advantages of PFN are less of limb length discrepancies and the need to restitute the medial buttress has been made obsolete. The healing time is faster and the delayed and non unions are rare. The additional antirotational hip pin screw prevents rotation and reduces the incidence of implant cut out while the fluting of the nail tip (i.e. the tip has smaller diameter) reduces the stress at the tip and hence reduces the energy fractures at the tip.

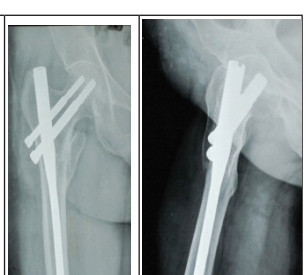
CASE REPORTS

CASE 1


Pre Op. Xray


IMMEDIATE POST OP X-RAY


DISTAL SCREWS REMOVED 10 MONTHS


2 YEAR FOLLOW UP


55 YRS / FEMALE
INJURY : LOW VELOCITY
PRE. ILLNESS : HYPERTENSION
UNION : 5 MONTHS
CROSS LEG SITTING : POSSIBLE
SQUATTING : NOT POSSIBLE
SHORTENING:<1CM.
RESULT : GOOD

CASE 2


Pre Op. Xray


IMMEDIATE POST OP X-RAY


2 YEAR FOLLOW UP


40 YRS / MALE
INJURY : HIGH VELOCITY
UNION : 8 MONTHS
CROSS LEG SITTING : POSSIBLE
SQUATTING : NOT POSSIBLE
SHORTENING: 1.5 CM.
RESULT : FAIR

CONCLUSION

After our study of Results of Proximal Femoral Nailing in the Treatment of Subtrochanteric Fractures of Femur we can conclude that-

- PFN (Intramedullary implant) has proved to be better implant than extramedullary implant.
- PFN is a closed method , thus preserves the fracture hematoma yields early healing and less mean radiological union time in comparison to extramedullary implants.

- It is a quick procedure in the hands of experienced surgeon who has overcome the 'learning curve' with small incision significant less amount of blood loss and minimal preoperative complications
- We have found significantly low infection rates and few immediate post operative complications in Proximal Femoral Nailing.
- Being a minimally invasive technique and operated mostly under spinal anesthesia PFN can be used effectively in elderly patients with multiple pre-existing illness.

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