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Original Research Paper

Orthopadedics

# A PROSPECTIVE COMPARISON OF THE PROXIMAL FEMORAL NAIL VERSUS THE PROXIMAL FEMORAL LOCKING PLATE IN SUBTROCHANTERIC FEMORAL FRACTURES.

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**ABSTRACT**

**BACKGROUND:** Subtrochanteric fractures account for 10% to 30% of all hip fractures. The fractures were repaired with a variety of implants. Direct anatomic reduction or indirect reduction and bridge plating procedures are also possible with the proximal femoral locking plate (PFLP). Proximal femoral nails (PFN) have been demonstrated to be superior to other implants due to biomechanical advantages. The goal of this study was to compare the radiological and functional outcomes of subtrochanteric fractures treated with the proximal femoral nail (PFN) and the proximal femoral locking plate (PFLP), in order to determine which implant was the best fit for the specific fracture pattern. **METHODS:** 50 patients with a Subtrochanteric femur fracture were operated on and treated with a proximal femoral nail and a proximal femoral locking plate (25 in each group). A 24-month follow-up was completed. The Harris Hip Score (HHS) and radiological results were used to determine the outcome. **RESULTS:** When compared to patients treated with a proximal femoral locking plate, individuals treated with proximal femoral nailing required considerably less time to achieve complete weight bearing. In patients treated with a proximal femoral locking plate, radiological union was considerably delayed compared to patients treated with proximal femoral nailing. The average HHS in the nailing group was slightly higher than in the plating group. **CONCLUSION:** PFN have the advantage by taking less operative time, high rate of union, minimal soft tissue damage, less infection rate and early postoperative rehabilitation. In our research, we discovered that both PFN and PFLP can be utilised successfully to treat Subtrochanteric fractures. In terms of anatomical alignment, limb length disparity, postoperative infection, and, most critically, the final Harris Hip Score, there was no significant difference between implants.

**KEYWORDS :** Subtrochanteric fractures, proximal femoral nail (PFN), proximal femoral locking plate (PFLP)

## INTRODUCTION:

The peri trochanteric fractures are among the most significant death rates and morbidity within elderly[1]. Subtrochanteric fractures are generally defined as those fractures occurring within 5cm of the distal extent of the lesser trochanter. Inter trochanteric femur fractures occur in between larger and lesser trochanters and it can affect any of these components. 45 percent among all hip fractures are intertrochanteric fractures[2].Although pathological fractures can occur at any age, they are more commonly caused by low energy trauma and can have atypical fracture patterns[3] According to biomechanical study, strong tensile and compressive stresses inside the medial cortex distally and laterally to the lower trochanter cause the femoral cortex in the posteromedial subtrochanteric region to be subjected to the highest stress in the body.

There has been a near complete elimination of nonsurgical treatment in adults during the last 30 years, with a comparable increase in surgery treatment of subtrochanteric fractures[4]The challenges in treating subtrochanteric fractures are due to the anatomical and biomechanical characteristics that are unique to this location.[3,5 7,8] Fractures in the subtrochanteric region of the femur, regardless of age, offer difficulties in attaining stable fixation and suitable reduction[8].To regain optimal ambulatory ability, femoral length, rotation, and correction of femoral head and neck angulation must be restored to re-establish appropriate abductor tension and strength.[3] Subtrochanteric fractures are treated with a variety of implants. However, the best implant for internal fixation of a subtrochanteric fracture is still up for debate. Intramedullary and extra medullary implants are the two types of implants available. Although intramedullary fixation is less invasive and biomechanically sound, it can cause trochanteric discomfort, abductor weakness, and symptomatic heterotopic ossification at the insertion site. Extramedullary devices such as dynamic condylar screws and angled blade plates provide good fixation and rotational stability in the cancellous bone of the femur's neck. Technically difficult, significant devascularization, increased infection risk, delayed weight bearing, and refracture following plate removal Subtrochanteric fractures respond well to indirect reduction and submuscular plating[6]

## OBJECTIVES AND GOALS

To investigate the long-term results and functional outcome of operative treatment of a subtrochanteric femur fracture with a long proximal femoral nail and a proximal locking compression plate.

## RESEARCH MATERIALS AND METHODS

During this time, 53 elderly patients with subtrochanteric fractures were randomly sorted into two groups on the basis on inclusion criteria. 27 cases of subtrochanteric femur fracture treated with a long proximal femur nail in Group 1. 26 cases of subtrochanteric femur fracture treated with a proximal femoral locking compression plate in Group 2. Routine blood tests, chest x-rays, pelvic x-rays, pre-anaesthesia check-ups, and post-surgical fitness checks are all performed prior to surgery.

The fractures in group 1 were treated with closed reduction and internal fixation with long PFN. The length of the intramedullary nail is measured from the greater trochanter tip to the upper pole of the patella Calculate the amount of rotation of the proximal fragment using anteroposterior and

lateral fluoroscopy. The degree of the C-arm from the horizontal is marked on a true lateral picture of the femoral neck, and 15 degrees is removed. Alternatively, take a true lateral picture of the hip and knee from the unaffected side to determine the anteversion of the contralateral side.

The degree the C-arm is from the horizontal on the correct lateral view of the damaged side is then removed from this more accurate measurement of anteversion. Close reduction by manipulation and check AP and Laterally under imaging reduced the fracture. Externally rotate the distal piece through the traction pin or boot, often 5 to 15 degrees, to match the predicted rotation of the proximal fragment. If the reduction insufficient under imaging, continue to internal fixation. Palpate the greater trochanter, then make a 1-3 cm proximal incision, which is then deepened to incise the fascia Lata. Entry was made at the level of the greater trochanter's tip with the help of an owl. Both the AP and lateral viewpoints of the entry are evaluated. Save this image on the fluoroscopy machine for further reference of the lesser trochanter's shape.

Obtain a correct lateral picture of the afflicted hip and, as previously described, quantify the amount of external rotation of the proximal section. If the close reduction is insufficient, open reduction and internal fixing are performed. In obese patients, the tip of the greater trochanter was found by palpation or, on rare occasions, by employing an image intensifier. From the point of the trochanter distally along the shaft of the femur, a 15-20cm vertical incision was made. Introduce the plate through the proximal wound to the level that allows a guide pin to be placed just proximal to the calcar once proper alignment has been obtained.

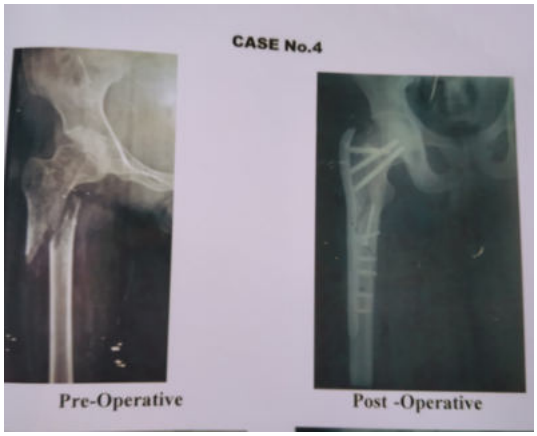
## POSTO PERATIVE MANAGEMENT

Up to the fifth postoperative day, enough analgesics and IV 3rd generation cephalosporin were provided. X-rays were taken after the operation for a post-op check. On the second day, I started sitting with a support and doing quadriceps exercises. On the 12th post-operative day, the stitches were removed.

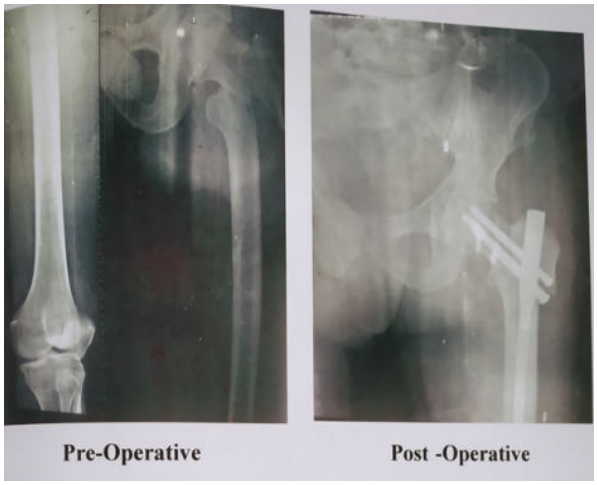
## FOLLOW UP MANAGEMENT

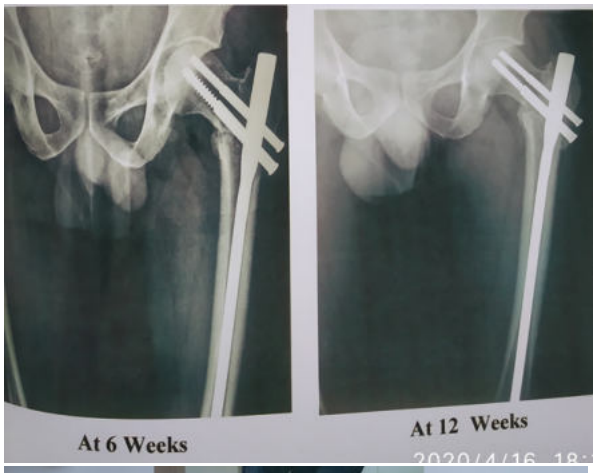
The functional results were graded using the MODIFIED HARRIS HIP EVALUATION SCORE, and the radiological evaluation was based on the fracture site's union status. The Long PFN group had an average age of 50.36 years, while the PFLCP group had an average age of 49.52 years. The majority of patients were male because they are more involved in outdoor activities and are more prone to vehicular injuries. 62 percent of patients had been in car accident, and 38percent had a fall. In the current study, all fractures were classified according to the Russell Taylor classification, with 40 percent of IA type, 36 percent of IB type, 24 percent of IIA type, and none of type IIB in the long PFN group, and 16 percent of IA type and 28 percent of each IB, IIA, and IIB type in the PF LCP group. The vast majority of patients were operated on within seven days after their fracture or as soon as they were medically fit. In both groups, two patients had superficial infections, but two patients in the PFLCP group had deep infections.

Two patients in the long PFN group had their screws taken out and had a varus deformity. In both groups, two patients had a significant reduction in height of more than one centimetre. Non-union occurred in one patient from the long PFN group and two patients from the PFLCP group, necessitating subsequent procedures. In a subtrochanteric fracture treated with long PFN, the average radiographic union time was 12.5 weeks, compared to 14.5 weeks with PFLCP. The first two categories of functional state, according to the modified Harris hip scoring system, are deemed unacceptable functional state, while two categories are deemed suitable functional status.

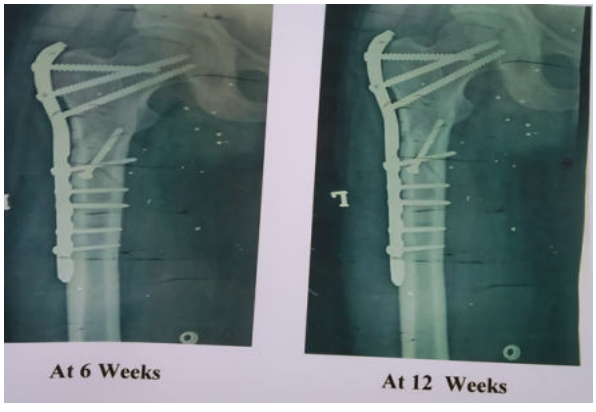




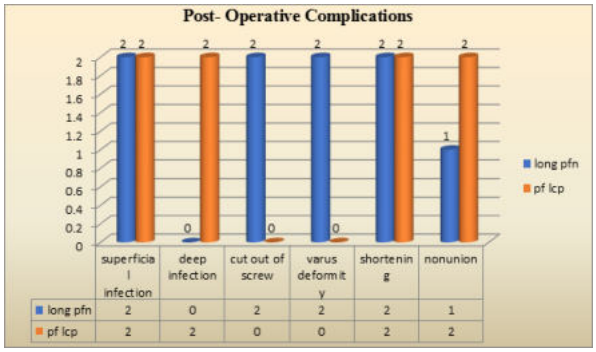








| SN | Characteristics | Group A (Long PFN) | | | | | Group B(PFLCP) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Sex | Male | Female | Total | | | Male | Female | Total | | |
| | | 21 | 4 | 25 | | | 20 | 5 | 25 | | |
| 2 | Mode of injury | H/o of fall | RTA | | | | H/o of fall | RTA | | | |
| | | 9 | 16 | | | | 10 | 15 | | | |
| 3 | Side | Right | Left | | | | Right | Left | | | |
| | | 14 | 11 | | | | 12 | 13 | | | |
| 4 | Type of fracture | IA | IB | IIA | IIB | | IA | IB | IIA | IIB | |
| | | 10 | 9 | 6 | 0 | | 7 | 4 | 4 | 4 | |
| 5 | Time interval between injury and surgery | Within 3 days | 3 to 7 days | More than 7 days | | | Within 3 days | 3 to 7 days | More than 7 days | | |
| | | 6 | 16 | 3 | | | 2 | 19 | 4 | | |
| 6 | Duration of surgery (In Minute) | ≤50 MIN. | 50-80 MIN | ≥80 MIN | | | ≤50 MIN. | 50-80 MIN | ≥80 MIN | | |
| | | 16 | 7 | 2 | | | 5 | 15 | 5 | | |
| 7 | Hospital stays after surgery (In days) | ≤10 | 11-15 | >15 | | | ≤10 | 11-15 | >15 | | |
| | | 18 | 7 | 0 | | | 5 | 18 | 2 | | |
| 8 | Time at partial weight bearing started | 5-6 weeks | 7-8 weeks | 9-10weeks | >10 weeks | | 5-6 weeks | 7-8 weeks | 9-10weeks | >10 weeks | |
| | | 14 | 10 | 1 | 0 | | 11 | 12 | 1 | 1 | |
| 9 | Time at full weight bearing started (In week) | 10-12 week | 12-16 week | >16 week | | | 10-12 week | 12-16 week | >16 week | | |
| | | 15 | 9 | 1 | | | 11 | 13 | 1 | | |
| 10 | Union time | ≤8 week | 8-15 week | >15 WK weeks | DELAYED UNION | NON-UNION | ≤8 week | 8-15 week | >15 week | DELAYED UNION | NON-UNION |
| | | 8 | 14 | 2 | 0 | 1 | 7 | 11 | 4 | 1 | 2 |
| 11 | Functional outcome | poor | Fair | Good | Excellent | | poor | Fair | Good | Excellent | |
| | | 0 | 1 | 8 | 16 | | 1 | 0 | 10 | 14 | |
| 12 | Functional status | Unacceptable | Acceptable | | | | Unacceptable | Acceptable | | | |
| | | 1 | 24 | | | | 1 | 24 | | | |




## DISCUSSION

Surgical treatment of subtrochanteric fractures is currently the favoured option because it avoids the problems that come with prolonged recumbency. Despite the fact that there are various surgical techniques for subtrochanteric fractures, there is no gold standard treatment for this type of fracture. When compared to extramedullary fixation, intramedullary fixation has a shorter operational duration, less blood loss, less soft tissue injury, and better biomechanical qualities. Their disadvantages include a longer operating time, more blood loss, a high level of technical difficulty, significant devascularization, a greater infection rate, and a delay in weight bearing. Subtrochanteric fractures respond well to indirect reduction and submuscular plating[6]. The purpose of this study is to assess the outcomes of a subtrochanteric fracture that was internally treated with long PFN and PFLCP. The average age of the patients in this trial was 50.36 years in the long PFN group and 49.52 years in the PF LCP group. This is similar to earlier research by DELEE et al ,[6]Lei-Sheng Jiang et al[8], Chakraborty M. Mirbolook et al ,[10] U Gunadham et al ,[9] who found that the average age of patients in their research was about 50 years. In their study, SUN-JUN HU et al 1 found that the average age of the patients was 76 years, which is greater than ours and other workers' findings. Eighty-two percent of the patients in our study were male and eighty-eight percent were female. Gowda et al[11] made similar observations in their investigations. Males made up 55.3 percent of the population, while females made up 44.7 percent, according to Mirbolook et al[10].

Gowda et al 3 made similar observations. [11]In this study, the right side was implicated in 26 of patients while the left side was implicated in 24 of patients. In our research, 86% of patients were operated on within 7 days of their injuries.[9]made similar observations.

The average surgical time in our study was 50 minutes for the long PFN group and 65 minutes for the PFLCP group Lei Sheng Jiang et al [8]made a similar observation for the long PFN group, while Ginghams et al[9] noticed a longer working duration for the PFLCP group. The lengthy PFN group's average blood loss was 70 ml, which was significantly less than the 220 ml in the PFLCP group. This is because a long PFN was inserted through a small incision with little soft tissue dissection and no drainage of the fracture hematoma. Blood loss was minimised when the MIIPO approach was employed instead of open reduction for pflcp, which required greater soft tissue dissection and drainage of fracture haematoma. This is significantly less than the 619± 276 ml average blood loss reported by U Gundham et al [9] for PFLCP. In our study, the average length of incision in the long PFN group was 82.2 cm, while the average length of incision in the PF LCP group was 18.5 cm. The length of incision in the long PFN group and PFLCP done with MIIPO technique was merged from two independent incision lengths.

The average hospital stay in the current study was 6.5 days in the long PFN group and 12.8 days in the PF LCP group. Patients who stayed in the hospital for more than 15 days did so due to problems such as infection. The average hospital stay in PFLCP was 14.55.6 days, according to U Gundham et al[9]. The average time to begin partial weight bearing in the long PFN group was 6.76 weeks, while the average time in the PFLCP group was 7.24 weeks.Full weight bearing took an average of 12.84 weeks in the long PFN group and 14.32 weeks in the PFLCP group. In our study, two patients from each group had superficial infection, which was treated with dressing and antibiotics, whereas two patients from the PFLCP group had deep infection, which was treated with antibiotic impregnated beads, IV antibiotics based on culture and sensitivity test, and dressing. There were two cases of nonunion in PFLCP, one of which was treated with bone marrow infiltration while the other was treated with bone grafting, and one of which was treated with bone grafting. The mean time of radiological union in our study was 12.5 weeks in the long PFN group and 14.5 weeks in the PFLCP group, which is similar to what Muhammad Ayoob Laghari et al[3].

## CONCLUSION

Subtrochanteric fractures were treated with a long proximal Femur nail and a proximal femoral locking compression plate in our study. In the end, there was no significant difference between the two groups except that the long PFN group had a shorter average time to union and less problems than the PFLCP group. Based on the findings, we conclude that intramedullary implants are preferred in the elderly with concomitant medical conditions because they require less operating time, less blood loss, and less soft tissue dissection. Intramedullary implants are also favoured in osteoporotic bone because they provide better rotation, length, and proximal purchase control. Because of the load shearing nature of this implant, compression at the fracture site is possible. Side plating is preferred in fractures with an unbroken lateral wall and in Russel Taylor type IIA and IIB fractures because it ensures appropriate fixing of the lateral fragments and inhibits proximal fragment lateral migration. Each implant has its own set of advantages and disadvantages, and this research reveals that the functional outcomes are similar in both. However, the type of implant to use should be determined by the patient and the type of fracture pattern.

## TOTAL HARRIS HIP SCORE

| SCORE | RATING |
|---|---|
| 90-100 | Excellent |
| 80-89 | Good |
| 70-79 | Fair |
| <70 | Poor |

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