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Original Article

Determination of Constipation Severity in Patients Undergoing Orthopedic Surgery: A Cross-Sectional Study

Aynur KOYUNCU[1], Kübra KAYA[1], Onur KAYA[2], Ayla YAVA[1]

[1]Department of Nursing, Hasan Kalyoncu University, Faculty of Health Sciences, Gaziantep, Türkiye
[2]Department of Orthopaedic and Traumatology, NCR Private Hospital Gaziantep, Gaziantep, Türkiye

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ABSTRACT

Objective: This study aimed to determine the severity of constipation in patients undergoing orthopedic surgery.

Methods: Ethical approval was obtained. The research was conducted at a state hospital in Gaziantep between August 1 and October 14, 2022. Completed the study with 80 patients meeting the sample criteria. Data were collected using the Introductory Information Form, Constipation Severity Scale, and Postoperative Constipation Severity Determination Form. The forms were administered to patients 1 day before surgery and on the third day after surgery. The data were collected through face-to-face survey method. Responses took 5-10 minutes, and the data were analyzed using SPSS 20.0. A significance level of $P < .05$ was accepted.

Results: The mean age of the participating patients was 42.29 ± 17.81 years, and the mean body mass index was 25.92 ± 4.42 kg/m^2. The preoperative Constipation Severity Scale mean scores were at a moderate level (30.28 ± 11.05). It was found that 78.8% of the patients had defecation within the first 3 days, and all patients passed gas within the first 3 days. When preoperative and postoperative constipation symptoms were compared, a statistically significant difference was determined ($P < .05$).

Conclusion: It was observed that patients undergoing orthopedic surgery were unable to fully empty their bowels despite defecating.

Keywords: Defecation, nursing, constipation, orthopedic surgery

Introduction

Constipation is defined as an abnormality in bowel functions.[1] Symptoms of constipation include decreased frequency of defecation, hard stool, incomplete emptying of the bowel, discomfort or pain in the abdomen, a feeling of obstruction during defecation, and the need for manual assistance in removing stool.[2-3] The need for excretion plays a crucial role in an individual's ability to continue life and enhance their quality of life.[4] Following surgical interventions, individuals often struggle to perform daily life activities, and bowel emptying activities are significantly affected.[5] Factors such as the inability to mobilize immediately after surgery, the need to use a bedpan to meet toilet requirements, surgical stress, dietary changes, preoperative fasting, inadequate fluid intake, and the use of opioid analgesic drugs can impact the frequency and severity of postoperative constipation.[6,7] Constipation, by increasing the risk of postoperative complications, leads to prolonged hospital stays and increased costs.[8]

Constipation is one of the common postoperative problems in patients undergoing orthopedic surgery.[9] When the literature is reviewed, the incidence of constipation in patients undergoing orthopedic surgery is reported to be between 57.9% and 65%.[10,11] Studies have reported that the risk of constipation in patients undergoing orthopedic surgery is moderately high.[6,12] Constipation continues to affect patients undergoing orthopedic surgery and increase complications.[10-12]

Diagnosing constipation and determining the severity of constipation is the most crucial factor in resolving this issue.[13] Although studies on the frequency and risk of constipation exist in orthopedic surgery patients,[7,10,14] there is a lack of research on determining the severity of constipation. Assessing the severity of constipation in patients undergoing orthopedic surgery can contribute to preventive measures for postoperative

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Corresponding author: Aynur KOYUNCU, e-mail: aynrkoyuncu@yahoo.com.tr

constipation. Constipation occurring after orthopedic surgery can negatively impact the quality of life for patients and may necessitate the development of treatment strategies. Therefore, routinely assessing the frequency and severity of constipation in orthopedic surgery patients using measurement tools can help prevent this issue from being overlooked. A study in this regard, by determining the prevalence of constipation in orthopedic surgery patients, could shed light on clinical practices related to managing this issue and contribute to improving the quality of life for patients in the postoperative period. With this study, we aimed to determine the severity of common constipation in patients undergoing orthopedic surgery.

The following hypotheses were tested in this study:

H0: There is no difference in constipation symptoms after surgery compared to before surgery in patients undergoing orthopedic surgery.
H1: There is a difference in constipation symptoms after surgery compared to before surgery in patients undergoing orthopedic surgery.

Methods

Study Design

The research is a single-center descriptive study conducted in the Orthopedics and Traumatology Clinic of Abdülkadir Yüksel State Hospital between August 1 and October 14, 2022. This study was reported using the STROBE checklist. The 2007 version of the STROBE checklist was used.

Sampling

The population of the study consisted of patients hospitalized in the Orthopedics and Traumatology Clinic of Abdülkadir Yüksel State Hospital between August 1 and October 14, 2022. The sample included 80 voluntary patients who met the sample criteria and agreed to participate in the study. The eligibility of 94 patients to participate in the study was assessed. Seven patients were transferred to another department, 4 patients were discharged after the second day post surgery, and 3 patients requiring intensive care were excluded from the study. The research was completed by analyzing the data of 80 patients. 85% of the universe has been reached.

Sample Criteria

Inclusion Criteria

- 18 years and older.
- Underwent orthopedic surgery.
- Capable of reading and writing in Turkish.
- Without a psychiatric diagnosis and not receiving medication for this reason.
- Without chronic constipation and not using medication for it.
- Mobilized in the preoperative period.
- Without dressing or bandage on the arm and hand for answering the questions.
- ASA score <III.
- Patients willing to participate in the study were included.

Exclusion Criteria

- Data of patients who, after volunteering to participate in the study, wanted to withdraw from the research at any stage were not included in the study.

Data Collection Tools

Data were collected using the "Introductory Information Form," "Constipation Severity Scale (CSS)," and "Postoperative Constipation Severity Determination Form," which contain individuals' introductory information.

Part I Introductory Characteristics Form: The initial part of the data collection form gathered information on patients' personal details, health status, lifestyle, and preoperative factors. This section, administered by the researcher in person, included inquiries about age, gender, height, weight, marital and educational status, employment, companionship, chronic illnesses, medication, surgery type, residence, dietary and exercise habits, water intake, bowel habits, anesthesia type, and last preoperative mealtime. Patients completed this section during a face-to-face session with the researcher 1 day prior to surgery.

Part II Constipation Severity Scale: The CSS, developed by Varma et al in 2008[15] and validated by Kaya and Turan in 2011[2], comprises 16 questions measuring bowel movement frequency, difficulty, and pain. The CSS includes 3 subscales: the Fecal Impaction Scale, Colonic Inertia Scale, and Pain Scale with scores ranging from 0 to 28, 0 to 29, and 0 to 16. The total CSS score ranges from 0 to 73, indicating increased symptom severity with higher scores. Patients answered CSS questions during a pre-surgery interview, obtaining permission from the authors. Cronbach's alpha values were .92 (original) and .89 (current study).

Part III. Postoperative Constipation Severity Determination Form: Researchers created a postoperative constipation questionnaire inspired by the CSS to assess frequency and severity. This survey

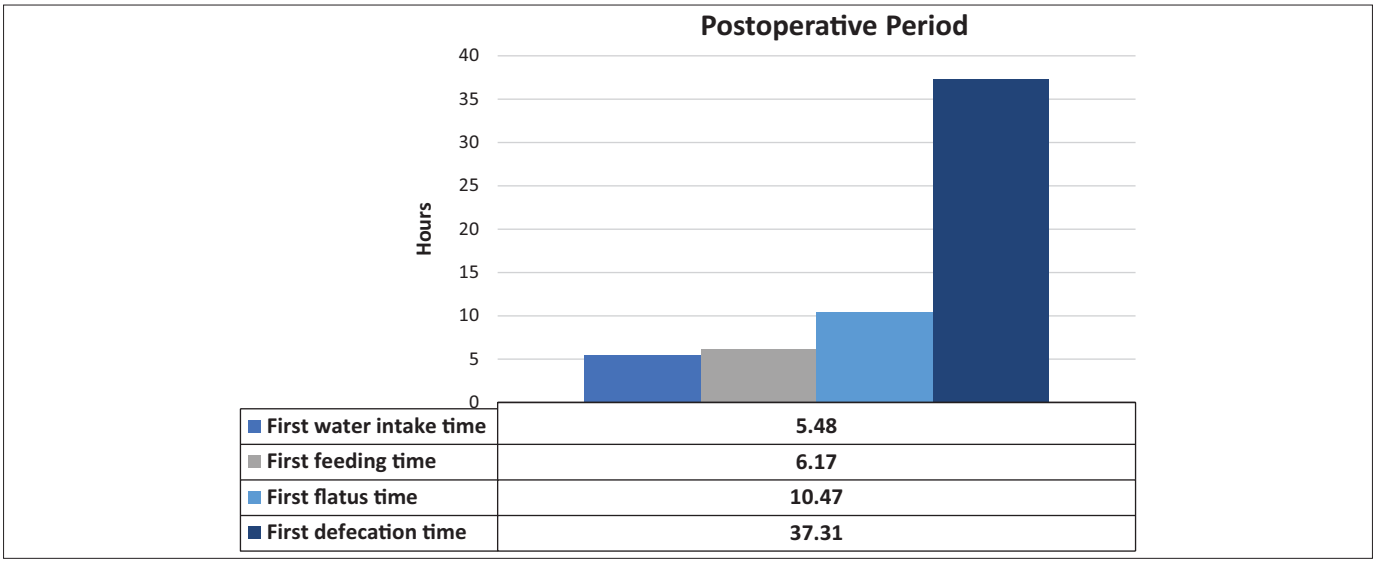

Figure 1. The times of initial water and nutrient intake, as well as the durations until the first flatus and defecation in patients after surgery (N = 80).

was constructed from the questionnaire form related to postoperative constipation.[2] Patients completed this section in a face-to-face interview on the third day after surgery. The questionnaire demonstrated a Cronbach's alpha value of .86 for constipation severity assessment.

Implementation of the Study

Patients undergoing orthopedic surgery at Abdülkadir Yüksel State Hospital were approached 1 day before and on the third day after the procedure. Data were collected through brief face-to-face interviews using a survey method lasting 5-10 minutes. Participants were verbally and in writing informed about the study's purpose, and those willing to join signed an informed consent form.

Ethical Considerations

The study received approval from Ethics Committee of Gaziantep Hasan Kalyoncu University (Approval no: 2022/058, Date: July 25, 2022) and research permission from the Provincial Health Directorate of Gaziantep (Approval no: 2022/104). After informing patients about the research, written consent was obtained, ensuring confidentiality.[16] The study adhered to ethical principles outlined in the World Medical Association Helsinki Declaration.[17]

Statistical Analysis

The statistical analysis of the data was performed using the Statistical Package for Social Sciences version 23.0 software (IBM Corp.; Armonk, NY, USA). In descriptive statistics, numbers (n) and percentages (%) were used for the representation of discrete values, while mean ± standard deviation was employed for continuous numerical values. The data were screened for normal distribution using appropriate tests (Kolmogorov–Smirnov and Shapiro–Wilk tests). For continuous variables demonstrating normal distribution, paired samples t-test and analysis of variance test were employed for comparisons. The chisquare test was used to determine the difference between categorical variables. Pearson correlation analysis was used to assess the relationship between variables. A significance level of $P < .05$ was considered for statistical significance.

Results

The mean age of the patients participating in the study is 42.29 ± 17.81, with 86.3% of the participants being under the age of 65. Of the patients, 66.3% are male, and 45% have a level of education at the high school level. Also, 56.3% of the patients received general anesthesia, and 50% underwent hip and knee surgery. The mean body mass index (BMI) of the patients is 25.92 ± 4.42 kg/m^2, with 52.5% having a BMI ≥ 26 kg/m^2. Of the patients, 33.8% have chronic diseases, and 30% use medication regularly, and 50% of the patients reported their preoperative bowel habits as 3 times a week (Table 1).

When looking at the Total and Subscale Scores of the CSS of the patients participating in the study, the mean total score of CSS for patients is 30.28 ± 11.05. The mean subscale scores are as follows: Fecal Impaction Subscale score is 14.13 ± 6.00, Colonic Inertia Subscale score is 14.04 ± 5.20, and Pain Subscale score is 2.11 ± 2.33 (Table 2).

After surgery, the average time for patients to take their first sip of water was determined to be 5.48 ± 0.56 hours, and the average time for their first nutrient intake was 6.17 ± 1.02 hours. It was found that the average time for patients to pass their first flatus after surgery was 10.47 ± 4.5 hours, and the average time for the first defecation was 37.31 ± 18.67 hours (Figure 1).

The study revealed a strong positive correlation between the time of first water intake and the time of first flatulence after surgery ($r = .883$, $P = .001$). However, no relationship was found between the time of first water intake and the time of first defecation after surgery ($P > .05$). A weak positive correlation was identified between the time of first food intake and the time of first flatulence after surgery ($r = .294$, $P = .008$). Nevertheless, there was no significant relationship between the time of first food intake and the time of first defecation ($P > .05$) (Table 3).

The average time for the first flatus after surgery among the participating patients is 10.47 ± 4.59, and the average time for the first defecation after surgery is 37.31 ± 18.67. When comparing the times of the first flatus and first defecation after surgery based on the demographic characteristics of the patients in the study, it was observed that as age increases, the duration for both the first flatus and first defecation after surgery also increases. The difference between the time of the first flatus after surgery and age was found to be statistically significant ($P = .027$, $P < .05$). The difference between the first flatus passage and the first defecation times of the patients was not statistically significant when compared with their indicative features, with $P > .05$ (Table 4).

The constipation symptoms of patients were compared before and after surgery. When comparing the inability to empty the bowels

Table 1. Descriptive Characteristics of Patients (N = 80)

Descriptive Characteristics	n	(%)
Age (mean ± SD= 42.29 ± 17.81, minimum: 18–maximum: 85)		
<65	69	86.3
≥65	11	13.8
Gender		
Woman	27	33.8
Male	53	66.3
Educational status		
Illiteracy and elementary school	30	37.5
Secondary education	36	45.0
Bachelor's degree or higher	14	17.5
Type of anesthesia		
General	45	56.3
Spinal	35	43.8
Type of surgery		
Hip surgery	12	15.0
Knee surgery	28	35.0
Tibia–fibula fracture	31	38.8
Other*	9	11.3
BMI (mean ± SD: 25.92 ± 4.42, minimum: 15.22–maximum: 42.24)		
≤25	38	47.5
≥26	42	52.5
Chronic disease status		
Present	27	33.8
Absent	53	66.3
Continuous medication use		
Yes	24	30.0
No	56	70.0
Preoperative bowel habits (weekly)		
Once	7	8.8
Twice	9	11.3
Three times	40	50.0
Four times and above	24	30.0

BMI, body mass index.
*Ankle fracture and hallux valgus.

Table 2. Mean Scores of Constipation Severity Scale Total and Subscale Scores (n = 80)

Total and Subscales	Minimum–Maximum	Mean ± SD
Stool Obstruction Subscale	0-26	14.13 ± 6.00
Colonic Inertia Subscale	2-23	14.04 ± 5.20
Pain Subscale	0-9	2.11 ± 2.33
Total Score (CS)	4-53	30.28 ± 11.05

Table 3. The Relationship Between the Time of First Flatus and Bowel Movement and the Onset of Initial Fluid and Food Intake in Patients (n = 80).

	First Flatus Time After Surgery (Hours) *r/P*	First Defecation Time After Surgery (Hours) *r/P*
First water intake time after surgery (hour)	*r* = .883, *P* = .001	*r* = .063, *P* = .579
First feeding time after surgery (hour)	*r* = .294, *P* = .008	*r* = .408, *P* = .104

Test r: Pearson correlation.

Table 4. Comparison of Postoperative First Flatus and First Defecation Times According to Patient Demographics (N=80)

Descriptive Characteristics	First Flatus Time After Surgery (Hours) Mean ± SD= 10.47 ± 4.59	Test	First Defecation Time After Surgery (Hours) Mean ± SD= 37.31 ± 18.67	Test
Age				
<65	10.02 ± 4.13	*t* = −2.261	36.54 ± 18.56	*t* = −0.910
≥65	13.31 ± 6.38	*P* = .027	43.71 ± 19.81	*P* = .392
Gender				
Woman	10.39 ± 4.71	*t* = *−0.116*	40.12 ± 15.46	*t* = 0.861
Male	10.51 ± 4.58	*P* = *.908*	36.15 ± 19.89	*P* = .394
Education status				
Unknown and primary education	11.03 ± 5.32	*F* = 0.355	40.40 ± 20.50	*F* = 1.664
Secondary education	10.16 ± 4.63	*P* = .703	38.31 ± 17.91	*P* = .198
Bachelor's and postgraduate studies	10.06 ± 2.49		28.75 ± 15.20	
Anesthesia type				
General	10.39 ± 4.83	*t* = −0.177	34.34 ± 18.86	*t* = −1.588
Spinal	10.57 ± 4.34	*P* = .860	41.76 ± 17.83	*P* = .117
Surgery type				
Hip surgery	12.20 ± 5.11	*F* = 0.674	42.00 ± 18.49	*F* = 0.879
Knee surgery	10.20 ± 4.90	*P* = .570	37.65 ± 18.49	*P* = .457
Tibia-fibula Fracture	10.23 ± 4.60		38.49 ± 18.75	
Other*	9.84 ± 2.58		28.55 ± 19.50	
BMI				
≤25	10.49 ± 4.14	*t* = 0.031	35.30 ± 19.77	*t* = −0.881
≥26	10.45 ± 5.02	*P* = .975	39.39 ± 17.55	*P* = .382
Chronic disease status				
Present	11.00 ± 5.15	*t* = 0.732	41.30 ± 18.56	*t* = 1.149
Absent	10.20 ± 4.31	*P* = .467	35.54 ± 18.66	*P* = .255
Continuous medication use				
Yes	10.87 ± 5.24	*t* = 0.512	41.52 ± 19.61	t = 1.083
No	10.30 ± 4.33	*P* = .610	35.82 ± 18.31	*P* = .283

F-ANOVA test, *t*-independent samples test.
BMI, body mass index.
*Ankle fracture and hallux valgus.

before and after surgery, a statistically significant difference was found (*P* = .012). The difficulty during defecation, as well as the discomfort due to difficulty during defecation, was both statistically significantly different before and after surgery (*P* = .004, *P* = .001, respectively). The sensation of not feeling the urge to defecate also showed a statistically significant difference before and after surgery (*P* = .001). Similarly, both anal pain and discomfort due to anal pain were found to have a statistically significant difference before and after surgery (*P* = .024, *P* = .032, respectively) (Table 5).

Discussion

The most significant finding of our study, conducted to assess the severity of constipation in patients undergoing orthopedic surgery, is that the severity of constipation symptoms has increased postoperatively compared to before surgery. Noticeable changes were observed in symptoms such as the inability to fully empty the bowels before and after surgery, difficulty in defecation and discomfort resulting from this difficulty, the absence of the sensation of defecation, anal pain, and discomfort resulting from this pain. The study highlights the problem of patients not being able to fully empty their bowels after surgical intervention, suggesting that this issue may be a commonly encountered problem in the postoperative period. The study findings revealed an increase in the severity of constipation symptoms after surgery compared to preoperative conditions. This may be attributed to postoperative mobility restrictions or immobility in patients following surgery. Understanding the changes in the severity of constipation symptoms before and after orthopedic surgery is crucial for comprehending the effects of surgical interventions on bowel functions and developing preventive measures in this regard.

It was determined that the mean total CSS score for patients participating in the study before surgery was 30.28 ± 11.05. In a study conducted by Yücel and Karadağ (2020), the mean pretreatment CSS scores of patients undergoing interventional hemorrhoid treatment were found to be 34.37 ± 15.68.[18] In a study by Arı and Yılmaz (2016), the mean preoperative CSS scores of patients were reported to be 29.6 ± 11.1.[19] The findings of the study show similar characteristics with literature reviews. In the study, it was assessed that the severity of constipation in patients before surgery was moderate. As a result of the study, it was found that the mean time for the first flatus after surgery was 10.47 ± 4.59 hours, and the mean time for the first defecation was 37.31 ± 18.67 hours. In the study conducted by Gürler et al,[11] it was indicated that the mean time for the first flatus after surgery was 5.50±8.58 hours, and the mean time for the first defecation was 30.55 ± 19.19 hours. In the study conducted by Park et al,[20] it was stated that the time to first defecation after surgery was 10.1 ± 7.6 hours. In a study by Arı and Yılmaz,[19] the mean time for the first flatus after surgery was found to be 11.0 ± 6.4 hours, and the mean time for the first defecation was 27.6 ± 14.9 hours. Literature reviews found that the

Table 5. Comparison of Patients' Constipation Symptoms Before and After Surgery (n = 80)

Seriousness	Preoperative n (%)	Postoperative n (%)	Test/*P*
Inability to empty bowels			$X^2 = 31.333$
Mild	42 (52.5)	19 (23.8)	$P = .012$
Moderate	23 (28.8)	29 (36.2)	
Severe	15 (18.7)	32 (40.0)	
Difficulty during defecation			$X^2 = 35.249$
Mild	32 (40.0)	20 (25.0)	$P = .004$
Moderate	29 (36.2)	24 (30.0)	
Severe	19 (23.8)	36 (45.0)	
Discomfort due to difficulty during defecation			$X^2 = 58.381$
Mild	31 (38.7)	12 (15.0)	$P = .001$
Moderate	36 (45.0)	34 (42.5)	
Severe	13 (16.3)	34 (42.5)	
Not feeling the urge to defecate			$X^2 = 30.278$
Mild	51 (63.8)	17 (21.2)	$P = .001$
Moderate	15 (18.7)	41 (51.4)	
Severe	14 (17.5)	22 (27.4)	
Anal pain			$X^2 = 14.557$
Mild	51 (63.8)	29 (36.2)	$P = .024$
Moderate	21 (26.2)	42 (52.5)	
Severe	8 (10.0)	9 (11.3)	
Discomfort due to anal pain			$X^2 = 22.570$
Mild	44 (55.0)	24 (30)	$P = .032$
Moderate	22 (27.5)	34 (42.5)	
Severe	14 (17.5)	22 (27.5)	

hours of patients' first defecation after surgery were consistent with the findings of the study.

In the study, it was observed that patients received water and food at the fifth and sixth postoperative hours. On average, they experienced flatus approximately 10 hours after surgery and had their first defecation around 37 hours postoperatively. A positive and significant correlation was found between the time of first water and food intake and the time of first flatus. This suggests that early oral intake of water and food after surgery may positively influence bowel functions[21] and potentially lead to an earlier initiation of flatus. However, there was no significant relationship between the time of first water and food intake and the time of first defecation. We attribute this to the cessation of food intake 1 day before surgery.

According to the results of the study, it was determined that increasing age, being female, lower educational level, undergoing surgery under spinal anesthesia, having hip surgery, higher BMI, having a chronic illness, and continuous medication use prolonged the time to the first defecation after surgery. Studies have identified a higher frequency of constipation in women compared to men.[11,22] The exact reason for this higher frequency in women is not fully understood, but it is believed to be related to a decrease in steroid hormone levels and an increase in progesterone receptors in colonic smooth muscle cells, leading to constipation.[23] In the literature, it has been determined that increasing age is associated with an increased frequency of constipation.[11] The results of this study also align with literature findings, showing that older age and female patients have longer times to the first defecation after surgery.

Some metabolic diseases, neurological disorders, spinal cord injuries, or illnesses can lead to constipation.[24] In this study, patients with chronic illnesses had later times for the first gas passage and the first defecation, which is consistent with the study findings, suggesting that these patients may be more prone to constipation. In patients undergoing hip surgery, chronic pain can develop in 7%-28% of cases postoperatively. Pain can negatively affect patients' early mobilization in the postoperative period, and the recovery of patients may be adversely affected.[25] The use of opioid/non-opioid analgesics and the use of sliding techniques for defecation within the bed due to pain in the postoperative period increase the risk of constipation in patients.[6] As a result, it is believed that the time to the first gas passage and the first defecation after surgery for these patients is longer compared to other surgical patients.

The study found that 78.8% of patients had defecation within the first 3 days after surgery.[6] In a study by Arı and Yılmaz,[18] it was determined that all patients had defecation within 72 hours after surgery.[18] In another study, 49.3% on the first and second postoperative days and 52.2% on the third day were found to have defecation.[26] This study, revealing insights into postoperative constipation severity in orthopedic surgery patients, has limitations such as a small sample size and a retrospective design, potentially limiting generalizability. Future research with larger, prospective samples can validate and explore these findings further. Specifically, investigating postoperative pain, medication use, surgery type, education level, and psychosocial factors may guide the development of more effective treatment strategies.

Conclusion

In conclusion, this study identified factors such as increasing age, female gender, lower education level, higher BMI, hip surgery, chronic illness, and continuous medication use, which contribute to delayed first defecation in orthopedic surgery patients. Most participants experienced their first bowel movement within 3 days post surgery, and all passed gas within this period. A statistically significant improvement in constipation symptoms post surgery ($P < .05$) was observed. This study highlights the importance of assessing postoperative constipation and underscores the necessity of pre- and post-surgery bowel health management, providing insights for future research and clinical applications in this area.

Ethics Committee Approval: Ethical approval for this study was obtained from the Ethics Committee of Gaziantep Hasan Kalyoncu University (Approval no: 2022/058, Date: July 25, 2022).

Informed Consent: Written informed consent was obtained from patients who participated in this study.

Peer-review: Externally peer-reviewed.

Author Contributions: Concept – A.K., A.Y., K.K., O.K.; Design – K.K., O.K., A.K.; Supervision – A.K., A.Y.; Resource – K.K., O.K.; Materials – K.K., O.K.; Data Collection and/or Processing – K.K., O.K.; Analysis and/or Interpretation – A.K., A.Y.; Literature Search – K.K., O.K., A.K.; Writing – K.K., O.K., A.K.; Critical Review – A.K., A.Y.

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