

Effect of Treatment Modality on Mobility and Quality of Life in Unstable Intertrochanteric Fractures

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Received: 12 July 2022

Accepted: 03 August 2022

ABSTRACT

Purpose: The aim of the study was to investigate mobility and quality of life in patients who underwent osteosynthesis with proximal femoral nail (PFN), or arthroplasty for unstable intertrochanteric fractures.

Methods: Treatment outcomes of 117 patients (76 Female/41 Male) who were treated with PFN (Group 1, n=66), hemiarthroplasty (Group 2, n=42), or total hip arthroplasty (Group 3, n=9) between 2008 and 2014 were retrospectively evaluated. The mobility of the patients was evaluated with the Palmer and Parker mobility score, and the quality of life was evaluated with the Barthel quality of life index.

Results: The mean ages in the groups were 83.51 (range, 75-97) years, 84.72 (range, 75-109) years, and 83.37 (range, 75-94) years; respectively. The mean follow-up periods were 23.26 (range, 3-43.9) months, 19.24 (range, 3-38) months, and 20.1 (range, 3-40) months; respectively. There was no statistically significant difference between the 3 groups in terms of age and follow-up time (p>0.05). Palmer-Parker mobility scores were 6.23 for Group 1, 3.68 for Group 2, and 4.22 for Group 3. Barthel Indexes were 68.73 for Group 1, 37.75 for Group 2, and 52.77 for Group 3. Group 1 had a statistically significantly higher Palmer-Parker mobility and Barthel Index score than Group 2 and Group 3 (p<0.001).

Conclusion: We concluded that osteosynthesis with PFN was more advantageous than hemiarthroplasty or total hip arthroplasty in terms of mobilization and quality of life in patients who were operated on for unstable intertrochanteric fracture.

Keywords: intertrochanteric fracture, proximal femoral nail, hemiarthroplasty, total arthroplasty, mobility, quality of life

İnstabil İntertrokanterek Kırıklarda Tedavi Yönteminin Mobilite ve Yaşam Kalitesine Etkisi

ÖZET

Amaç: Bu çalışmanın amacı instabil intertrokanterik kırıklarda proksimal femur çivisi (PFN) ile osteosentez veya artroplastik tedavilerinin mobilite ve yaşam kalitesini üzerine etkilerini araştırmaktır.

Yöntem: 2008-2014 yılları arasında PFN (Grup 1, n=66), hemiarthroplastisi (Grup 2, n=42) veya total kalça artroplastisi (Grup 3, n=9) ile tedavi edilen 117 hastanın (76 Kadın/41 Erkek) tedavi sonuçları retrospektif olarak değerlendirildi. Hastaların mobiliteyi Palmer ve Parker mobilite skoru ile, yaşam kaliteleri Barthel yaşam kalitesi indeksi ile değerlendirildi.

Bulgular: Grup 1, Grup 2 ve Grup 3'te ortalama yaşlar sırasıyla 83.51 (aralık, 75-97) yıl, 84.72 (aralık, 75-109) yıl ve 83.37 (aralık, 75-94) yıl idi. Ortalama takip süreleri sırasıyla 23.26 (aralık, 3-43.9) ay, 19.24 (aralık, 3-38) ay ve 20.1 (aralık, 3-40) ay idi. Her 3 grup arasında yaş ve takip süresi açısından istatistiksel anlamlı fark yoktu (p>0.05). Palmer-Parker mobilite skoru Grup 1 için 6.23, Grup 2 için 3.68 ve Grup 3 için 4.22 idi. Barthel indeksi Grup 1 için 68.73, Grup 2 için 37.75 ve Grup 3 için 52.77 idi. Grup 1, Grup 2 ve Grup 3'e kıyasla istatistiksel olarak anlamlı daha yüksek Palmer-Parker skoru ve Barthel indeksi değerine sahip idi (p<0.001).

Sonuç: İnstabil intertrokanterik kırık nedeniyle opere edilen hastalarda PFN ile osteosentezin hemiarthroplastisi ve total kalça artroplastisine göre mobilizasyon ve yaşam kalitesi açısından daha avantajlı olduğu sonucuna varılmıştır.

Anahtar kelimeler: intertrokanterik kırık, proksimal femur çivisi, hemiarthroplastisi, total artroplastisi, mobilite, yaşam kalitesi

The incidence of hip fractures has been increasing in parallel with the aging population. The worldwide incidence was 1.6 million in the years of 2000s, and it is expected to be 2.6 million worldwide by the year 2025 (1, 2). Hip fracture is an important health issue associated with higher mortality, loss of function, and lower quality of life (3, 4). One-year mortality with proximal femoral nail is 24.24%, while it may reach to 60% with hemiarthroplasty (5, 6). On the other hand, regression in mobility due to surgical treatment leads to a lifestyle dependent on the help of others (4, 7). Only half of the patients, who can walk without help before fracture, can maintain an independent life after treatment (8).

The traditional approach, in effect for a long time, includes arthroplasty for collum femoris fractures and osteosynthesis for intertrochanteric fractures in order to provide early mobilization of a patient. Nonetheless, osteosynthesis with proximal femoral nail (PFN) can be applied in treatment of unstable intertrochanteric fractures, or arthroplasty can be applied in severe comminuted fractures with previous symptomatic coxarthrosis or in osteoporotic bones which are not suitable for internal fixation. However, to our knowledge, a limited number of studies compared these two different treatment approaches in terms of mobility and function (9). Unstable intertrochanteric fractures are important due to increasing incidence, obscure ideal treatment options, and significant impairment of return to active life despite treatment. In this study, we performed a functional evaluation of surgical outcome in unstable intertrochanteric fractures, and we tried to provide help to surgeons who experience difficulty during decision making process of ideal treatment.

MATERIALS AND METHODS

In this retrospective study, patients older than 75 years with hip fractures who were admitted to the hospital between April 2008 and March 2014 were analyzed. 117 patients with AO 31A-2.2, 31A-2.3, 31A-3 and Evans-Jensen type 3-4-5 intertrochanteric fracture (Male/Female, 41/76) were included to the study. Exclusion criteria were age below 75 years, pathological fracture, renal osteodystrophy, polytrauma, and less than 3 months follow-up (Table 1).

The mean follow-up of patients was 19.06 (range, 3-43.9) months. Group 1 consisted of 67 patients with an intertrochanteric femoral fracture who were treated by PFN (Proximal Femoral Nail Antirotation Surgical Technique DePuy Synthes); Group 2 consisted of 42 patients who were treated with cemented bipolar hemiarthroplasty

(Echelon Primary Hip System, Smith & Nephew); and Group 3 consisted of 8 patients who were treated by cemented total hip arthroplasty (Echelon Primary Hip System, Smith & Nephew). All surgical procedures were performed in the same center. All patients received low molecular weight heparin during postoperative 4 weeks as prophylaxis for embolism. Preoperative cefazolin prophylaxis (2x 1g) was given half an hour before surgery. All patients underwent preoperative AP hip x-ray imaging; standard AP x-ray imaging of both hips was also performed on the same day after surgery. All patients achieved to sit at bed edge on postoperative 1st day and to walk by the aid of crutches on postoperative 2nd day. Full weight-bearing was permitted on the postoperative 2nd day in arthroplasty patients, and in the postoperative 4th week in PFN patients.

Table 1. Exclusion Criteria

Age below 75 years
Pathological fracture
Renal osteodystrophy
Polytrauma
Less than 3 months follow-up

The mean age in Group 1, Group 2, and Group 3 were 83.51 (range, 75-97) years, 84.72 (range, 75-109) years, and 83.37 (range, 75-94) years; respectively, whereas the mean follow-up periods were 23.26 (range, 3-43.9) months, 19.24 (range, 3-38) months, and 20.1 (range, 3-40) months. The study groups were comparable in terms of age, gender, and follow-up period ($p>0.05$) (Table 2).

Table 2. Characteristics of Patients with Unstable Intertrochanteric Hip Fractures

	Mean age (year)	Follow-up period (month)	Gender
Group 1	83,51 (range, 75-97)	23.26 (range, 3-43.9)	44 F / 23 M
Group 2	84,72 (range, 75-109)	19.24 (range, 3-38)	27 F / 15 M
Group 3	83,37 (range, 75-94)	20.1 (range, 3-40)	5 F / 3 M
P value	$p>0.05$	$p>0.05$	$p>0.05$

Mobility was evaluated by the Palmer-Parker mobility score, and quality of life was evaluated by the Barthel quality of life index (Barthel Index) in the groups (10, 11) (Table 3 and 4). Data were obtained by control visits and phone interviews.

Table 3. Palmer-Parker Mobility Score. Assessment of Mobility After the Treatment. Score is the Total, 0 to 9

Mobility	No difficulty	With an aid	With help from another person	Not at all
Able to get about to house	3	2	1	0
Able to get out of the house	3	2	1	0
Able to go shopping	3	2	1	0

Table 4. The Barthel Index is a Scoring System for Evaluating Mobility, Life Quality and Self-care

Task	With help	Independent
Feeding	5	10
Moving from wheelchair to bed	5-10*	15
Personal toilet (wash, shave, comb)	0	5
Getting on / off toilet	5	10
Bathing	0	5
Walking on level surface	10	15
Ascend, descend stairs	5	10
Dressing	5	10
Controlling bowels	5	10
Controlling bladder	5	10

*5= independent in wheelchair
*10=Either some minimal verbal or physical help is needed in activity

Statistical Analysis

Comparisons among the three groups were performed by One-way ANOVA for variables with normal distribution, and by non-parametric Kruskal Wallis test for variables without normal distribution. Significance level was adjusted to $p < 0.05$. SPSS 22.0.0.0 software was used (IBM, Chicago, IL, USA).

RESULTS

Palmer-Parker mobility scores and Barthel Index were compared among the groups. Palmer-Parker mobility scores were as follows: 6.23 for Group 1, 3.68 for Group 2, and 4.22 for Group 3 (Table 5). In addition, Barthel Indexes were as follows: 68.73 for Group 1, 37.75 for Group 2, and 52.77 for Group 3 (Table 5). PFN group (Group 1) had significantly higher Palmer-Parker mobility and Barthel Index values than groups who underwent cemented bipolar hemiarthroplasty (Group 2) or cemented total hip arthroplasty (Group 3) ($p < 0.001$).

Table 5. Mobility and Quality of Life Scores in Terms of Treatment Modality

	Palmer-Parker Mobility Score	Barthel Index
Group 1	6.23	68.73
Group 2	3.68	37.75
Group 3	4.22	52.77
P value	$P < 0.001$	$P < 0.001$

Furthermore, other factors which affected functionality and quality of life were analyzed. An analysis based on the type of anesthesia revealed that the Palmer-Parker mobility score and Barthel Index were significantly higher in patients who had spinal anesthesia compared to general anesthesia ($p = 0.011$ and $p = 0.009$, respectively). Gender and age were not significant factors in terms of these two scoring systems (for Palmer-Parker mobility score, $p = 0.631$ and $p = 0.16$; for Barthel Index, $p = 0.5$ and $p = 0.72$). When the patients were analyzed according to lower versus higher ASA scores, there was no significant relationship between ASA score and Palmer-Parker mobility score ($p = 0.63$). However, a higher ASA score was found to be related to a lower Barthel Index score ($p = 0.02$).

DISCUSSION

With the prolongation of human life, the clinical importance of hip fractures is increasing. This is because hip fractures are associated with high mortality and morbidity, have a significant adverse effect on mobilization, have high treatment costs and a substantial majority of patients become help-dependent after treatment (4, 12, 13).

Hip fractures include collum femoris fractures, intertrochanteric fractures, subtrochanteric fractures, and femoral head fractures (14). Among these, the most common type is collum femoris fracture and its gold standard treatment approaches have been clearly identified compared to intertrochanteric fractures (14, 15). Intertrochanteric fractures, which are the second most common type, are classified into two groups as stable and unstable fractures according to the Evans-Jensen classification (Figure 1). In this classification, the fracture line starts from the trochanter major and extends to the inferomedial part, but posteromedial cortex, lateral cortex, and trochanter minor are spared and in stable fractures (16). Many clinical studies reported that osteosynthesis is the ideal treatment for stable intertrochanteric fractures (17). Again, according to Evans-Jensen's classification, unstable fractures include loss of lateral cortex unity, comminuted posteromedial cortex, displaced trochanter minor, and reverse oblique fractures with fracture line extending from medial cortex to lateral and distal (16). Osteosynthesis and arthroplasty are treatment choices in unstable intertrochanteric fractures and few studies compared both interventions in terms of patient mobility, return to daily life, and quality of life (17, 18).

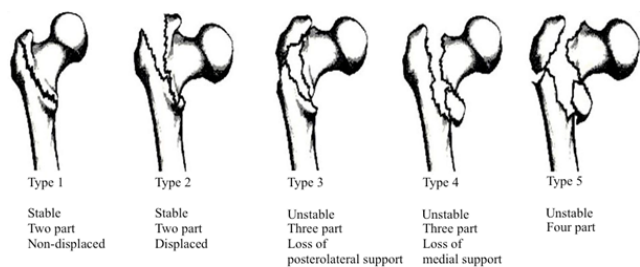


Figure 1. Evans-Jensen Classification

Palmer-Parker compared their own mobility score to mental scoring in order to estimate mortality in patients with a proximal femoral fracture (10). In this mobility scoring system; the patient's ability to perform activities such as mobilization at home, going out of the house, going shopping, and the need for assistance for these activities were taken into account (Table 3). Although they defined the mobility test to be superior to the mental test in predicting 1-year mortality, the mobility test described by Palmer and Parker has been used in many studies in the functional evaluation of hip fracture patients (19, 20).

Barthel Index assesses activities such as feeding, bathing, grooming, dressing, toilet use, transfers (bed to chair and back), and functions of bowels and bladder in addition to patient mobilization (Table 4) (11). Therefore, it is a useful scoring system for the evaluation of a patient's quality of life. Its validity, reliability, and sensitivity have been shown; and its usage has been widely accepted in especially geriatric patient populations (21, 22, 23).

In this study, the Palmer-Parker mobility score and Barthel Index were compared in different surgical approaches. PFN group (Group 1) had a significantly higher Palmer-Parker mobility score and Barthel Index score when compared to cemented hemiarthroplasty group (Group 2) and cemented total hip arthroplasty group (Group 3) ($p < 0.001$) ($p < 0.001$) (Table 5). This finding is in parallel to the findings of Desteli et al., who reported higher mobility scores in osteosynthesis patients (9). They compared functional outcomes of the proximal femoral nail and cementless hemiarthroplasty in the treatment of trochanteric fractures by using the Jensen, Palmer-Parker, and EQ-5D index (9).

On the other hand, to the best of our knowledge, there is no study in the literature comparing the effects of different treatments on quality of life in a similar patient population. Cornwall et al. analyzed functional results of treatment in different types of hip fractures, and they used the Functional Independence Measure (FIM) score (24). Functional scores related to living without help were highest in the patient group of non-displaced femoral fracture and were lowest in the patient group of unstable intertrochanteric fracture (24).

Mariconda et al., in their prospective study, examined the change in daily life activities of patients who were surgically treated for hip fractures. They found no significant mobility difference in terms of fracture type or surgery type (25).

The retrospective design of the study, lack of randomization in unstable fracture subtypes when establishing treatment groups, and a small number of patients in the total hip arthroplasty group may be limiting factors in this study. Nevertheless, we believe that this study is important for current orthopedic practice as it is the first and the only study that evaluated functional level and quality of life together in unstable intertrochanteric fractures

treated by osteosynthesis with proximal femoral nail and arthroplasty. Further prospective studies should be performed in similar patient groups with longer follow-up periods.

CONCLUSION

The findings of this study suggest that osteosynthesis with a proximal femoral nail has superior short to mid-term results in terms of functionality, and quality of life compared to cemented bipolar hemiarthroplasty and cemented total hip arthroplasty treatments in patients with an unstable intertrochanteric fracture.

DECLARATIONS

Funding

None

Conflicts of Interest/Competing Interests

None

Ethics Approval

Our study was approved by the Local Ethics Committee of Istanbul University Faculty of Medicine (protocol ID: 2022/977).

Availability of Data and Material

Available upon request.

Authors' Contributions

GK: conceived and designed the analysis, contributed data and analysis tools, performed the analysis, wrote the paper. YB: conceived and designed the analysis, collected the data. MD: collected the data. GP: conceived and designed the analysis, contributed data and analysis tools. AE: conceived and designed the analysis, contributed data and analysis tools. TK: contributed data and analysis tools. MİB: conceived and designed the analysis. ÖY: conceived and designed the analysis.

Other Declarations

This study was presented as an oral presentation at the 25th National Turkish Orthopedics and Traumatology Congress.

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