

Management of Seinsheimer type IIB and type IIIA subtrochanteric fracture with proximal femoral nail (PFN) versus proximal femoral locking compression plate (PF-LCP): Prospective comparative study

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Abstract

Introduction: Seinsheimer subtrochanteric fracture of femur are important to treat and associated with high rate of complications. Among all fractures of hip upto 34% present in subtrochanteric area.

Objectives: Comparison of clinical outcome in Seinsheimer type IIB and type IIIA subtrochanteric fractures treated with proximal femoral nail (PFN) versus proximal femoral locking compression plate (PF-LCP).

Materials and Methods: Patients presented with Seinsheimer subtrochanteric fracture at our hospital i.e, R L Jalappa Hospital, Tamaka, Kolar, Karnataka, India between May 2018 to June 2019 among which forty patients were included as per the inclusion criteria. In which twenty patients were treated with Proximal Femoral Nail and twenty patients with Proximal Femoral Locking Compression Plate. By using Modified Harris Hip Score results were assessed at final follow up.

Results: Group PFN shows at final follow up 45% excellent outcome, 45% good outcome and 10% fair outcome whereas group PF-LCP shows 60% good outcome, 20% fair outcome and 20% poor.

Conclusion: For Seinsheimer subtrochanteric fractures proximal femoral nail shows better results compared to plating group with respect to functional outcome and clinical outcome.

Keywords: Subtrochanteric fracture, Seinsheimer, PFN, PF-LCP.

Introduction

In the femur the subtrochanteric region is defined as the region between lesser trochanter and junction of proximal and middle thirds of the femur. Among all hip fractures and all proximal femoral fractures subtrochanteric fractures account for 10% to 34% and 10% to 15% respectively.¹ Proximal femoral fractures constituting 11.6% of total fractures¹ and are relatively common in elderly individuals.² If not treated these fractures may alter life quality, which results in a greater percentage of deaths.³ Dynamic hip screw became the gold standard for hip fracture fixation from 1980 to 2000.^{4,5} For unstable proximal third femur fractures treated with a DHS (dynamic hip screw) has shown complications as high as 3% to 15%.⁶ In 1996 AO-ASIF developed an intramedullary device Proximal Femoral Nail-PFN. Newer implant Proximal Femoral Locking Compression Plate-PFLCP is made for the management of proximal femoral fracture.

In subtrochanteric fracture, the proximal fragment to flexed, externally rotated and abducted and distal fragment to medial and aggravates the deformity. Nonunion is the major complication on conservative management and pressure ulcers, DVT deep vein thrombosis and respiratory infections are the complications of prolonged immobilization.⁷ The important goal is to make early weight bearing and to do daily activities as early as possible.

This creates interest in us for to do this study in subtrochanteric fractures with Proximal Femoral Nail PFN and Proximal Femoral Locking Compression Plate PFLCP for better management in order to prevent the long term complications.

Aims and Objectives

In the Seinsheimer type IIB and IIIA subtrochanteric fractures treated with Proximal Femoral Nail PFN versus Proximal Femur Locking Compression Plate PFLCP to compare the clinical outcome.

Materials and Methods

Forty patients with Seinsheimer type IIB and type IIIA subtrochanteric fracture treated with Proximal Femoral Nail and Proximal Femoral-Locking Compression Plate at our hospital i.e R L Jallappa Hospital, Tamaka, Kolar, Karnataka, India between January 2018 to March 2019. Written informed consent obtained from each patient and then enrolled in the study based on inclusion and exclusion criteria. Local hospital ethics committee approval for the study was granted prospectively. Patients with Segmental fracture, pathological fracture, open fracture and fracture before physal closure were excluded.

Among forty patients, twenty patients treated with PFN in which 5 were female and 15 were male. Twelve patients had fracture over right side and eight had left side. Patients having fracture of Seinsheimer type IIB were nine and patients of Seinsheimer type IIIA were eleven. Among the twenty patients treated with PFLCP, six were female and fourteen were male. Right side over fourteen and left side over six patients and with 12 patients having fracture of Seinsheimer type IIB and 8 patients of Seinsheimer type IIIA.

Operative technique

Patient was placed in the supine position on a traction table for PFN surgery and the limb about 10 degrees adducted. The fracture checked and reduced under fluoroscopy. Around 5

cm skin incision was made proximally from the greater trochanter, on dissection of fascia and gluteus to expose the tip of the greater trochanter. The proximal canal was then opened by evenly applied force to avoid breakage of the greater trochanter. After insertion of awl and guide wire, fluoroscopy was performed to evaluate the fracture reduction. Serial reaming done and then appropriate size PFN inserted and screws applied with c-arm confirmation. For PFLCP, both Open and MIPO techniques were used. For the former, the PFLCP was inserted through a direct lateral incision centered over the greater trochanter. For the MIPO technique, indirect reduction was achieved with the aid of a traction table. A small incision was made over the greater trochanter, and a sub-muscular tunnel was created using a Cobb elevator. An appropriately sized PF-LCP was then slide into position and was locked using a mixture of locking and cortical screws after reduction.

On the first day of postoperative rehabilitation, started with isometric quadriceps exercises and post-operative x-rays were taken. After 2 days, hip and knee flexion and extension exercises were initiated. Patients were followed upto 1 year on regular intervals at 6 weeks, 12 weeks and 24 weeks. Partial weight bearing was allowed with walker by 6 weeks and full weight bearing weight after the disappearance of the fracture line on subsequent X-rays.

Results

At 1year follow up results were assessed with Modified Harris Hip score.⁸

Among the PFN group, excellent outcome in nine patients (45%), good outcome in nine patients (45%) and 2 patients (10%) had fair outcome.

Among the PFLCP group, good outcome in twelve patients (60%), fair outcome in four patients (20%) and four (20%) patients with poor outcome.

Table 1: Gender distribution

	PFN	PF-LCP
Male	15	14
Female	5	6

Table 2: Side distribution

	PFN	PF-LCP
Right	12	14
Left	8	6

Table 3: Subtrochanteric fracture Seinsheimer type

	PFN	PF-LCP
Seinsheimer type IIB	9	12
Seinsheimer type IIIA	11	8

Table 4: Modified Harris Hip Score – Clinical outcome of Patients treated with PFN and PF-LCP at one year follow up

	Excellent	Good	Fair	Poor
PFN	9 (45%)	9 (45%)	2 (10%)	0
PF-LCP	0	12 (60%)	4 (20%)	4 (20%)

Complications

In group PFN, knee stiffness was the most common complication in this group which occurred with 4 patients, outer thigh pain was encountered in 2 patients probably due to irritation of iliotibial tract by proximal end of nail placed above greater trochanter, superficial skin infection seen in two patients and one patient had varus collapse with screw cut out who underwent reoperation with a different implant.

In the PFLCP group, most common complication is infection which is superficial seen in six patients who were treated with regular dressings and antibiotics. Shortening seen in four patients. Four patients had implant failure. Those implant failure cases were having posteromedial defect which lead to varus collapse and finally screw breakage/loosening. These patients were reoperated and fracture fixed with PFN.

Discussion

Usually high velocity trauma leads to subtrochanteric fractures with significant displacement and very difficult to reduce by closed method. The Seinsheimer subtrochanteric fractures is associated with some failures.⁹ In addition, the amount of velocity suffered at the time of injury alters the results in young.¹⁰

These factors make the surgeon to think about proper implant selection. Nonunion, delayed union and malunion are the complications associated with conservative treatment.¹¹ To prevent these complications surgery is preferred now a days.

The treatment choices of Seinsheimer subtrochanteric fractures can be divided into two groups based on current management trends: cephalomedullary hip nails and lateral plate-screw systems. The use of intramedullary nail fixation in peritrochanteric fractures has been increasing because it is easy and fast to apply and can guarantee stability even in inherently unstable fractures.

The PFN as a cephalomedullary nail has many advantages over the extramedullary devices as it's a load sharing device, lesser operative time, minimal incision with closed reduction and internal fixation allowing early mobilization. PFN permits collapse control at the fracture site thus not making the fracture prone for varus collapse in cases of posteromedial discontinuity.

However, the PFN does have its disadvantages like increased x-ray exposure, Z-effect, screw cut out, inability to place the screws in narrow neck patients. The screw cut out was minimized by placing the screw in the neck inferiorly in anteroposterior view parallel to the femoral neck calcar and centrally in lateral view and the tip at subchondral region. The cause for outer thigh pain is due to irritation of iliotibial band by the nail protruding above greater trochanter which can be eliminated by carefully selecting patients with long femur and using PFNA-2 in short stature patients.

The PF-LCP was reported to be the strongest construct for vertically orientated femoral neck fractures among 4 different fixation techniques.¹² The PF-LCP was reported to have similar biomechanical properties as the 95°-angled blade plate.¹³ None the less, loss of fixation with and without

screw breakage, plate breakage, skin infection, increased blood loss, after PF-LCP fixation. Proximal femoral nail enable controlled impaction of the fracture fragments.¹⁴ Whereas the PF-LCP system locks the fracture in position without controlled collapse. Fractures involving the medial calcar or fractures with missing posteromedial corners, or fractures that are inadequately reduced result in high varus strains at the fracture-implant interface which leads to loosening of the locking screws progressively and collapse the fracture in varus. PFN is a load sharing and PFLCP is a load bearing device.

Conclusion

Seinsheimer subtrochanteric fractures are always challenging to manage and implant has to be selected properly based on fracture pattern. Compared to Proximal Femoral Locking Compression Plate, PFN nail has better results with respect to clinical, functional outcomes and less failure rates.

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Conflicts of interest

There are no conflicts of interest.

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