

## Comparison of Outcomes of Proximal Femoral Nailing and Bipolar Hemiarthroplasty Techniques in Intertrochanteric Femur Fracture Treatment

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### Abstract:

**Introduction:** Intertrochanteric femur fractures are among the most common fractures. Because of mankind's increasing longevity, the occurrence of these fractures is also increasing. The fourth generation of intramedullary nails, such as gamma nails or proximal femoral nails, are used to treat these fractures. We examined early outcomes and complications in patients with intertrochanteric femur fractures who underwent proximal femoral nailing (PFN) and bipolar hemiarthroplasty (BPH) at a tertiary care hospital.

**Materials and Methods:** The current prospective study was carried out during a two-year period at Dr. Patnam Mahender Reddy Medical College. Our study comprised patients with intertrochanteric fractures who came to our hospital. The study comprised patients over the age of 60 with intertrochanteric fractures. Patients were separated into two groups: those who had bipolar hemiarthroplasty (BPH) and those who had proximal femoral nail (PFN). The functional outcome of both groups was assessed using the Harris Hip scale and various parameters were compared.

**Result:** All the patients were elderly. The most common age group was 71-80 years, the average age for arthroplasty was 77.3 years and PFN was 75.8 years. Females were predominantly affected in both cases. In the BPH group, the right side was involved in 9 (36%) patients and the left side in 11 (64%) patients, and in the PFN group, the right side was in 8(40%) patients and the left side was in 12(60%) patients. Domestic fall accounted for the most common mode of injury in both BPH (85%) and PFN (80%) groups. The average amount of blood lost in BPH cases was 516.66 ml. The average amount of blood lost in PFN cases was 187.33 ml which was statistically significant. The average duration of surgery was 81.4 minutes for the BPH Group, and the average duration of surgery for the PFN Group was 77.58 minutes. The mean Harris hip score at the end of one year for the BPH group was 80.84 and for the PFN group was 74.3

**Conclusion:** When compared to Bipolar hemiarthroplasty, PFN provides the advantage of shorter surgical time, less blood loss, and shorter hospital stay with no difference in functional outcome.

**Keywords:** Intertrochanteric Fractures, Cemented Bipolar Hemiarthroplasty, Proximal Femoral Nail.

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### Introduction

Intertrochanteric fractures are extracapsular fractures of the proximal femur between the greater trochanter and the lesser trochanter. It accounts for 45% of all hip fractures [1]. These fractures are prevalent in the elderly population. The occurrence of such fractures has lately increased due to an increase in global life expectancy [2].

Thirty-five to forty percent of all intertrochanteric hip fractures are unstable three and four-part

configurations with posterior-medial cortical displacement [1]. Russell also discovered that in the elderly, low energy mechanisms such as a simple fall in osteoporotic bone produce fracture, whereas in young patients, high energy trauma is involved [3].

Surgical therapy of unstable intertrochanteric fractures continues to be difficult around the world. Currently, intramedullary (nails) and extramedullary

(screws or plates) fixations, as well as total or partial arthroplasty, are employed in treatment. Because patients over the age of 75 have poor bone quality due to osteoporosis, problems such as nonunion, femoral head collapse, and metal failure are more likely.[4] Most studies in the literature advocate proximal femoral nailing and hemiarthroplasty as the first surgical options for treating unstable intertrochanteric fractures [5,6].

We examined early outcomes and complications in patients with intertrochanteric femur fractures who received proximal femoral nailing and bipolar hemiarthroplasty at a tertiary hospital in the current study.

### Materials and Methods

The current prospective study was carried out at Dr. Patnam Mahender Reddy Medical College in Chevella, Telangana, at the Department of Orthopaedics. The research was carried out between April 2021 and March 2023. The institutional ethical committee approved the study. Patients over the age of 60, with a recent traumatic history, a displaced, unstable intertrochanteric femur fracture, and a willingness to participate in the study.

### Exclusion criteria

Age less than 60 years, Patients with pathologic fractures, Patients with multiple fractures, Patients with old neglected fractures, and Patients with osteoarthritis of the hip joints. Patients not willing to participate.

Following the patient's admission, a surgical profile, cardiology fitness for surgery, and pre-anaesthetic check-up were performed. Randomization divides 30 patients into two groups of 15 each. Cemented bipolar hemiarthroplasty was performed on BPH patients, and PFN was conducted on PFN patients. Patients were operated on as soon as their condition stabilised, which was usually within 48 hours of their presentation.

All surgical procedures were carried out under spinal or epidural anaesthesia. Prophylactic antibiotics were administered during anaesthesia induction and continued for three doses postoperatively. Prophylaxis against DVT with LMWH began 12 hours before surgery and was continued postoperatively. PFN patients were made to walk non-weight bearing with support starting on the fifth or seventh day after surgery, and quadriceps exercises were suggested. Toe-touch weight bearing was started six weeks after surgery at the first follow-up. After four to six weeks, patients who showed both clinical and radiographic evidence of the union were allowed to bear full weight. Patients who underwent cemented bipolar hemiarthroplasty were made to stand with the assistance of a walker and were allowed to walk by the fourth or fifth postoperative day. They were not permitted to squat or sit cross-legged. They were followed up with every month for the first three months, then every three months for the first year, and then every six months after that.

### Results

Out of 40 patients with intertrochanteric fractures, 20 patients were treated by proximal femoral nail, and 20 patients were treated by bipolar hemiarthroplasty. The following observations were made in our study.

All of the patients were old, with the most prevalent age group being 71-80 years (45%), the average age for arthroplasty being 77.3 6.4 years, and the PFN being 75.8 9.2 years. In both cases, women were particularly affected. In the case of hemiarthroplasty. In PFN, the right side was involved in 9 (36%) patients and the left side was involved in 11 (64%) patients, whereas the right side was involved in 8 (40%) patients and the left side was involved in 12 (60%) patients. As a result, affection of the left side was greater in both groups. Domestic falls (slip and fall at home) were the most common mode of injury in both bipolar hemiarthroplasty (85%) and PFN (80%). (Table 1)

**Table 1: Comparison of baseline characteristics**

Characteristic	PFN Group	BPH Group	p-value
Age, years	75.8 ± 9.2	77.3 ± 6.4	0.325
Sex, n (%)			
Male	3 (15%)	2 (10%)	0.434
Female	17 (85%)	18(90%)	
Side, n (%)			
Right	8 (40%)	9 (45%)	0.421
Left	12 (60%)	11 (55%)	
Mode of injury, n (%)			0.242
Domestic fall	16 (80%)	17 (85%)	0.135
RTA	4 (20%)	3 (15%)	

In cases with Bipolar hemiarthroplasty, the average volume of blood loss was 516.66 ml. In PFN cases, the average volume of blood loss was 187.33 ml,

which was statistically significant. The average duration of surgery for the BPH Group was 81.4 minutes, and the average duration of surgery for the

PFN Group was 77.58 minutes. The functional outcomes of the procedures were rated using the Harris hip scale. It is a 100-point scale with 44 points for discomfort, 47 points for function, 5 points for range of motion, and 4 points for lack of deformity. The

findings were evaluated at 1, 3, 6, and 1 year, and the Harris hip score after one year was 74.3 8.64 in the PFN group and 80.84 7.12 in the BPH group, both of which were statistically significant. (Table 2).

**Table 2: Comparison of various parameters in both the groups**

Outcome	PFN Group	BPH Group	P value
Blood loss (ml)	182.63(37.31)	503.44(66.61)	0.002*
Duration of surgery (minutes)	77.58 ± 12.65	81.4 ± 9.54	0.276
Stay in hospital (days)	10.98± 4.23	13.54± 3.87	0.253
Harris Hip Score (1 yr)	74.3 ± 8.64	80.84 ± 7.12	0.023*

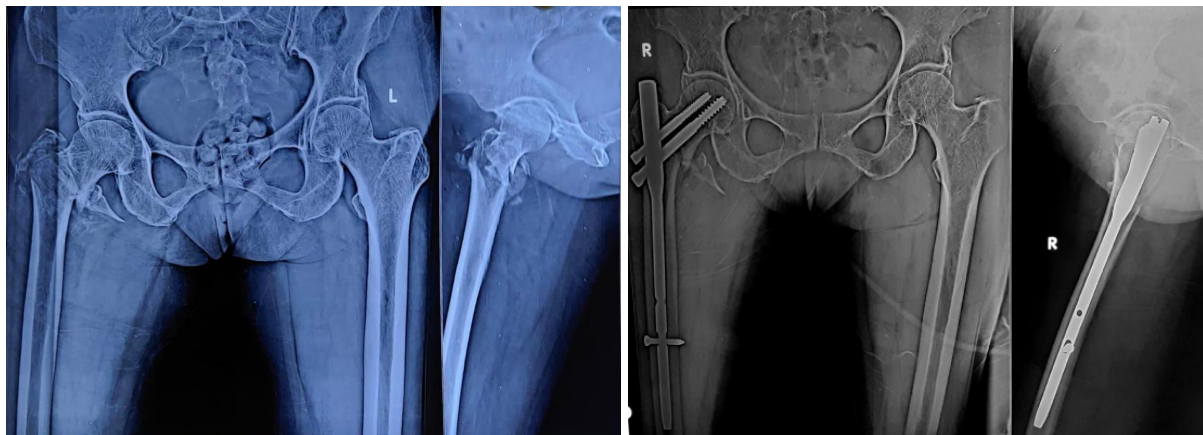
\*significant

Out of the 30 patients operated, 1 patient in the PFN group and 1 patient in the BPH group got infected which was statistically significant. 1 patient in the PFN group and 2 patients in the BPH group had limb length discrepancy which was statistically significant. 2 patients in the BPH group and 3 patients in the PFN group got bedsore which was statistically significant.

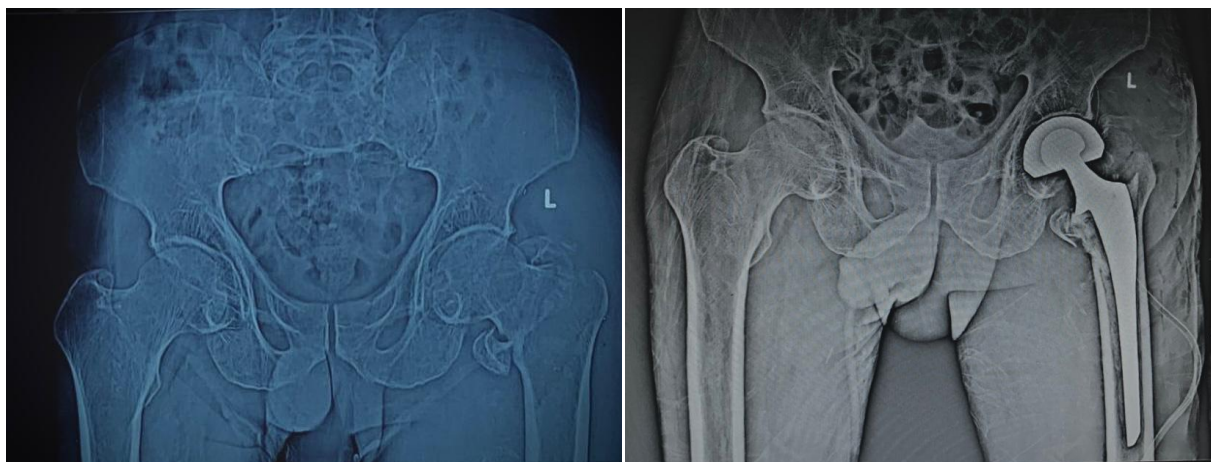
**Table 3: Comparison of complications**

Complications	PFN Group (n)	BPH Group (n)	P value
Bedsore/pressure heel sore	3	2	0.032*
Limb shortening	1	2	0,021*
Superficial infection	1	1	0.031*

\*significant



**Figure 1: A pre and post-operative image of proximal femur fractures; the proximal femur nailing**



**Figure 2: A pre- and post-operative image of proximal femur fractures; bipolar hemiarthroplasty**

## Discussion

Hip fractures are a major cause of morbidity and mortality in the elderly, and surgery is usually required. However, comorbidities, osteoporosis, and poor bone structure in the elderly make finding an effective treatment for hip fractures difficult. Several studies suggested surgical repair. Most surgical intervention patients were mobilised sooner, according to study reports published after 1971, when primary arthroplasty was performed first. Patients who underwent surgical intervention had fourfold lower mortality at one year and thrice lower mortality at two years compared to those who chose non-operative treatment [7,8]. Furthermore, surgical restoration improves pain control and movement more quickly, even in bed [9].

We compared our findings to previous research on trochanteric fractures treated with bipolar hemiarthroplasty or PFN. The majority of our patients were older. Patients receiving Bipolar hemiarthroplasty had an average age of 77.3 years, compared to 82 years in Haentjens.[10] The PFN group's mean age was 75.8 years, compared to 72 years in Tyllianakis et al.[11]

In our Bipolar hemiarthroplasty group, the average blood loss was 503.44 ml. Our PFN group had a mean blood loss of 182.63ml, compared to 320 ml in a research by Pajarinen et al.[12] and 0.5 to 1.8 units (175 ml to 630 ml) in Tyllianakis et al.[11] In our study, the length of surgery for the Bipolar hemiarthroplasty group was 77.58 minutes. The duration of surgery in Haentjens' [10] trial was 82 minutes plus or minus 4 minutes. Our PFN group's mean operation time was 77.58 minutes, compared to 68 minutes in Tyllianakis et al.[11] In our investigation, the PFNA group had a shorter postoperative hospital stay, which was similar to another study [13].

## Conclusion

Because of the complexity of the fracture geometry and the osteoporotic nature of the bone, unstable intertrochanteric fractures present a significant challenge to surgeons. Both methods produce nearly identical results. When compared to Bipolar hemiarthroplasty, PFN has a shorter operational time, less blood loss, and a shorter hospital stay with no difference in functional outcome or general problems.

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