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Clinical characteristics of the postoperative course after total hip arthroplasty in patients with different body mass indexes

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This article was written with the aim of comparatively studying the clinical characteristics of the postoperative course after total hip arthroplasty in patients with normal and increased body mass index (BMI). The study included 106 patients who underwent total hip arthroplasty. The patients were divided into three groups according to BMI: 50 patients with normal BMI (Group I), 24 patients with increased BMI (Group II), and 32 patients with obesity (Group III). In terms of intraoperative blood loss, patients with higher BMI had a more severe course, with a statistically significant increase in blood loss volume. According to the WOMAC questionnaire, assessing pain, stiffness, and functional status, patients in Group I showed significantly better outcomes compared to Groups II and III. It can be concluded that body weight correction is an important factor for achieving a favorable postoperative course following total hip arthroplasty. According to WOMAC scores, patients with normal BMI demonstrated significantly better outcomes in terms of pain, stiffness, and functional status compared with overweight and obese patients. Although a low rate of postoperative complications such as surgical site infection and neurological complications was observed across all groups, no definitive conclusions regarding the relationship between BMI and infection risk could be drawn due to the limited number of events. In conclusion, increased BMI may be associated with less favorable postoperative outcomes after total hip arthroplasty. The findings suggest that higher body weight is linked to prolonged operative course and poorer functional recovery; however, further prospective studies are required to confirm these associations.

Keywords: *Osteoarthritis, total hip arthroplasty, quality of life, blood loss, thrombosis, postoperative complications*

INTRODUCTION

Osteoarthritis (OA) is a degenerative joint disease, which is prevalent among the elderly population (Garofalo et al., 2025). According to the Prevalence Trends of Site-Specific Osteoarthritis From the Global Burden of Disease Study 2019, prevalent cases of OA increased by 113.25% over a 10-year period, from 247.51 million in 1990 to 527.81 million in 2019 (Fan et al., 2023).

The role of existing inflammasomes may be intricately linked to inflammatory responses and promote synovitis along with osteoclast differentiation and osteoclastogenesis within the joint, thereby underlying a distinctive pathophysiological pathway of hip osteoarthritis (Oprisan et al., 2024).

Total hip arthroplasty (THA) is used in the treatment of advanced hip joint arthritis and is one of the most commonly performed orthopedic procedures in adults (Ferguson et al., 2018).

Total hip arthroplasty is generally regarded as a safe and effective surgical procedure with satisfactory clinical outcomes. However, venous thromboembolism, including deep vein thrombosis and pulmonary embolism, poses a serious threat to patients and significantly reduces quality of life (Khatkar et al, 2022).

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Table 1. Distribution by gender and place of residence.

Indicator	Normal BMI(n=50)		Overweight (n=24)		Obesity (n=32)	
	n	%	n	%	n	%
Male	27	54.0	10	41.7	9	28.1
Female	23	46.0	14	58.3	23	71.9
Urban residence	27	54.0	13	54.2	16	50.0
Rural residence	23	46.0	11	45.8	16	50.0

One of the current challenges facing surgeons is determining which types of sports patients can safely engage in after surgery and what level of physical activity is appropriate. Given that arthroplasty is increasingly performed in younger patients, expectations regarding return to physical activity are correspondingly higher (Crawford et al., 2021).

Complications occurring after total hip arthroplasty negatively affect the overall clinical condition and quality of life of patients (LaValva et al., 2024).

Thus, considering the high incidence of complications following total hip arthroplasty, the study of the postoperative course in patients with different BMI levels remains a relevant issue.

Aim of the study: The aim of this study was to comparatively investigate the clinical characteristics of the postoperative course after total hip arthroplasty in patients with normal and overweight.

MATERIALS AND METHODS

The study included 106 patients who underwent total hip arthroplasty. According to the World Health Organization classification, patients with BMI 18.5-24.9 kg/m^2 were included in group I – 50 (47.2%) patients (normal BMI), patients with BMI 25.0-29.9 kg/m^2 in group II – 24 (22.7%) patients (overweight) and patients with BMI ≥ 30.0 kg/m^2 in group III – 32 (30.2%) patients (obesity) (Zierle-Ghosh and Jan, 2026).

The gender and place of residence of the 106 patients included in the study were analyzed by research groups (Table 1).

The number of both males and females in Group I was statistically significantly higher compared to Group III (χ^2=5.30, p=0.0213, p<0.05). Excess body weight or abnormalities in weight-height parameters are assessed using a universal indicator – the body mass index (BMI), also known as the Quetelet index.

To assess quality of life in the postoperative period, the WOMAC (Western Ontario and McMaster Universities Osteoarthritis Index) questionnaire was used among patients (Kim et al., 2020).

During surgery, the duration of the operative procedures üas recorded for each patient. Besides, postoperative thromboprophylaxis duration and intraoperative blood loss volume were evaluated and compared between study groups.

Intraoperative blood loss was measured in milliliters for all patients. Excessive blood loss was defined as blood exceeding 500 mL and / or requiring blood transfusion.

All patients received postoperative thromboprophylaxis with low-molecular-weight heparin beginning 12 hours after surgery and continuing through hospitalization.

Statistical analysis was performed using BioStat 2009, Statistica 6.0, Microsoft Excel 7.0, and Statgraphics 5.1 software. The normality of data distribution was assessed using the Shapiro–Wilk test. Variables with normal distribution were analyzed using Student's t-test, while non-normally distributed variables were compared using the Mann–Whitney U test. Categorical variables were compared using the χ^2 test. Statistical significance was accepted at p<0.05 (Qafarov, 2021).

RESULTS AND DISCUSSION

The duration of surgery and the length of hospital stay in the postoperative period were analyzed across the study groups (Table 2).

Statistically significant differences were also identified between the groups in terms of the duration of surgery. Specifically, in Group III (157.0±3.07 minutes), the duration of surgery was significantly longer compared to Group I (145.5±2.41 minutes) (t=2.94, p=0.0043). No

statistically significant differences were found between Groups II and III, as well as between Groups I and II. Thus, the presence of obesity had a negative impact on the duration of surgery. In particular, the surgical procedure lasted significantly longer compared to patients with normal BMI, while the difference compared to overweight patients was not statistically significant.

The average length of hospital stay was also analyzed across the groups. It was found that although the mean hospital stay was longer in Group III (6.8±0.24 days), no statistically significant differences were observed compared to Group I (6.5±0.21 days) and Group II (6.6±0.28 days) (Table 3).

As shown in the table, the duration of the surgical procedures was assessed in all three groups. Significant differences were observed between the groups. The duration of the surgery was significantly longer in overweight and obese patients compared with patients having normal BMI.

Differences in the duration of surgery were statistically significant between the groups. Specifically, the duration was significantly longer in Group II compared to Group I ($t=2.39$, $p=0.0196$, $p<0.05$), in Group III compared to Group I ($t=7.42$, $p<0.05$), and also in Group III compared to Group II ($t=7.42$, $p<0.05$).

Postoperatively, all patients received thromboprophylaxis. Statistically significant differences were identified between the groups regarding the duration of prophylactic measures. The shortest duration of thromboprophylaxis was observed in Group I (7.1±0.07 days), while the longest was in Group III (8.6±0.06 days). Compared to Group I, the duration was significantly longer in Group II ($t=3.67$, $p=0.005$, $p<0.05$) and in Group III ($t=16.30$, $p<0.05$). Additionally, Group III had a significantly longer duration compared to Group II ($t=10.36$, $p<0.05$).

Blood loss was also assessed in all three groups. The groups differed in terms of the volume of blood loss. The mean blood loss was 222.6±1.43 mL in Group I, 215.8±4.21 mL in Group II, and 229.8±3.02 mL in Group III. Some differences were statistically significant. Blood loss in Group III was significantly higher compared with Group I ($t=2.15$, $p=0.0349$, $p<0.05$) and Group II ($t=2.68$, $p=0.0097$, $p<0.05$).

Table 2. Duration of surgery and length of hospital stay in the study groups.

Indexes	Group I	Group II	Group III
Duration of surgery, minutes	145.5±2.41 (120.0-180.0)	148.5±3.23 (120.0-175.0)	157.0±3.07 (125.0-180.0)
Length of hospital stay, days	6.5±0.21 (4.0-9.0)	6.6±0.28 (4.0-9.0)	6.8±0.24 (4.0-9.0)

Table 3. Quantitative indicators of essential postoperative changes in the study groups

Groups	Duration of surgical intervention, minutes	Thromboprophylaxis, days	Mean blood loss, mL
I qroup	101.2±0.50 (92.0-107.0)	7.1±0.07 (6.5-8.0)	222.6±1.43 (205.0-238.0)
II group	103.5±0.77 (97.0-110.0)	7.5±0.08 (7.0-8.0)	215.8±4.21 (180.0-245.0)
p (1-2)	0.0196	0.0005	0.1403
t	2.39	3.67	1.49
III group	110.3±0.98 (96.0-121.0)	8.6±0.06 (8.0-9.0)	229.8±3.02 (207.0-258.0)
p (1-3)	<0.0001	<0.0001	0.0349
t	7.42	16.30	2.15
p (2-3)	<0.0001	<0.0001	0.0097
t	5.47	10.36	2.68

Table 4. Surgery-related indicators in the study groups.

Indexes	Group I		Group II		Group III	
	Abs.	%	Abs.	%	Abs.	%
Excessive blood loss complications	7	14.0	3	12.5	4	12.5
Surgical site infection	1	2.0	1	4.17	1	3.13
Neurological (nerve) complications	1	2.0	1	4.17	1	3.13

Table 5. Mean WOMAC score in study groups before and 6 months after enhanced rehabilitation measures.

Groups	WOMAC before	WOMAC 6 months later	p
Normal BMI (n=50)	62.4±8.1	18.6±5.2	<0.001
Overweight (n=24)	66.8±7.5	22.9±5.8	<0.001
Obesity (n=32)	71.3±8.9	27.4±6.3	<0.001

Complications such as intraoperative blood loss, surgical site infection, and neurological (nerve) disorders were also recorded during the surgical process. Blood loss complications were identified in 7 patients (14.0%) in Group I, 3 patients (12.5%) in Group II, and 4 patients (12.5%) in Group III. Surgical site infection was detected in 1 patient (2.0%) in Group I, 1 patient (4.17%) in Group II, and 1 patient (3.13%) in Group III (Table 4). Although previous studies have reported an increased risk of postoperative infection in overweight and obese patients, only one infection cases was observed in each study group. Therefore, no reliable conclusions regarding the relationship between BMI and infection risk can be drawn from the present study (Varacallo et al., 2026).

Neurological (nerve) complications were observed in 1 patient (2.0%) in Group I, 1 patient (4.17%) in Group II, and 1 patient (3.13%) in Group III. As can be seen, all complications were recorded at a relatively low frequency, particularly among patients with normal BMI.

The results of the WOMAC questionnaire were collected from patients in all three study groups, and after statistical processing, the mean values were analyzed in terms of pain, stiffness, and functional parameters (Aprato et al., 2011).

The lowest mean pain score was observed in Group I (26.8±1.34), while the highest was recorded in Group III (49.8±1.64). Differences in pain scores between all three groups were statistically significant. The mean pain score in Group II was significantly higher compared to Group I ($t=2.81$, $p=0.0063$, $p<0.05$), in Group III compared to Group I ($t=10.37$, $p<0.05$), and in Group III compared to Group II ($t=7.47$, $p<0.05$).

Similarly, statistically significant differences were observed between the groups regarding stiffness. The highest mean stiffness score was found in Group III (53.1±1.59), while the lowest was in Group I (31.8±0.89). Differences between all three groups were statistically significant. The mean stiffness score in Group II was significantly higher than in Group I ($t=4.29$, $p=0.0001$, $p<0.05$), in Group III compared to Group I ($t=10.15$, $p<0.05$), and in Group III compared to Group II ($t=5.30$, $p<0.05$).

Significant differences were also identified between the groups in terms of the functionality domain of the WOMAC questionnaire (Table 5).

Table shows a significant reduction in WOMAC scores 6 months after treatment across all BMI groups ($p<0.001$). Before treatment, the highest WOMAC scores were observed in the obeьity group (71.3±8.9), followed by overweight (66.8±7.5) and normal BMI (62.4±8.1). After 6 months scores decreased markedly in all groups: normal BMI (18.6±5.2), overweight (22.9± 5.8) and obesity (27.4±6.3). Despite improvement in all groups, patients with higher BM consistently higher postoperative score.

CONCLUSIONS

The study demonstrated that higher BMI is associated with a more severe postoperative course. The duration of surgery and the duration of thromboprophylaxis in the postoperative period were longer in patients with elevated BMI. Blood loss was also significantly greater in patients with higher BMI.

According to the WOMAC questionnaire, outcomes in terms of pain, stiffness, and functionality were significantly better in Group I compared to both Group II and Group III.

It can concluded that BMI associated with longer operative time is an essential factor for achieving a favorable postoperatibe course following total hip arthroplasty

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CONFLICT OF INTEREST

The author declares no conflict of interest related to this study.

AI STATEMENT

The author declares that no artificial intelligence (AI) tools were used to generate, analyze, interpret, or validate the clinical data, statistical results, or scientific conclusions presented in this study. Any AI-assisted technologies, if used, were limited to language editing, grammar correction, or formatting support. The author assumes full responsibility for the accuracy, originality, and integrity of the manuscript.

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