Original Article

A prospective comparative study in the management of Seinsheimer type IIB and type IIIA subtrochanteric fracture with proximal femoral nail (PFN) versus proximal femur locking compression plate (PF-LCP)

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Abstract

Introduction: Subtrochanteric femur fractures have demanded special consideration in orthopaedic traumatology, given the high rate of complications associated with their management. 10%–34% of all hip fractures occur in the subtrochanteric region. **Purpose of the study:** To compare the clinical outcome of Seinsheimer type IIB and type IIIA subtrochanteric fractures treated with PFN versus LCP – PF. **Materials and Method:** A prospective study of 40 patients with Seinsheimer type IIB and type IIIA subtrochanteric fracture among which 20 were treated with Proximal Femoral Nail and 20 with Proximal Femoral-Locking Compression Plate at two Hospitals attached to J.J.M Medical College Davangere, Karnataka, India between June 2014 to October 2016.. At final follow up results were assessed with Modified Harris Hip score. **Result:** In the PFN group, 9 patients (45%) showed excellent outcome, 9 patients (45%) showed good outcome and 2 patients (10%) showed fair outcome. Among the PF-LCP group, 12 patients (60%) showed good outcome, 4 patients (20%) showed fair outcome and 04 patients with poor outcome. **Conclusion:** Proximal Femoral Nail for subtrochanteric fractures has better results compared to Locking Compression Plate-proximal femur with less failure rates and restoring better hip biomechanics.

Keyword: type IIB and type IIIA, PF-LCP.

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Received Date: 02/11/2015 Revised Date: 25/12/2015 Accepted Date: 01/01/2016

Access this article online	
Quick Response Code:	Website: www.statperson.com
	Volume 6 Issue 1

INTRODUCTION

Subtrochanteric region of the femur is defined as the region between lesser trochanter and junction of proximal and middle thirds of femur. Most proximal femoral fractures occur in elderly individuals as a result of only moderate or minimal trauma. In younger patients these fractures usually result from high-energy trauma. High-velocity injuries are more difficult to treat and are associated with more complications than low-velocity injuries.[1] Subtrochanteric fractures, which account for 10% to 15% of proximal femoral fractures and these fractures account for 10 % to 34% of all hip fractures[1]. Following a fracture in the subtrochanteric region the proximal fragment to flexed, externally rotated and abducted. Distal fragment displaces medially and further aggravates the deformity[2] and that's why conservative methods of treatment results in malunion with shortening and limitation of hip movement as well as complications of prolonged immobilization like bed sores, deep vein thrombosis and respiratory infections. The main goal for the treatment of these fractures is to restore the pre-

How to cite this article: Ramesh R, Ajeet Hundekar. A prospective comparative study in the management of seinsheimer type IIB and type IIIA subtrochanteric fracture with proximal femoral nail (PFN) versus proximal femur locking compression plate (PF-LCP). *International Journal of Recent Trends in Science and Technology* January to March 2016; 6(1): 01-04 http://www.statperson.com

fracture activity status and to allow early full weight bearing.

AIMS AND OBJECTIVES

To compare the clinical outcome of Seinsheimer type 2B and 3A subtrochanteric fractures treated with Proximal Femoral Nail (PFN) versus Proximal Femur Locking Compression Plate (PF-LCP).

MATERIAL AND METHODS

A prospective study of 40 patients with Seinsheimer type IIB and type IIIA subtrochanteric fracture among which 20 were treated with Proximal Femoral Nail and 20 with Proximal Femoral-Locking Compression Plate at two Hospitals attached to J.J.M Medical College Davangere, Karnataka, India between June 2014 to October 2016. Patients with Segmental fracture, pathological fracture, open fracture and fracture before physeal closure were excluded. Among the 20 patients treated with PFN, 15 were male and 5 were female.12 patients had fracture of right femur and 8 had fracture of left femur with 9 patients having fracture of Seinsheimer type IIB and 11 patients of Seinsheimer type IIIA. Among the 20 patients treated with PF-LCP, 14 were male and 6 were female. 14 patients had fracture of right femur and 6 had fracture of left femur with 12 patients having fracture of Seinsheimer type IIB and 09 patients of Seinsheimer type IIIA.

Operative technique:

For PFN, the patient was placed in the supine position on a traction table. The limb was adducted about 10°. The fracture was reduced under fluoroscopy. An approximately 4 to 7cm proximal and longitudinal incision was made through the 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 a reamed nail, fluoroscopy was performed to evaluate the fracture situation. In anteroposterior fluoroscopy, the lag screw is located in inferior portion of the femoral neck and located central of the femoral neck in lateral fluoroscopy and then the ante-rotation screw was introduced. Distal dynamic locking was done. For PF-LCP, Both open and MIPO techniques were used. For the former, the PF-LCP was inserted through a direct lateral incision on the hip, which was centered over the greater trochanter and the lateral aspect of the femur shaft. 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 slid into position and was locked using a mixture of locking and cortical screws after reduction. Postoperative rehabilitation The first day after the isometric quadriceps and ankle pump exercises had been performed, the first 2 days of hip and knee flexion and extension exercises were initiated and the patients' X-rays were reviewed. All patients were followed up at 1st, 3rd, 6th month and 1 year. Partial weight bearing was allowed with walker by 6 weeks and full weight bearing weight after the disappearance of the fracture line on X-rays.

RESULTS

At 1yr follow up results were assessed with Modified Harris Hip score[3]. Among the PFN group, 9 patients (45%) showed excellent outcome, 9 patients (45%) showed good outcome and 2 patients (10%) showed fair outcome. Among the PF-LCP group, 12 patients (60%) showed good outcome, 4 patients (20%) showed fair outcome and 04 (20%) patients with poor outcome.

Table 1: Clinical outcome of Patients treated with PFN and PF-LCP at one year follow up

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

Figure 1:A case of Seinsheimer type IIB Fracture treated with PFN, A)Pre Operative X ray, B)Immediate Post Operative, C)At 6months Post Operative, D) At one year Post Operative

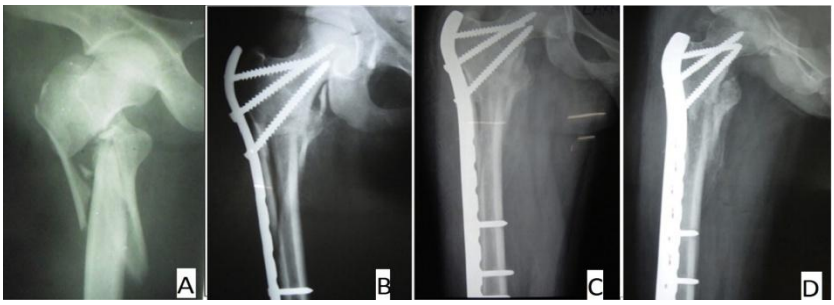

Figure 2: A case of Seinsheimer type IIIA Fracture treated with PF-LCP, A)Pre Operative X ray, B)Immediate Post Operative, C)At 6months Post Operative, D) At one year Post Operative

COMPLICATIONS

In the PFN group, 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 the proximal part of nail placed above greater trochanter, 2 patients had superficial skin infection and one patient had varus collapse with screw cut out who underwent reoperation with a different implant. In the PF-LCP group, superficial infection was the most common complication seen in 6 patients who were treated with antibiotics and regular dressings followed by shortening seen in 4 patients. Implant failure was seen in 4 patients, who had posteromedial defect which lead to varus collapse and finally screw breakage/loosening. These patients were re operated and fracture fixed with PFN.

DISCUSSION

Unlike osteoporotic trochanteric fractures, subtrochanteric fractures are usually the result of high-energy trauma and often subjected to significant displacement and great difficulty in close reduction through traction. Fractures of the proximal femur are challenging injuries for the orthopaedic surgeon. The subtrochanteric fractures of the proximal femur treatment is associated with some failures[4]. The reasons may be enlisted as follows: disregard for biomechanics, over estimation of the potentials of new surgical techniques or new implants or poor adherence to established procedures, high stress concentration which is subject to multiple deforming forces, slow healing time because of predominance of cortical bone, decreased vascularity and high incidence of complications after surgical treatment. In addition, the results of treatment of this type of fracture in young and middle-aged adults are also influenced by the amount of trauma suffered at the time of injury[5].These factors makes the surgeon to think about proper selection of the implant. The high incidence of delayed union, malunion and nonunion of fractures has left conservative treatment abolished in modern trauma care[6]. The treatment choices of femoral subtrochanteric fractures can be divided into two groups based on current management trends: cepholomeduallary 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 fixation allowing early mobilization. PFN permits controlled collapse 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 lag and the anti rotation screw in the femur neck due to narrow neck. The incidence of screw cut out can be minimized by placing the lag screw in the inferior portion of the neck 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[7]. The PF-LCP was reported to have similar biomechanical properties as the 95º-angled blade plate[8]. Nonetheless, loss of fixation with and without screw breakage, plate breakage, skin infection, increased blood loss, after PF-LCP fixation is a complication in these. Proximal femoral nail system enable controlled impaction of the fracture fragments[9].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. This leads to progressive loosening of the locking screws and varus collapse of the fracture with eventual failing of the construct. PF-LCP is a load bearing device unlike PFN which is a load sharing and falls in line with anatomical axis of femur.

CONCLUSION

Fractures of the subtrochanteric region of the femur are challenging to treat and need a proper selection of implant based on fracture pattern. Proximal Femoral Nail for subtrochanteric fractures has better results compared to Locking Compression Plate-proximal femur with less failure rates and restoring better hip biomechanics**.**

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