Factors Predicting Pressure Injury Incidence in Older Adults Following Elective Total Hip Arthroplasty: A Longitudinal Study

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Advances in Skin & Wound Care. 35(1), p48-55.
https://doi.org/10.1097/01.ASW.0000801540.04621.57

ABSTRACT

OBJECTIVE: To identify the factors associated with pressure injury (PI) development in older adult patients who underwent elective total hip arthroplasty (THA).

METHODS: A nonexperimental longitudinal prospective study was conducted with a sample of 40 patients undergoing elective THA. Patients were evaluated for PI at hospital admission, 24 hours postsurgery, at discharge, and 1 month after surgery.

RESULTS: The incidence of PIs (category 1 or category 2) in this study was 7.9% 24 hours after surgery and 24.3% at discharge. The most common PI location was the sacrum/coccyx or the ischial tuberosity. This study found significant relationships between PIs and female sex (odds ratio [OR], 8.75), body fat mass percentage (OR, 1.15) and the motor score from a functional independence measure scale (OR, 0.89). Finally, the following variables were also associated with PIs ($P < .1$): skeletal muscle mass (OR, 0.82), lower limb with osteoarthritis weight (OR, 0.61), lower limb without osteoarthritis weight (OR, 0.62), and geriatric depression scale (OR, 1.12).

CONCLUSIONS: This work identifies those patients at higher risk of PI, enabling targeted prevention and treatment in the population of patients undergoing elective THA. The findings of this study are in line with extant literature and suggest that women with a higher percentage of body fat and less mobility had a higher risk of PI.

KEYWORDS: arthroplasty, frailty, hip, older adult, osteoarthritis, pressure injury, risk, wound care

INTRODUCTION

Pressure injuries (PIs) cause pain, decrease quality of life, and lead to significant morbidity and prolonged hospital stays.1 A PI is localized injury to the skin and/or underlying tissue, usually over a bony prominence, as a result of pressure or pressure in combination with shear.2 There are many risk factors for PI, although reduced mobility is one of the most important. Related risk factors for the development of PI include advanced age, immobility, incontinence, inadequate nutrition and hydration, neurosensory deficiency, medical devices, comorbidities, and circulatory abnormalities.3

Any PI in hospitalized older adult patients can have significant negative effects for pain, length of hospital stay, cost of care, medical complications, mortality, and rehabilitation.4,5 They are a considerable healthcare problem worldwide in relation to the detrimental effect they have on the patients' quality of life, as well as the financial burden to healthcare organizations.6

Patients with PI require significantly more nursing time, remain hospitalized for longer periods, generate higher hospital charges, are at higher risk of a nursing home stay following hospitalization, and utilize more health care resources after discharge than comparable patients without PIs.3 These injuries dramatically raise healthcare costs because of the increased need for wound care products and nursing time.

Older adults undergoing surgical replacement of the hip joint are at high risk of developing PIs given lengthy periods of immobility during and after surgery and the presence of other ulcer risk factors (age, sex, low Braden scale score, low body mass index [BMI], diabetes, surgery duration, surgical positioning [prone and park-bench position], application of external force, and the amount of blood loss).7,8 Contributing factors to the incidence of surgery-related PI in this population include surgical immobility and pain caused by prolonged pressure on the operating table; further, the use of anesthetic agents can cause a loss of muscle tone that increases pressure over bony prominences and prolonged pressure causes decreased perfusion, leading to ischemia and tissue necrosis.9

The pathogenesis of PI is a multifactorial process involving inflammatory factors, hormonal changes, reduced immune protection, impaired blood perfusion, and degenerative changes.10 Interface pressures experienced by patients lying on typical surfaces in the OR and the hospital ward are often far in excess of the 32 mm Hg required to initiate skin breakdown.11 In addition, friction and shear can occur as patients are repositioned on tables, then transported. Thus, PI are a common and sometimes serious complication in patients admitted for fractures or orthopedic elective surgery such as total hip arthroplasty (THA).5

Surgical technique is extremely important in determining implant performance and consequently in postoperative patient positioning, mobility, and PI risk.12 Two of the most commonly used approaches in Portugal are the anterolateral (modified Watson-Jones) and the posterior (Southern, Moore, Gibson, or posterolateral) approaches.13 Adduction and internal rotation after a posterior approach is avoided for at least 3 months. After anterior approach adduction, external rotation and hyperextension are avoided for 6 to 12 weeks. In both cases, patient should refrain from deep sitting with the hips flexed above 90°.14

Staff of the orthopedic inpatient unit involved in this study developed an integrated practice-based model of care.15 This model aims to provide optimal rehabilitation for patients following THA and includes (1) early rehabilitation; (2) individualized assessments and interventions focused on the patients' remaining abilities; (3) assessments for dementia, delirium, and depression within the first 3 days of admission to rehabilitation; (4) patient-centered goals that involve input from patients and their families; (5) individualized rehabilitation care at the bedside if necessary; (6) a focus on care strategies that minimize behavioral and cognitive symptoms related to cognitive impairment; and (7) education and support for healthcare providers and facilities to implement the model of care.

The care of hip arthroplasty patients is now characterized by shorter hospital stays and a rehabilitation phase in diverse postacute discharge settings. However, PI increase length of stay by an additional 3.5 to 5 days on average.16 Schultz et al17 reported that surgical patients with a PI had a median hospital length of stay of 16.5 days, compared with 7 days for a surgical patient without a PI. One hospital-based descriptive study found that PIs doubled the length of stay for patients undergoing hip surgery, an average increase of 10 days.18

However, few PI prevalence and incidence studies in patients undergoing THA have been carried out to assess the risk of PI development, and so there is little knowledge of the specific risk factors for this group.4,19–21 A previous retrospective study in the authors' hospital including other clinical areas and a different methodology and data collection protocol revealed that approximately one-third of all participants had high risk of PI development on admission.22 In the same study, lower Braden Scale scores (that is, a high risk of PI) were found in women, older patients, patients following emergency admission, and those with longer hospital stays hospitalized in medical units and/or with vascular problems, trauma, respiratory conditions, infection, or cardiac diseases.

A prospective observational study of unselected primary elective THA operations was carried out in five UK regions.23 In this study, the authors observed that 4.3% of patients developed a new PI because of surgery. According to the authors, these findings point to suboptimal intra- and postoperative care and may reflect a degree of nursing understaffing on orthopedic wards.

Lindgren et al24 conducted a study, methodologically identical to the present study but with a different data collection protocol, to identify risk factors associated with PI development among a mixed group of adult patients undergoing surgery, including orthopedic surgery.24 In this study the authors observed that 14.3% of the patients developed PIs during the postoperative period. The most common type was nonblanchable erythema (category/stage I). Those who developed PIs were significantly older, weighed less, and had a lower BMI and serum albumin. More women than men developed PIs. Risk factors identified in multiple stepwise regression analyses were female sex, American Society of Anesthesiologists Physical Status Classification System1 score, New York Heart Association Functional Classification1 score, and food intake.

The risk factors for PI development are well documented.2 However, the correlation between these factors and the actual cause of PIs in THA patients is not known. Accordingly, the purpose of this study was to determine whether patient-related factors involving potential periods of immobility during hospitalization are associated with PI development among older adults undergoing elective THA. The specific objectives of this work were to (1) investigate the incidence of PI during hospitalization, (2) characterize the sociodemographic and clinical variables associated with PI development after hip arthroplasty, and (3) to identify potential risk factors for the development of PI in patients admitted for elective THA.

METHODS

Study Design

A nonexperimental longitudinal prospective design was adopted to facilitate a survey of PI incidence during hospitalization and related factors in older adult patients (>60 years of age) undergoing elective THA at four time points. Data were collected on hospital admission, 24 hours postsurgery, at discharge, and 1 month after surgery. The study period was April to September 2018.

Sample and Participants

The study used a convenience sampling method, which is a nonprobability sampling technique in which participants are selected because of their accessibility.25 In this case, investigators recruited older adults undergoing elective hip arthroplasty (including cases of osteoarthritis and/or prosthesis revision) from the orthopedic inpatient unit of a public Portuguese hospital.

Participant inclusion criteria were (1) patients older than 60 years of age, with the mental capacity to give informed consent to take part in the study; (2) patients with an indication for elective THA; and (3) patients who could ambulate independently and sustain their weight partially or totally before surgery. The exclusion criteria were (1) patients who presented with disorientation and/or confusion after or during hospitalization; (2) patients who developed severe systemic complications during the hospitalization, and (3) patients with an existing PI (of any grade) on admission. Assessment of mental capacity was carried out by the research nurse using a structured interview with the patient and interview/consultation with other individuals, including family members and/or professionals who know the patient well. The Mini-Mental State Examination (MMSE) was also used in this process; the MMSE is the instrument most used in Portugal to assess cognitive impairment of older adult patients.26

Data Collection and Outcome Measures

Three research nurses with relevant clinical experience collected data on the patients included in the study. The nurses were trained on the data collection instruments and data recording before the study began. Written consent was obtained from all patients before interviewing. After the hip arthroplasty, patients who met the inclusion criteria were identified and signed informed consents to allow access to their medical records. Their medical records were coded to guarantee confidentiality.

Data were collected from the following time points:

(1) Hospital admission: demographic characteristics, clinical characteristics (comorbidities, vital signs, blood analytical data and Numeric Pain Rating Scale [NPRS]), anthropometric parameters (body mass index and body composition analysis),3 and mental (MMSE and Geriatric Depression Scale [GDS]) and functional status (Functional Independence Measure [FIM] scale, Morse Fall Scale [MFS], and Braden Scale)3

(2) 24 hours postsurgery: type of anesthesia, surgery time (minutes), complications, vital signs, NPRS, postsurgery blood analytics, functional status (FIM, MFS, and Braden scales), and presence/absence of PI.3

(3) Hospital discharge: the time interval from surgery to commencing the rehabilitation program, the length of stay, complications during hospital rehabilitation, discharge location (community, institution, not discharged [ie, transferred to acute care or death]), vital signs, NPRS, mental status (GDS), functional status (FIM, MFS, and Braden scales), and presence/absence of PI.

(4) 1 month after discharge: data were collected via telephone call (NPRS, GDS, MMSE, MFS, FIM, and Braden Scale).

Ethical Considerations and Registration

The Hospital's Ethics Committee gave full ethical approval and the study was registered with the Hospital's Research Office, thus fulfilling local research governance requirements (process number 040954). Meetings were held with ward staff prior to study start. All participants gave informed consent before inclusion in the study. They were assured that there was no obligation to take part and that their care would not be affected if they declined. The procedures followed were in accordance with the ethical standards of the responsible committee on human's experimentation and with the Helsinki Declaration of 1975 as revised in 2000. All data were confidential and kept securely in locked filing cabinets and password-protected computers.

Data Analysis

Descriptive statistics were used to describe patients' sociodemographic characteristics and distribution of the number of PIs. Quantitative variables were expressed in mean ± SD, and qualitative variables are expressed in absolute (N) and frequency (%) values. For each scale (NPRS, GDS, MMSE, Braden Scale, MFS, and FIM: motor and cognitive scores), a single factor within participants' analysis of variance was applied (one-way analysis of variance with repeated measures), with the evaluation moment (timepoint) as the within-participant factor (M0: on admission, M1: 24 hours after surgery, M2: at discharge, and M3: at 1 month follow up). The analysis of variance assumptions of residual normality (Kolmogorov-Smirnov test) and sphericity assumption (Mauchly test) were validated. In one case, the sphericity assumption was not verified, and the Epsilon of Huynh-Feldt correction for sphericity was used. Multiple comparisons were established using a Bonferroni correction procedure.

To identify risk factors in patients with PIs, a binary logistic regression model was used. Then, the unadjusted odds ratio (OR) and the corresponding 95% confidence interval (CI) were calculated for the univariate model. The Homer and Lemeshow test presented goodness-of-fit adequacy for the univariate models. All statistical analyses were performed using SPSS Software (SPSS v 21.0, Inc, Chicago, Illinois) and P values under .05 were considered significant.

RESULTS

Of a total of 44 patients admitted for THA during the study period, only 42 patients met the inclusion and exclusion criteria (2 patients were younger than 60 years). Accordingly, 42 patients were consented and entered into the study. During hospitalization, one patient developed severe systemic complications and one patient presented with disorientation/confusion, leaving a total sample of 40 patients.

Patient Characteristics

Table 1 presents the sociodemographic characteristics of participants. Overall, 57.5% were men, with a mean age of 67.4 ± 9.0 years, and the majority were younger than 75 years (75.0%). A high proportion of patients were classified as overweight (BMI ≥ 25 kg/m2; 31 patients [79.5%]). Regarding body composition, the mean mass of body fat and skeletal muscle were 37.0% ± 10.7% and 22.3% ± 6.3%, respectively.

Generally, patients had 2.2 ± 1.5 comorbidities, the most common being hypertension, type 2 diabetes mellitus, dyslipidemia, and hypercholesterolemia, affecting 67.5% (n = 27), 30.0% (n = 12), 25.0% (n = 10), and 20.0% (n = 8), respectively. With respect to fasting blood glucose levels, 60.0% (n = 24) of the studied patients had higher ranges, which relates to the prevalence of type 2 diabetes mellitus in the study group. Clinical laboratory data results showed that most of the patients were within normal range, except for hemoglobin. Anemia, as defined by a hemoglobin level below 13.5 g/dL for men and below 12.0 g/dL for women, was present in 22.7% (n = 5) of men and 25.0% (n = 4) of women. The THA surgeries lasted on average 95.6 ± 27.5 minutes, and the average blood loss during surgery was 475.0 ± 152.9 mL.

Between admission (M0) and 1 month after discharge (M3), the pain intensity (NPRS) and cognitive impairment values significantly decreased (P < .001; Table 2). The risk of PI increased after surgery but returned to baseline values at discharge and 1 month follow up (P < .001). The risk of falling (MFS) increases after surgery and at discharge but decreased at 1 month follow up (P < .001). Last, motor capacity drastically decreased after surgery, but recovered to the baseline values at subsequent timepoints (P < .001). No significant changes were observed in GDS or cognitive score.

Pressure Injury Patients

Table 3 shows the distribution of the number of PIs for patients after THA 24 hours after surgery and at discharge. Three patients developed a PI 24 hours after surgery (cumulative incidence, 7.9%), and nine presented with a PI at discharge (cumulative incidence, 24.3%). In the first assessment (24 hours after surgery) all the PIs were stage 1 (n = 3) and in the second assessment (at discharge), six (75.0%) of the PIs were classified as stage 1 and three (25.0%) as stage 2. In both assessments, the most commonly affected anatomic locations were the sacrum/coccyx and ischial tuberosity.

The relationships between the study variables (sociodemographic, clinical, hospitalization, surgery, and scales scores at admission) and PIs at discharge are presented in Table 4. In the univariate model, significant relationships associated with PI incidence at discharge were found for women (OR, 8.75; 95% CI, 1.49-51.50), body fat percentage (OR, 1.15; 95% CI, 1.04-1.27) and the motor score from the FIM scale (OR, 0.89; 95% CI, 0.81-0.99). Women had a risk of developing PIs 8.75 times greater than men, and the risk associated with body fat percentage increased by 15% for each unit added. For the motor score, for each unit added, the risk decreased by 11%.

Despite its nonsignificance (higher than $P > .05$ but less than $P < .1$), it is worth mentioning the following variables associated with decreased PI risk: an increase in skeletal muscle (OR, 0.82; 95% CI, 0.68-1.00), the lower limb (that will be operated on) with osteoarthritis weight (OR, 0.61; 95% CI, 0.35-1.07), and the lower limb (the nonsurgical limb) without osteoarthritis weight (OR, 0.62; 95% CI, 0.34-1.11). Finally, an increase in GDS increased the risk of for PI (OR, 1.12; 95% CI, 1.00-1.27).

DISCUSSION

The patients included in this study were mostly men older than 75 years and classified as overweight. Patients had, on average, more than two diagnosed comorbidities, and hypertension and type 2 diabetes mellitus were most prevalent. This is similar to previous studies19,27,28 and confirms that the patients in this study were similar in nature to those with osteoarthritis in other countries.

The risk of PI increased after surgery but eventually returned to baseline values. According to Ueno et al,8 patients undergoing surgery are at high risk for developing PIs and these are a major problem associated with increased morbidity in immobile patients following major surgery such as hip arthroplasty.

An overall PI prevalence of 18.1% was noted in a 2007 European pilot survey undertaken by the European Pressure Ulcer Advisory Panel, which included 5,947 hospital patients located in several countries.2 The International Pressure Ulcer Prevalence survey found hospital PI prevalence varied from 8% to 14% in hospital units and incidence varied from 3% to 5%.29The incidence of PIs in this study was 7.9% 24 hours after surgery and 24.3% at discharge. In earlier studies, the incidence of PIs among older adult hip arthroplasty patients ranged from 4.3% to 14.3%.23,24 According to Baumgarten et al,4 the broad range of incidence estimates is doubtless because of differences in study setting, time period, patient population, and PI assessment tools.

The higher incidence of PIs at discharge may be attributable to methodologic factors (different assessment timepoints in the different studies), but it is strange that the incidence increases when the patients are more independent. This may be related to the fact that the risk is greater for seated individuals than for those receiving care lying down in bed.30 This is because of the relatively small surface area absorbing high pressure when seated.2,31 Therefore, it is recommended to reduce the duration of sitting to less than 2 hours at any one time.30

If pressure is not evenly distributed, it is the point of pressure (ie, the pressure applied on a specific area of the body) that causes damage. When seated, the contact area is much smaller than when lying in bed, so the risk of PI development is increased. The same amount of force applied to a small area, when compared with a bigger area, will result in greater pressure. For an individual in a seated position, the force pressing on the surface is the weight of the individual.

In addition, the shape of the pelvis when seated may have an effect: the ischial tuberosities are approximately 7 to 8 cm below the next bony structure, the trochanters, increasing the effect of pressure. The ischial tuberosities, buttocks and thighs support the weight of the body, such that if an individual is left in a seated position for a prolonged period of time, it is in these areas that PI will primarily develop.31

Repositioning patients is an important component in the prevention of PIs and involves moving the individual into a different position to remove or redistribute pressure from a particular part of the body. Accordingly, patients after THA are encouraged to alternate periods when they are sitting with periods of walking and should use pressure redistribution surfaces.

The most frequent location of PIs in this study was the sacrum/coccyx or the ischial tuberosity on the opposite side from the THA site. These areas of injury are in accordance with those described by Bartley and Stephen;31 the most common sites for PI development when seated in an upright position include the ischial tuberosities, coccyx, greater trochanter, bony prominences of the spine, scapula, heels, elbows, back of the head, and back of the knees.

As already mentioned, remaining seated for extended periods of time increases the risk of PI development over the buttocks, as the soft tissue in this area is squashed between the seat and the bones of the pelvis.32 Performing a THA changes the way patients sit, overloading the ischial tuberosity on the contralateral side from the surgical site. This overload is usually because of pain in the operation site, causing the patient to relieve that buttock and overload the other.28 There are custom designed gel and pneumatic wheelchair cushions that may help to distribute the load more evenly and help prevent PI formation.

Another factor related to the development of PI in patients undergoing surgical intervention is skin hydration. Hydration plays a vital role in the preservation and repair of skin integrity because it has a direct effect on the elasticity and health of the skin. Dehydration can sap the skin of important fluids, vitamins, nutrients, and oxygen, increasing the risk of PI and slowing healing if a patient does develop an injury.33 Adequate fluid intake is necessary to support blood flow to wounded tissues and prevent additional breakdown.

Any THA is a large and aggressive surgery during which the patient loses a large amount of blood. This fact, combined with the pause in the food intake (NPO) necessary for the surgery, can lead to dehydration. Postoperative fluid management plays a key role in providing adequate tissue perfusion, stable hemodynamics, and reducing morbidities related with hemodynamics such as PIs.34

Further, about a quarter of this sample had anemia prior to surgical intervention. Anemia is a condition in which the body lacks sufficient red blood cells to supply oxygen to body tissues. The changes in oxygen dissociation-curve seen with anemia affect the risk for tissue ischemia and may contribute to PI development.10

Another possible factor related to the development of PI is the presence of inflammation as measured by inflammatory markers after the surgery, although these were not obtained in this study. Operative injury to the body from all procedures causes a stereotypical cascade of neuroendocrine, cytokine, myeloid, and acute phase responses that can influence PI development.

This response is typically monitored by observing cortisol, interleukin-6, white cell count, and C-reactive protein levels.35

Several of the intrinsic factors that were examined in this study were significantly associated with PI incidence at discharge. This study found differences by sex, body fat, and values in the motor score of the FIM scale. These researchers conclude that women are more likely to develop PI than men. These results are consistent with those of a previous retrospective study in the same hospital, which revealed differences in Braden Scale score by age, sex, admission, specialty, length of stay, and diagnosis.22 However, the authors found other studies in which patient sex was not associated with an increased PI risk.36,37

According to Ness et al,38 obesity is a significant and independent risk factor for PI development. In their study, overall PI prevalence was 6.9% and was significantly higher in the underweight and morbidly obese groups (underweight 12.7%, healthy weight 7.8%, overweight 5.7%, obese 4.8%, morbidly obese 12%; $P = .001$). Inpatients with morbid obesity had over three times the odds of developing a PI compared with patients of healthy weight (OR, 3.478; 95% CI, 1.657-7.303; $P = .001$).

Another result of this study was that patients with higher values in the motor score of the FIM scale had a lower risk of developing a PI. Risk factors for PIs include activity and mobility restrictions, malnutrition, diminished capillary perfusion, and increased skin moisture.2 Immobilization and lying in bed for extended periods of time contribute to the development of PIs.29 In particular, THA can contribute to reduced mobility, leading to increased susceptibility for PI.8 Therefore, it is expected that patients with greater mobility before surgery will maintain this capacity after surgery and thus be less likely to develop PI.

Prevention of PIs is a priority for providers and healthcare organizations throughout the world, and a key factor in PI prevention and management is individual nurse decisionmaking.39 Nurses hold the most responsibility for the prevention and management of PIs, although it is a multidisciplinary problem. It is nurses' primary responsibility to maintain skin integrity and prevent complications. Recognizing patients at risk of developing a PI on admission is an essential part of the prevention care pathway.3

Limitations

The principal limitation of the present study was the relatively small study population. The hospital ward where the study was conducted has patients undergoing emergency and elective surgery. In the period in which the study was conducted, there was an increase in emergency admissions (e.g. due to trauma), which reduced beds available for elective surgeries such as THA.

Another limitation is related to surgical technique, which could lead to a different positioning during and after surgery. Because this information was not recorded, the authors could not ascertain whether patients developed a PI because of the surgical technique used.

An additional limitation of this study is that it included a very select group of patients who underwent elective ambulatory THA and had no postoperative adverse outcomes such as delirium or systemic complications. Patients undergoing surgery for a hip fracture tend to be older and have more comorbidities than patients choosing elective THA, and including these patients could have affected the outcome,40,41 in particular because the complication most common in patients with hip fractures is PI (8.8% to 55%).42 Further, patients with delirium may require longer stays, have an increased incidence of dementia, and have more hospital-acquired complications such as falls and

PIs.43 Ultimately, the results were very specific to the identified clinical question, and the authors did not include some variables that could increase the incidence of PIs.

CONCLUSIONS

Patients after THA constitute an important group to target for PI prevention in hospitals. This study provides important trends and data that should help nurses implement measures to prevent PIs in patients undergoing THA. Approximately one-quarter of THA patients developed an PI between surgery and discharge. The findings suggest that men with a higher percentage of fat mass and better motor skills had a lower risk of PI.

Regular skin inspections should be carried out and, where possible, patients should be moved or repositioned to prevent pressure build up over at-risk areas and redistribute surface pressure. Special attention should be paid to women with lower BMIs and less mobility.

Questions remain about the chronicity of PIs that arise in the first few days following THA and the degree to which they influence long-term outcomes. Further prospective studies are needed in which patients are followed for up to 1 year after surgery to evaluate the impact of PIs on functional recovery, quality of life, and cost of care.

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TABLES & FIGURES

Table 1.

PATIENT CHARACTERISTICS

Sociodemographic Characteristics	**n (%)**
Sex	
Male	23 (57.5)
Female	17 (42.5)
Age, y	67.4 ± 9.0
≤65	16 (40.0)
66-74	14 (35.0)
≥75	10 (25.0)
Education level	
Low (≤4 y)	33 (82.5)
Moderate (5-12 y)	5 (12.5)
High (>12 y)	2 (5.0)
Marital status	
Married/civil union	28 (70.0)
Widowed/divorced	12 (30.0)
Household	
Lives alone	6 (15.0)
Lives with family	34 (85.0)
Residence area	
Rural	30 (75.0)
Urban	10 (25.0)
Body mass index, kg/m^2	28.8 ± 4.6
Underweight (<18.5)	1 (2.6)
Normal (18.5-24.9)	7 (17.9)
Overweight (≥25)	31 (79.5)
Body composition	
Fat mass, % (n = 35)	37.0 ± 10.7
Fat-free mass, % (n = 35)	63.0 ± 10.7
Skeletal muscle mass, kg (n = 35)	22.3 ± 6.3
Lower limb with osteoarthritis weight, kg (n = 31)	7.3 ± 1.9
Lower limb without osteoarthritis weight, kg (n = 31)	7.5 ± 1.9

Table 2.

CLINICAL SCALES RESULTS OF PATIENTS AFTER THA

Scale, M ± SD	M0	M1	M2	M3	Statistical and MC Results	*P*
NPRS (n = 30)	3.7 ± 2.2	2.0 ± 2.2	2.5 ± 1.9	1.4 ± 1.9	F(3;87) = 8.4; MC: M0 = M2; M1 = M2 = M3	<.001
GDS (n = 32)	8.8 ± 6.4		8.6 ± 7.2	7.3 ± 6.2	F(2;62) = 2.1; MC: M0 = M2 = M3	.131
MMSE (n = 32)	26.1 ± 2.9			23.53 ± 4.2	F(1;31) = 19.4; MC: M0;M3	<.001
Braden Scale (n = 32)	19.1 ± 1.7	14.7 ± 1.1	18.0 ± 1.7	19.2 ± 1.7	F(3;93) = 73.4; MC: M0 = M3; M1; M2	<.001
Morse Fall Scale (n = 32)	42.8 ± 16.9	53.0 ± 14.2	68.1 ± 11.6	46.4 ± 13.6	F(3;93) = 23.9; MC: M0 = M3; M1; M2	<.001
FIM motor score (n = 32)	83.0 ± 8.3	33.1 ± 4.1	55.2 ± 12.9	77.6 ± 9.0	F(3;93) = 238.8; MC: M0; M1; M2; M3	<.001
FIM cognitive score (n=32)	34.3 ± 2.1	34.6 ± 1.5	34.7 ± 1.1	34.4 ± 2.0	F(2.3;70.6)[a] = 1.0; MC: M0 = M1 = M2 = M3	.392

Abbreviations: FIM, Functional Independence Measure; GDS, Geriatric Depression Scale; M0, admission; M1, 24 h after surgery; M2, discharge; M3, 1 month follow up; MC, multiple comparisons; MMSE, Mini-Mental State Examination; NPRS, Numeric Pain Rating Scale.
[a]Huynh-Feldt epsilon.

Table 3.

DISTRIBUTION OF THE NUMBER OF PRESSURE INJURIES FOR PATIENTS AFTER THA

Variable, n (%)	24 h after surgery (n = 38)	At discharge (n = 37)
Skin assessment tool		
Without pressure injury	35 (92.1)	28 (75.7)
With pressure injury	3 (7.9)	9 (24.3)
Pressure injury anatomic location		
Spinous process	0 (0.0)	1 (6.3)
Sacrum/coccyx	3 (50.0)	9 (56.3)
Ischial tuberosity	3 (50.0)	4 (25.0)
Other	0 (0.0)	2 (12.5)
Total	6 (100)	16 (100)
Pressure injury category		
I	6 (100.0)	12 (75.0)
II	0 (0.0)	4 (25.0)

Table 4.

RELATIONSHIPS BETWEEN STUDY VARIABLES AND PRESSURE INJURIES AT DISCHARGE

Sociodemographic Data, n (%)	Without Pressure Injury	With Pressure Injury	Univariate Analysis	
			Odds Ratio	95% Confidence Interval
Sex, n (%)				

Male	20 (71.4)	2 (22.2)	1	-
Female	8 (28.6)	7 (77.8)	8.75	1.49-51.50
Age, y (mean ± SD)	67.0 ± 9.9	70.2 ± 5.5		
≤ 65	12 (42.9)	2 (22.2)	1	-
66-74	9 (32.1)	4 (44.4)	2.67	0.40-17.9
≥ 75	7 (25.0)	3 (33.3)	2.57	0.34-19.34
Clinical data, mean ± SD				
Body mass index, kg/m^2	28.2 ± 4.3	31.1 ± 5.7	1.14	0.96-1.36
Body composition				
Fat mass, %	33.2 ± 4.3	45.9 ± 10.9	1.15	1.04-1.27
Skeletal muscle mass, kg	23.9 ± 6.5	18.2 ± 3.6	0.82	0.68-1.00
Lower limb with osteoarthritis weight, kg	7.7 ± 2.0	6.2 ± 1.2	0.61	0.35-1.07
Lower limb without osteoarthritis weight, kg	23.9 ± 6.5	18.2 ± 3.6	0.62	0.34-1.11
Hospitalization and surgery data, mean ± SD				
Surgery time, min	99.0 ± 29.2	89.4 ± 21.1	0.99	0.95-1.02
Period between surgery and beginning of rehabilitation, h	82.5 ± 32.9	75.3 ± 29.7	0.99	0.97-1.02
Scales scores at admission, mean ± SD				
Numeric Pain Rating Scale	3.4 ± 2.1	4.4 ± 2.2	1.28	0.88-1.87
Geriatric Depression Scale	7.9 ± 5.6	12.7 ± 7.5	1.12	1.00-1.27
Mini-Mental State Examination	26.3 ± 2.7	26.0 ± 3.5	0.96	0.74-1.24
Braden Scale	19.0 ± 1.6	18.7 ± 2.0	0.88	0.56-1.38
Morse Fall Scale	43.4 ± 17.2	43.3 ± 15.4	1.00	0.96-1.07
Functional Independence Measure: motor score	85.6 ± 5.4	78.2 ± 11.8	0.89	0.81-0.99
Functional Independence Measure: cognitive score	34.4 ± 1.7	34.0 ± 2.6	0.90	0.63-1.27

Note: Other nonsignificant variables: household, residence area, diabetes mellitus type 2, hypercholesterolemia, depression, anesthesia type, blood transfusion.