

## How did the Treatment Modalities Effect the Kinesiophobia for the Treatment of Unstable Intertrochanteric Fractures? Retrospective Clinical Trial

Kerim Öner<sup>1\*</sup>, Ahmet Emre Paksoy<sup>2</sup>

<sup>1</sup>Department of Orthopedics and Traumatology, Faculty of Medicine, Karadeniz Teknik University Trabzon, TURKEY

<sup>2</sup>Department of Orthopedics and Traumatology, Faculty of Medicine, Atatürk University Erzurum, TURKEY

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### \*Corresponding Author

Dr. Kerim Öner

Department of Orthopedics and Traumatology,

Faculty of Medicine,

Karadeniz Teknik University,

Trabzon, Turkey.

Phone: + 90 5434267752

E-mail: dr.kerimoner@hotmail.com

ORCID: <https://0000-0001-8415-1057>

**Abstract:** Kinesiophobia is the fear of pain and re-injury resulting from movement. It may occur after surgery and affect functional outcomes and patient comfort. In this study, we compared fixation with proximal femoral nail antirotation (PFNA) and hemiarthroplasty, which are two essential methods in treating geriatric unstable intertrochanteric femur fractures, by performing functional evaluation and kinesiophobia measurement. Patients who were treated with PFNA or hemiarthroplasty for AO 31A2 hip fracture in our clinic between January 2017 and May 2019 were retrospectively evaluated. A total of 72 patients (age range 60-89, mean age  $75.2 \pm 7.7$  years) with at least 1 year follow-up were included in the study. Functional evaluation of the patients was done with the Harris Hip Score (HHS), pain evaluation was performed with the Numerical Rating Scale (NRS), and the kinesiophobia measurement was carried out with the Tampa Scale (TSK). The mean TSK scores in the PFNA and hemiarthroplasty groups were  $47.9 \pm 4.9$  (95% CI 46.4-49.5) and  $51.7 \pm 5.7$  (95% CI 49.6-53.4), respectively ( $p < 0.05$ ). On the other hand, while the mean HHS was  $89.1 \pm 3.7$  (95% CI 87.2-90.3) in the PFNA group, it was  $86.2 \pm 4.1$  (95% CI 84.8-87.6) in the hemiarthroplasty group ( $p < 0.05$ ). The NRS score was  $2.81 \pm 2.62$  in the PFNA group and  $3.11 \pm 2.81$  in the hemiarthroplasty group ( $p = 0.672$ ). There was no correlation between age and TSK, NRS, or HHS scores ( $p = 0.316$ ). However, a significant negative correlation was observed between the HHS and TSK scores ( $r = -0.77$ ,  $p < 0.01$ ). Hemiarthroplasty in geriatric unstable intertrochanteric femur fractures is associated with high levels of kinesiophobia. Fixation with PFNA is more advantageous in terms of functional results and kinesiophobia. © 2021 NTMS.

**Keywords:** Intertrochanteric Fractures; Hemiarthroplasty; Kinesiophobia and PFNA; Pain..

### 1. Introduction

The rise in the elderly population increases the rate of intertrochanteric femur fractures (1), which have been reported to have high mortality and morbidity rates,

reaching 38% in the first year (2). When these fractures are detected early and treated appropriately, mortality and morbidity can be minimized, and the rapid decrease

in the quality of life can be prevented (3).

Various methods, such as bipolar hemiarthroplasty, total hip arthroplasty and various fixation methods (PFNA, DHS, Plate Screw Systems) are used to treat intertrochanteric femur fractures. Many factors, such as the patient's general medical status, patient profile, surgeon's experience, and preference, determine the treatment selection (4). Despite several studies, there is no consensus on the optimal treatment option in this patient group (4-7).

On the other hand, kinesiophobia is defined as “an excessive, irritational, and debilitating fear of physical movement and activity resulting from feeling of vulnerability to a painful injury or re-injury” (8). Kinesiophobia is a hot topic still under investigation. It is associated with success following surgery and affects the quality of life (9-17).

Kinesiophobia after intertrochanteric femoral fracture will make this difficult-to-treat condition even more complicated. This study aimed to compare fixation with PFNA and hemiarthroplasty, which are two essential methods used in the treatment of geriatric unstable intertrochanteric femur fractures, by performing functional and kinesiophobia analysis. Our hypothesis was that fixation with PFNA would cause less kinesiophobia compared to that with hemiarthroplasty.

## 2. Material and Methods

Patients in the 60-89 age range, who were admitted to our clinic between January 2017 and May 2019, operated due to intertrochanteric femur fracture, and underwent fixation with PFNA or hemiarthroplasty, were examined retrospectively in the study. The study was conducted in accordance with the principles of the declaration of Helsinki. Ethics committee approval was obtained from the local ethics committee for this study between 2019-2020 (2017-KAEK-189\_2019.11.27\_13). Data retrieval was done from the patient files using the records at the one-year follow-up. Written informed consent was obtained from every patient at the time of the operation. The mechanism of injury in all patients was a fall from the same level. The fracture classification was performed according to the AO classification (18). A total of 121 patients with AO 31A2 fractures were operated. Surgical interventions of all patients were performed by the same orthopedic surgeon.

Patients with pre-operative unassisted walking capacity, good nutritional status, BMI between 19-24, no post-operative complications, good cognitive status, no psychiatric disease, no pathological fracture were included.

Forty-nine patients, who had a neurological pathology that caused movement disorder (n=3), had a pathological (metastatic or primary tumoral lesions) fracture (n=25), were mentally disabled (n=9), had some psychiatric disease (n=8), and who had missing data in the patient file (n=2), no informed consent (n=2) were excluded from the study. Fixation with PFNA was performed in 40 patients (PFNA group) (26 patients

31A2-2, and 14 patients 31A2-3), while in 32 patients received hemiarthroplasty (hemiarthroplasty group) (17 patients 31A2-2 and 15 patients 31A2-3) (Figure 1). The patients' median follow-up duration was 16 months for the PFNA group, and 14 months for the hemiarthroplasty group. All patients were mobilized within 48 hours postoperatively, with loads as they could tolerate.

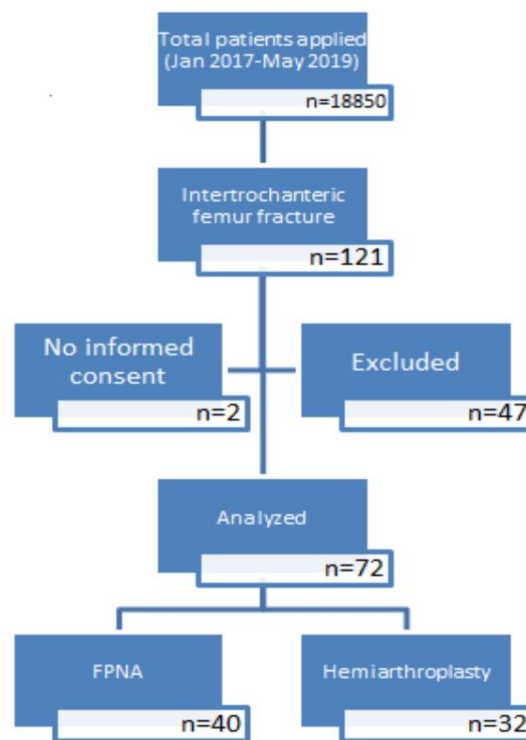


Figure 1: Study flow diagram.

Using the applet developed by RussLenth (<http://homepage.divms.uiowa.edu/~rlenth/Power/>), a post-hoc sample size calculation was done based on the primary outcome variable TSK. Given a common standard deviation of five, a two-tailed alpha error of 0.05, and a true difference of means of four (effect size=0.8), a sample size of 64 participants (32 PFNA + 32 hemiarthroplasty) would achieve a power of 88.3% to compare the two groups concerning mean TSK scores with the independent samples t-test.

### 2.1. Measurement Scales

Functional evaluation: The groups were assessed with the Harris Hip Score (HHS) regarding functional outcomes. HHS is a commonly used score for evaluating patients after surgery. The maximum score that can be received from the scale is 100. Less than 70 points are reported as poor results. The instrument asks questions about pain, function, deformity, and range of motion (19). Functional evaluation was performed in all patients in the first postoperative year.

Pain evaluation: Pain was assessed with the Numerical Rating Scale (NRS). NRS is a scale classified as zero (no pain at all) and ten (worst imaginable pain). Patients answer the tool based on the subjective pain they feel by choosing a score between zero and ten) (20).

Kinesiophobia evaluation: Patients were evaluated with the Tampa Scale (TSK) concerning kinesiophobia. TSK is a scale consisting of 17 self-response items. Each item is numbered from one to four. The minimum and maximum obtainable scores from the instrument are 17 and 68, respectively (8).

### 2.2. Surgical Technique

Regional anesthesia was used in all patients. In the PFNA group, the procedure was performed in the supine position on the fracture table. The fracture was reduced carefully, With an incision of approximately 5 cm from the superior of the trochanter major, the appropriate entry point was determined under the scope and nails were (Dyna Locking Trochanteric nail System, Uijeongbu Gyeonggi-do COREA) applied conventionally.

In the hemiarthroplasty group, a posterior intervention was performed by using an approximately 10-12 cm incision. the external rotator muscles were marked and the capsule was incised in a t-shape. TIPSAN (TIPSAN Co, Izmir, Turkey) prosthesis was used, and at the end of the operation, capsule and external rotator muscles were routinely sutured. An Hemovac drain was placed at the end of the procedure.

### 2.3. Statistical Analysis

Statistical analysis was done using the Statistical Package for Social Sciences (SPSS) Version 22.0 (SPSS, Chicago, IL) statistical analysis software. The normal distribution of the numerical variables was assessed by the Kolmogorov–Smirnov test. Postoperative comparisons were performed by the Student t-test. A two-tailed p-value of <0.05 was considered significant. The Pearson correlation analysis was used to check for correlations between the NRS, HHS, and TSK scores.

## 3. Results

Data of 72 patients operated due to intertrochanteric femur fracture were analyzed. Fixation with PFNA was done in 40 patients (55.6%), while hemiarthroplasty was performed in 32 patients (44.4%). Forty patients were female (55.6%), and 32 were male (44.4%). There was no difference in terms of gender distribution between the groups. The patients' mean age was  $75.2 \pm 7.7$  years (range, 60-89) (95% CI 73.4-77.1). The mean age in the PFN group was  $73.9 \pm 8.1$ . The mean age in the hemiarthroplasty group was  $77.4 \pm 6.9$ . There was no significant difference between the groups in terms of ages ( $p=0.382$ ). The median follow-up

duration of the patients was 16 months (13-28 months) in the PFNA and 14 months (12-24 months) in the hemiarthroplasty group ( $p=0.621$ ).

The mean TSK score was  $49.6 \pm 5.5$  (95% CI 48.3-50.9). The mean HHS was  $87.8 \pm 4.1$  (95% CI 86.9-88.8). While there was a significant difference concerning HHS and TSK scores, age and NRS scores were not significantly different between the groups (Table 1).

There was no correlation between age and TSK, NRS, or HHS scores ( $p=0.316$ ). However, a significant negative correlation was observed between the HHS and TSK scores ( $r=-0.77$ ,  $p<0.01$ ) (Figure 2).

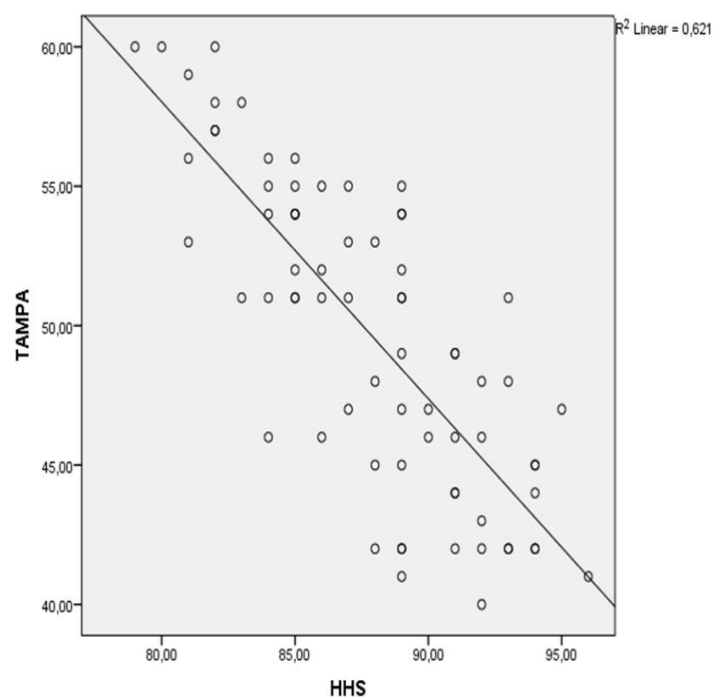


Figure 2: Correlations between HHS and TSK scores.

## 4. Discussion

This study confirmed that comparing PFNA and hemiarthroplasty in the treatment of unstable intertrochanteric fractures in elderly people, PFNA caused less kinesiophobia.

Fixation with PFNA and hemiarthroplasty are among the commonly used methods in treating geriatric unstable intertrochanteric femur fractures. Many studies compared these two methods from various aspects (21-26). In many studies, it has been stated that fixation with PFNA is superior regarding short operation durations, a little bleeding, and low surgical complications, while hemiarthroplasty is more advantageous in certain aspects such as early mobilization and being a safer method in unstable and osteoporotic fractures (5, 7).

**Table 1:** Demographic data of the patients.

	PFNA group (n=40)	95% CI	Hemiarthroplasty group (n=32)	95% CI	p*
Age (years)	73.9 ±8.1	71.8-75.6	77.4 ± 6.9.	74.8-80.3	0.382
HHS (score)	89.1 ±3.7	87.2-90.3	86.2 ±4.1	84.8-87.6	0.002
TSK (score)	47.9 ±4.9	46.4-49.5	51.7 ±5.7	49.6-53.4	0.004
NRS (score)	2.81 ±2.62	2.1-3.4	3.11 ±2.81	2.7-4.2	0.673

NRS: numerical rating scale; TSK: Tampa Scale; HHS: Harris Hip Score.

Many studies revealed that both approaches are beneficial treatment options in geriatric intertrochanteric femur fractures. Besides, there are no significant differences between them in terms of functional scores (24-26).

Kinesiophobia is a problem that generates fear of re-injury during an activity preventing movement (8). In geriatric unstable intertrochanteric femur fractures, early mobilization after treatment is vital in reducing mortality and morbidity. From this perspective, it is seen that kinesiophobia has a critical potential to affect the success of rehabilitation, and thus, morbidity and mortality in geriatric intertrochanteric femur fractures. Using TSK scoring, Şengül et al. found that the pain scores and kinesiophobia were significantly higher in the osteoarthritis group compared to the hip-fracture group in patients receiving a total hip replacement. However, they also stated that they detected high kinesiophobia scores in the hip fracture group (27). As far as we know, there are no studies in the medical literature evaluating these two different surgical methods concerning kinesiophobia in geriatric unstable intertrochanteric femur fractures. In this context, we think that our research will shed light on the rehabilitation process and success of PFNA and hemiarthroplasty treatments applied in geriatric unstable intertrochanteric femur fractures.

Kristin et al. stated that 63% of the patients had moderate pain in the first year after major traumas (28). Pain control is an important factor that affects rehabilitation and treatment success. In our study, we did not determine a significant difference between the groups regarding pain scores. However, we discovered that the PFNA group was significantly superior concerning kinesiophobia. In this context, we can state that the significant difference in the TSK scores does not arise from pain.

When we examine the literature, there are many studies reporting that hemiarthroplasty is better concerning early movement and rehabilitation (21-22). In some studies, it was determined that HHS scores were substantially higher regarding hemiarthroplasty in the first 6 months in the PFNA and hemiarthroplasty groups. However, after the 6<sup>th</sup> month, no significant difference was observed between the two groups (5,7,22). Ozkayın et al. compared proximal femoral nails with hemiarthroplasty and showed higher

functional outcomes in the PFNA group after 12 years of follow-up (29). When we looked at the functional outcomes in our study, we found significantly higher results in the PFNA group in mean HHS. We also found that the PFNA group was superior in TSK scores. In this context, it can be stated that PFNA is an enhanced treatment method in terms of patient satisfaction.

Even if fixation with PFNA does not provide a full load to the patient in the early period, kinesiophobia is less common in these patients because of less harm. This may explain that the HHS values in our study were higher in the PFNA group after a follow up of more than one year. For this reason, in our research, we found a negative correlation between HHS and TSK values. Also, although hemiarthroplasty allows for an early full load, possible blood loss, surgical fatigue, and muscle damage are higher in these patients (29-32).

In their study, Kristin et al. stated that kinesiophobia can cause psychosocial problems and depression (28). We can state that, kinesiophobia may cause psychological and social problems and affect the quality of life, a problem that should not be neglected. It can be predicted that having a higher level of kinesiophobia and fear of injury in the hemiarthroplasty group can cause psychological issues, lifestyle changes, and restrictions in the patients.

Although we collected our data prospectively, the long duration required to accumulate sufficient patients necessitated a retrospective file analysis, which can be mentioned as a limitation of the study. Besides, other variables such as the amount of blood loss and information about the follow-up status are missing. Hence, this study should be interpreted in light of these limitations. On the other side, it worth mentioning that this research is important in terms of being the first publication comparing these two common surgical methods in respect of kinesiophobia..

## 5. Conclusions

Based on our findings, it can be stated that fixation with PFNA and hemiarthroplasty are successful treatment methods in geriatric unstable intertrochanteric femur fractures. However, when evaluated regarding kinesiophobia, fixation with PFNA proves superior compared to a hemiarthroplasty. Future studies should investigate long-term outcomes of PNFA, including patient satisfaction in a larger series of cases.

### Conflict of Interests

The authors declared no conflicts of interest with respect to the authorship and/or publication of this article.

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### Author Contributions

Öner K contributed to the conception and design of the study. Paksoy AE contributed to the collection of the data and statistical analysis and evaluation of the results. Öner K and Paksoy AE created the manuscript. Öner K contributed to revising the work and final approval of the version.

### Ethical Approval

Approved by the local ethics committee. (Decision number:2017-KAEK-189-2019.11.27-13).

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#### Authors' ORCID

Kerim Öner

<http://orcid.org/0000-0001-8415-1057>

Ahmet Emre Paksoy

<http://orcid.org/0000-0002-8333-6137>



<https://dergipark.org.tr/tr/pub/ntms>

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