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ORIGINAL ARTICLE

EVALUATION OF THE RELATIONSHIP BETWEEN HIP FRACTURES AND PRESSURE ULCERS IN PATIENTS AGED 65 AND OVER

Aybüke Yiğittürk[1], Ceydanur Sarı[1], Burakcan Bıçakçı[1], Fatima Bayer[1], Yusuf Başpınar[1], Selin Alaybeyoğlu[1], Turan Alper Demir[1], Mert Çiftdemir[2]

[1]Trakya University School of Medicine, Edirne, TÜRKİYE
[2]Trakya University School of Medicine, Department of Orthopedics and Traumatology, Edirne, TÜRKİYE

ABSTRACT

Aims: The aim of this study was to evaluate the relationship between hip fractures and pressure ulcers in patients aged 65 and over, and to determine the risk factors associated with pressure ulcer development.

Methods: Patients aged 65 and over treated for femur neck fracture and pertrochanteric femur fracture at Trakya University School of Medicine, Department of Orthopedics between January 2021 and December 2022 were included in this retrospective, cross-sectional study. Patients' age, gender, type of fracture, date of fracture, date of hospital admission, surgery date, comorbidities, medications, use of anti-decubitus mattresses, body mass index, location of pressure ulcers, grade, and Pressure Ulcer Scale for Healing scores according to the National Pressure Ulcer Advisory Panel were obtained.

Results: Pressure ulcers developed in 21 (7.6%) of the 276 patients, and multiple pressure ulcers developed in 6 (2.2%) patients. The mean preoperative waiting time was 9.1 days for patients who developed pressure ulcers. No significant relationship was found between gender, presence of comorbidities, and pressure ulcer development, including multiple ulcers. A significant relationship was found between the type of fracture and pressure ulcer development.

Conclusion: Etiology, pathophysiology, risk factors, and preventive measures against the development of pressure ulcers are well described. This study emphasizes the relationship between the type of hip fracture and the development of pressure ulcers.

Keywords: Femur neck fracture, hip fractures, pressure ulcer

INTRODUCTION

Pressure ulcers, or decubitus ulcers, are injuries to the skin or soft tissue caused by prolonged pressure on specific areas of the body. These ulcers most commonly occur in the bony regions of the body, such as the ischium, greater trochanter, sacrum, heel, lateral malleolus, and occiput (1). They often cause pain, prolonged hospital stays, increased healthcare costs, and lead to serious complications such as osteomyelitis, septic arthritis, gangrene, and sepsis (2). Given that deep tissue injuries take an average of 23 days to fully heal and 40% of pressure ulcers never heal completely, identifying and preventing the causes of these ulcers is crucial for avoiding complications in elderly patients (3).

With the increasing elderly population worldwide, the prevalence of hip fractures is increasing, especially in higher-income countries (4). Hip fractures are a serious threat to elderly patients due to reduced quality of life, dependency, disability, and mortality they cause (2, 5). The prevalence of pressure ulcers among patients suffering from hip fractures has been previously reported to be 36.1%, which highlights the need for close follow-up and meticulous wound care for such patients (2).

Address for Correspondence: Aybüke Yiğittürk, Trakya University School of Medicine, Edirne, TÜRKİYE
e-mail: aycsbb99@gmail.com
ORCID iD of the authors: AY: 0009-0002-8504-9702; CS: 0009-0002-4232-7960; BB: 0009-0009-7426-4192; FB: 0009-0001-8931-422X; YB: 0009-0002-6665-3322; SA: 0009-0009-8058-7975; TAD: 0009-0001-9272-5396; MÇ: 0000-0002-9677-2819
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Considering that 86% of all hip fractures occur in patients 65 years or older and the one-year mortality risk for patients who develop pressure ulcers is 2.5 times that of patients who do not, determining the risk of pressure ulcer development is important in preventing the occurrence of such complications (6, 7).

The aim of this study was to evaluate the relationship between hip fractures and pressure ulcers in patients 65 years and over and to determine the risk factors associated with pressure ulcer development.

MATERIAL AND METHODS

This retrospective, cross-sectional study was approved by the Ethical Committee of Trakya University School of Medicine (protocol code: TUTF-GOBAEK 2023/251, approval number: 11/02, date: 03.07.2023). Written consent was obtained from all 276 patients. Patients 65 years and over treated for femur neck fracture (S72.0) and pertrochanteric femur fracture (S72.1) at Trakya University School of Medicine, Department of Orthopedics between January 2021 and December 2022 were included in the study. Patients' age, gender, type of fracture, date of fracture, date of hospital admission, surgery date, comorbidities, medications, use of anti-decubitus mattresses, body mass index (BMI), location of pressure ulcers, grade, and Pressure Ulcer Scale for Healing (PUSH) scores according to the 2019 International Pressure Ulcer/Injury Guideline by the National Pressure Ulcer Advisory Panel (NPUAP) were obtained from the unit of pressure ulcer nursing follow-up forms and patient records (8). The evaluation scale from the 2019 NPUAP guideline was used to assess pressure ulcers (9).

Statistical Analysis

Data were analyzed using R version 4.2.1 (R Foundation for Statistical Computing, Vienna, Austria) software. Nominal variables were expressed as total count and percentage. Age was expressed as mean ± standard deviation. Demographic variables were evaluated with descriptive statistical tests. Chi-square test was used to evaluate the relationship between categorical variables. For continuous variables, Student's t-test was applied in cases of normal distribution, and Mann-Whitney U test was used in non-parametric distribution. Logistic regression analysis was performed to assess the comorbidities causing pressure ulcers. A p-value threshold of <0.05 was set for statistical significance.

RESULTS

A total of 276 patients were included in our study, with a mean age of 80±7.538 (65-98) years. Of these, 85 (30.8%) were male, and 191 (69.2%) were female. The mean time from fracture to surgery was 8±6.223 (0-64) days. All patients included in the study had at least one comorbidity. Patients used a mean of three different medications for their comorbidities, and polypharmacy (use of at least five medications) was present in 61 (22.1%) patients. The mean BMI was 26.71±4.44 (17-35 kg/m^2). All patients used anti-decubitus mattresses. The number of patients with femur neck fractures was 133 (48.2%), and 143 (51.81%) patients had trochanteric fractures.

Pressure ulcers developed in 21 (7.6%) of the 276 patients, and multiple pressure ulcers developed in six (2.17%) patients. A total of 34 pressure ulcers were recorded. Five (23.8%) patients who developed pressure ulcers were male, and 16 (76.19%) were female. Pressure ulcers developed most commonly in the coccyx (n=8, 22.22%). Pressure ulcer locations are shown in Table 1 and Figure 1. The median grade of pressure ulcers was grade 2 (Table 2). The mean preoperative waiting time was 9.1±4.8 (3-24) days for patients who developed pressure ulcers. The mean PUSH score was calculated as 6.9±2.68 (2-10).

Statistical analysis revealed no significant relationship between pressure ulcer development and BMI (p=0.195), multiple pressure ulcer development and BMI (p=0.49), age (p=0.344), and the number of medications used (p=0.532). Additionally, no significant relationship was found between gender, presence of comorbidities, and pressure ulcer development, including multiple ulcers (p>0.05).

Logistic regression analysis did not reveal a significant relationship between comorbidities and pressure ulcer development (p>0.05). Preoperative waiting duration was not significantly related to pressure ulcer development (p=0.219). However, a significant relationship was found between the type of fracture and pressure ulcer development (p=0.008). 16 (76.2%) patients with pressure ulcers had a femur neck fracture, and five (23.8%) patients had a trochanteric fracture. No significant relationship was found between fracture type and the development of multiple pressure ulcers (p=0.627). No significant relationship was found between preoperative waiting duration and the grade of the pressure ulcer (p=0.483). Additionally, no significant relationship was observed between BMI and the grade of the pressure ulcer (p=0.204).

Table 1: Locations of pressure ulcers.

Location of Ulcers	Number of Ulcers (n, %)
Left Scapula (5)	1 (2.77%)
Right Scapula (4)	1 (2.77%)
Left Elbow (7)	1 (2.77%)
Spine (8)	1 (2.77%)
Sacrum (9)	3 (8.33%)
Coccyx (10)	8 (22.22%)
Left Trochanter (14)	1 (2.77%)
Right Glute (15)	8 (22.22%)
Left Glute (16)	2 (5.55%)
Right Knee (19)	1 (2.77%)
Left Knee (20)	1 (2.77%)
Left Leg (22)	3 (8.33%)
Left Lateral Malleolus (24)	1 (2.77%)
Right Heel (25)	2 (5.55%)
Left Heel (26)	2 (5.55%)
Total:	**36 (100%)**

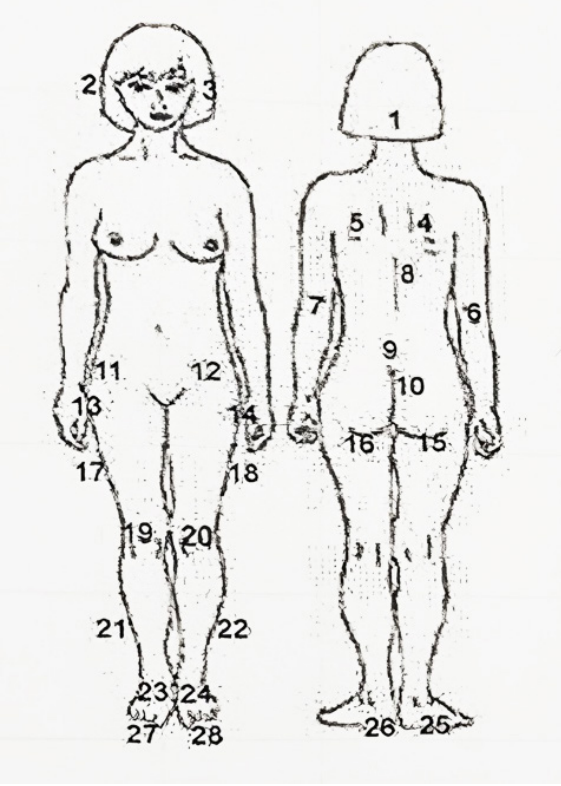

Figure 1: Pressure ulcer location diagram.

Table 2: Grades of pressure ulcers.

Grade	Number (n, %)
1	4 (11.11%)
2	16 (44.44%)
3	11 (30.55%)
4	5 (13.88%)
Total:	**36 (100%)**

DISCUSSION

The rate of pressure ulcer development in patients over 65 years of age with hip fractures has been reported as 3.8% by Haleem et al. (10), 5.15% by Galivanche et al. (11), 36.1% by Baumgarten et al. (2), and as high as 53% by Houwing et al. (12), while in our study this rate was found to be 7.6%. The variability of this rate may have been related to previously non-standardized definitions of pressure ulcers or differences in wound care practices. It has been stated by Galivanche et al. (11) that the development of pressure ulcers due to hip fractures is more common in female patients with a rate of 63.24%, and our study is in line with this statement with a rate of 76.19%. However, Tzen et al. (6) reported a predominance of male patients in their study examining the clinical risk factors of perioperative pressure ulcers.

Preoperative waiting time and consequent immobilization have been highlighted as important factors for the development of pressure ulcers. Haleem et al. (10) underline the timeframe between the fracture and surgery as the most important risk factor for pressure ulcers, reporting a mean delay of 93.9 hours in their study. The mean preoperative waiting time in our study was nine days for patients who developed pressure ulcers and eight days for those who did not. While this duration is approximately twice as long as the aforementioned time frame, the reason surgical delay was not a significant risk factor in our study may have been the implementation of preventive measures such as using anti-decubitus mattresses and changing the position of the patients frequently until surgery. Houwing et al. (12) on the other hand, highlighted the effects of prolonged surgery on the development of pressure ulcers. While our study did not investigate this parameter, it is worth noting that prolonged immobilization of any kind may pose a risk of pressure ulcer development.

We have found the type of fracture to be a significant risk factor for pressure ulcer development. While previous studies have compared the pressure ulcer development following fractures in various parts of the body, our study focused on hip fractures alone (13). Chiari et al. (5) reported that 56.6% of patients suffering from hip fractures who developed pressure ulcers had femur neck fractures. In our study, the number of patients with either type of fracture was distributed evenly. However, while our findings also suggest the majority of the patients with pressure ulcers had femur neck fractures as well, the ratio we report (76.2%) appears much higher than the aforementioned study. Although studies present in the literature do not focus on the effect of the type of hip fracture on pressure ulcer development and possible underlying reasons for this potential correlation, differences in treatment procedures might shed light on this issue. Generally, the mainstay of treatment for femur neck fractures in elderly patients is total hip arthroplasty (THA) while proximal femoral nailing (PFN), a closed intramedullary fixation method, is the frequent choice of treatment for pertrochanteric femur fractures in the same age group (14). Compared to PFN, THA is a more complex surgical procedure with more blood loss (15). On the other hand, PFN includes a smaller incision, less wound-related complications and patients in this treatment group show better results of hip joint function regarding Harris Hip Score which might be the reason that pertrochanteric femur fractures are less likely to lead to pressure ulcer development in comparison to femur neck fractures (14).

The most common sites of pressure ulcers in our study were the coccyx (22.22%) and right gluteal area (22.22%), accounting for approximately half of all pressure ulcers. Haleem et al. (10) reported that the sacral area was the most commonly affected area, accounting for more than half the cases, while these ulcers made up only 8.33% of all pressure ulcers in our study. Similarly, Baumgarten et al. (2) reported the sacrum and posterior iliac crest as the most common sites of pressure ulcers, with a rate of 47.3%. Reporting a rate of 63.9%, Chiari et al. (5) also showed

that the sacral area was the most commonly affected body region.

The majority of the pressure ulcers in our study were grade 2. Baumgarten et al. (2) have also reported grade 2 ulcers as the most common, albeit with a much higher rate (88.4%) than our study (44.44%). Lindholm et al. (13), on the other hand, reported an 87% rate of grade 1 ulcers in their study. More than 70% of all pressure ulcers developing in adult patients are superficial injuries such as grades 1 and 2, which are easier to treat. Lower-grade pressure ulcers are also less likely to cause systemic complications and are preventable (16).

BMI was not a significant risk factor for pressure ulcer development in our study, as previously reported (11, 13). Despite these findings, another study reported that obese patients had a significantly lower risk of developing pressure ulcers compared to normal-weight patients, although extreme obesity (BMI greater than 40 kg/m^2) was associated with increased risk (17). There were no patients with a BMI greater than 35 kg/m^2 included in our study, therefore, there may not have been a significantly increased risk. While age was not a significant risk factor in our study, several studies show that the risk of pressure ulcers increases with age (17, 18). It is worth noting that poor skin elasticity, weakened immune system, and lowered mobility can easily increase the pressure on the area and cause damage (18).

Study Limitations

Our limitations were the retrospective and single-center nature of this study. A larger sample size with a greater variety of patients may shed light on the results that are not in line with the current literature, such as the prevalence of pressure ulcers in hip fracture patients, sites most affected by ulcers, and length of preoperative waiting time. The length of surgery may appear as a potential risk factor, while some authors have reported otherwise. Nonetheless, the well-defined pathophysiology of the development of pressure ulcers provides clinicians with many strategies to prevent them.

CONCLUSION

Hip fractures are serious injuries for the elderly due to the morbidity and mortality they cause. Pressure ulcers are common complications of hip fractures and are challenging phenomena for patients and healthcare providers. Being aware of the risk factors associated with such complications and implementing the necessary preventive measures are important.

Footnote

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Ethics Committee Approval: *This retrospective, cross-sectional study was approved by the Ethical Committee of Trakya University School of Medicine (protocol code: TUTF-GOBAEK 2023/251, approval number: 11/02, date: 03.07.2023).*

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