

## Research Article

# Proximal Femoral Nailing Fixation of Femoral Intertrochanteric Fractures in Parkinson's Disease

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### Abstract

**Objectives:** We aimed to evaluate the results of patients with Parkinson's disease (PD) who underwent proximal femoral nail (PFN) as an internal fixation method internal fixation.

**Methods:** Fifty patients with PD who had intertrochanteric fractures treated with PFN between included in our study. Patients were evaluated for complications and the ability to walk with or without support.

**Results:** The mean age of the patients was 76 years (67-81). The mean duration of surgery after hospital admission was 3 days (2-5). The mean surgery time was 63 minutes (52-70 min.). The mean length of hospital stay was 3 days (2-5 days). The mean follow-up was 2.2 years (1-3 years). Pressure ulcers; wound infections, and urinary system infections were not observed because the surgical time and hospital stay were short. Pneumonia was observed in 2 of our patients. Loss of reduction was observed in 1 patient. At the end of the first year, 44 (88%) of our patients were able to walk with or without support.

**Conclusion:** PFN is a minimally invasive method, major postoperative complications can be seen less and it may be more advantageous than endoprosthesis in terms of early mobilization as there is no risk of dislocation.

**Keywords:** Parkinson's disease, proximal femoral nail, intertrochanteric femur fracture

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Intertrochanteric femur fractures, which constitute a significant rate of hip fractures, are mostly seen in elderly patients and occur with low-energy injuries. In these patients, complications such as deep vein thrombosis, pulmonary embolism, urinary tract infection, and pressure ulcer, which increase the mortality rate by adversely affecting the prognosis, may develop due to the prolonged hospitalization period after a fracture. Parkinson's disease is a common, chronic, neurological condition whose prevalence increases with age. It is characterized by bradykinesia with or without tremors, muscle rigidity, and postural instability.<sup>[1]</sup> Patients with Parkinson's disease (PD) are at higher risk of fall fractures than healthy people because

of their unstable posture and abnormal gait.<sup>[2,3]</sup> Evidence suggests that people with Parkinson's are at higher risk of falls, associated with internal (disease-related) factors rather than external (environmental) factors.<sup>[4,5]</sup> It has been suggested by Rothermal and Garcia that the reason why patients taking levodopa are at increased risk of fractures compared to those not taking levodopa is related to the fact that this drug makes patients more mobile without improving their balance.<sup>[6]</sup> It is also suggested that patients with Parkinson's disease have increased rates of osteoporosis, which may not be solely related to inactivity, compared with control groups of the same age.<sup>[7,8]</sup> With an increased risk of both falls and osteoporosis, people with

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Parkinson's are likely to have an increased risk of hip fractures.<sup>[9]</sup> The studies have reported that intertrochanteric femur fractures cause more distress in patients with PD than in patients without PD in terms of mortality, post-operative complications, and functional improvements. Even though there are studies indicating that there is no significant difference in mortality between surgery and conservative treatment in intertrochanteric hip fractures in patients with PD, surgical treatment is recommended in terms of functional recovery. The treatment aims to avoid complications such as deep vein thrombosis, pulmonary infection, urinary tract infection, and pressure ulcer, which increase the mortality rate by adversely affecting the prognosis, by ensuring the pre-fracture function level as soon as possible with early mobilization. Although discussions continue regarding the surgical methods to be applied, the use of endoprosthesis is traditionally recommended for hip fractures accompanied by neurological disease.<sup>[11]</sup> In our study, the proximal femoral nail (PFN) was used as an internal fixation method and we aimed to evaluate the outcomes of PFN in intertrochanteric femur fractures in patients with Parkinson's Disease.

## Methods

### Study Design

This retrospective study was conducted after the ethics committee approval of our hospital (23.05.2022, No: 179) and was carried out under the ethical standards in the Helsinki Declaration. Written consent was obtained from all patients participating in the study. Patients with PD who had acute intertrochanteric femur fractures and had internal fixation using the PFN method were included in the study (Fig. 1). Exclusion criteria can be listed as those with multiple fractures, pathological fractures, open fractures, joint replacement history, and concomitant diseases that will affect prognosis, such as pulmonary infection, malignancy, diabetes, cardiovascular, and renal system problems. All patients were applied PFN following the closed reduction in the lateral decubitus position under spinal anesthesia, and prophylactic antibiotics were used (Fig. 2). On the postoperative 1<sup>st</sup> day, patients were encouraged to perform in-bed exercises, sitting, and assisted mobilization without weight bearing. Extremity weight bearing was allowed from the postoperative 3<sup>rd</sup> day

Follow-up examinations were performed at the first, 2<sup>nd</sup>, 3<sup>rd</sup>, 6<sup>th</sup>, 12<sup>th</sup>, 24<sup>th</sup>, and 36<sup>th</sup> months after surgery (Fig. 3). Patients were evaluated for complications and the ability to walk with or without support.

Sequential anteroposterior and lateral hip radiographs were taken during the follow-ups to evaluate the fracture

union time. Bridging of fracture at three cortices, progressive obliteration of fracture line, and cortical continuity were the criteria used to assess fracture healing.

Harris Hip Score<sup>[10]</sup> was used for the assessment of hip function. This instrument contains ten items divided into three categories that describe pain, function, range of motion, and deformity. The first component is a patient-oriented questionnaire and comprises the patient's limitations and activities. The second and third portions, which comprise leg length measurement and hip range of motion (ROM) measurements (flexion, abduction, external rotation, and adduction) are administered by the physician. Each item has its number scale, which correlates to the descriptive response alternatives. A higher score indicates good function, whereas a lower score indicates hip dysfunction.

### Statistical Analysis

SPSS for Windows version 20.0 software (SPSS Inc. Chicago, Ill. USA) was used for statistical analysis. Descriptive statistics of the data mean, standard deviation, median, minimum, maximum, frequency, and ratio values were used to describe the study population.

## Results

We enrolled 32 female and 18 male patients treated and followed up in our hospital between January 2015 and January 2019. The mean age of the patients was 76 years (67-81). The mean duration of surgery after hospital admission was 3 days (2-5). The mean surgery time was 63 minutes (52-70 min.). The mean length of hospital stay was 3 days (2-5 days). All patients were followed for a minimum of 1 year. The mean follow-up was 2.2 years (1-3 years).

### Radiological and Clinical Results

The mean union time was 4 months (3-6 months). Avascular necrosis was observed in two patients in late follow-up. No additional surgery was performed.

The mean final Harris Hip Score was 82,16 (range, 65-91). Pressure ulcers; wound infection, and urinary system infections were not observed because the surgical time and hospital stay were short. Pneumonia was observed in 2 of our patients. Loss of reduction was observed in 1 patient, which we thought was due to the initiation of full weight bearing on the 10th day. Although the patient was offered revision, she refused. Union was observed in malposition. At the end of the first year, 44 (88%) of our patients were able to walk with or without support. In our follow-ups, two of our patients died in the postoperative 16th and 20th months Table 1.

**Table 1.** Patient demographics and follow-up's data

Age, years, mean	76 (67-81)
Sex, n (%)	
Male	18 (36)
Female	32 (64)
Follow-up	
Years, mean	2.2 (1-3)
Fracture union time	
Months, mean	4 (3-6)
Surgery time	
Minutes, mean	63 (52-70)
Time of hospital stay	
Days, mean	3 (2-5)
Complications, n	Pneumonia (2) Malunion (1) Avascularnecrosis (2)

## Discussion

PFN application is an effective alternative treatment method in patients with PD who had intertrochanteric femur fracture. PFN is a minimally invasive method, major postop-

erative complications can be seen less and it may be more advantageous than endoprosthesis in terms of early mobilization as there is no risk of dislocation

This study had a few limitations. Our study is a single-center study. We had a small number of patients. It was a non-comparative retrospective study,

The treatment method to be applied in PD patients with hip fractures is still controversial. Regardless of surgical procedures, these patients have high, mortality, and, as well as orthopedic and other complications.<sup>[11,12]</sup> Rehabilitation can be difficult and lengthy due to tremors, rigidity, and impaired balance.<sup>[1]</sup> Some studies have recommended internal fixation instead of hemi arthroplasty because of the high rate of prosthetic dislocation.<sup>[12]</sup> In our study, we used PFN as a minimally invasive internal fixation method. They suggested hemi arthroplasty in studies that argued that internal fixation failure would develop and nonunion would occur in patients with severe tremors and stiffness.<sup>[13]</sup> Staeheli et al.<sup>[14]</sup> and Coughlin and Templeton<sup>[12]</sup> stated that early mobilization is necessary to reduce complications. In our study, although we observed a loss of reduction in one patient, we achieved good results by providing early mobilization after internal fixation, Coughlin and Templeton and Turcotte et al suggested that endoprosthesis has significantly worse outcomes than IF with greater dislocation, mortality, postoperative complications, and functional decline.<sup>[12,15]</sup> Coughlin and Templeton had a high rate of mortality associated with the posterior approach.<sup>[12]</sup> In a study of 47 patients, Tur-



**Figure 1.** Preoperative X-Ray.



**Figure 2.** Early Postoperative X-Ray.



**Figure 3.** X-Ray at 6<sup>th</sup> month.

cotte et al.<sup>[15]</sup> found dislocation in 5 patients (11%) and wound infection in 4 patients. It has been reported that 1 out of 5 patients with dislocation died, the other three remained non-ambulatory, and all wound infections had poor results. They did not report wound infection in internal fixation. Coughlin and Templeton<sup>[12]</sup> reported that the increased risk of avascular necrosis and nonunion in internal fixation is more acceptable than complications such as increased mortality, pulmonary complications, and decubitus ulcers.

Although few publications are comparing the applications of arthroplasty and internal fixation in patients with Parkinson's hip intertrochanteric fracture, they reported that the need for blood transfusion increased and the length of hospital stay was prolonged after arthroplasty. The shorter hospital stay after internal fixation was explained by the easier post-operative early mobilization. Dislocation risk is the most important factor preventing early mobilization

after arthroplasty. Thus, it is possible to reduce complications such as pneumonia, pressure ulcer, and urinary infection that may increase mortality and morbidity that may accompany delayed mobilization and a long stay in the hospital. Londos et al.<sup>[16]</sup> recommended internal fixation as the primary treatment in patients with Parkinson's hip fractures.

In our study, we observed that the hospitalization times of our patients were shortened due to the reduced perioperative blood transfusion requirement, early postoperative mobilization, and weight-bearing factors. As we avoided the risk of dislocation, which significantly increases the risk of mortality and morbidity, complications such as pneumonia, pressure ulcer, and urinary system infection, which can be encountered more frequently after arthroplasty, were observed very few or not at all.

During our follow-up, pneumonia was observed in two of our patients. Pressure ulcers and urinary tract infections were not observed. Early reduction loss was observed in 1 patient. Malunion was observed because it could not be revised. After all, the patient did not want a new surgery. Avascular necrosis was observed in three patients. It was observed that 46 of our patients (88%) were able to walk with or without support at the end of the first year. It was evaluated that one of the remaining patients had malunion and one had avascular necrosis, and the other 4 patients were patients who did not make any effort for rehabilitation and mobilization due to adjustment problems. Two of these patients died in the 16<sup>th</sup> and 20<sup>th</sup> months postoperatively.

## Conclusion

We think that the PFN application is an effective alternative treatment method in patients with PD who had intertrochanteric femur fracture. We think that since it is a minimally invasive method, major postoperative complications can be seen less and it may be more advantageous than endoprosthesis in terms of early mobilization as there is no risk of dislocation.

## Disclosures

**Ethics Committee Approval:** Ethical Committee (ethical approval number: 23.05.2022, No: 179).

**Peer-review:** Externally peer-reviewed.

**Conflict of Interest:** None declared.

**Authorship Contributions:** Concept: E.T., A.Ç.T., B.K.; Design: E.T., A.Ç.T., B.K.; Data Collection or Processing: E.T., A.Ç.T., B.K.; Analysis or Interpretation: E.T., A.Ç.T., B.K.; Literature Search: E.T., A.Ç.T., B.K.; Writing: E.T., A.Ç.T., B.K.

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