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Effect of Abdominal Massage on Constipation after Cardiac Surgery

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Abstract

Background: Although the incidence of gastrointestinal complications after cardiovascular surgery is rare, patients have been reported to experience constipation in the week following discharge.

Aim: This study aimed to investigate the effect of abdominal massage on constipation after cardiac surgery.

Methods: A prospective, randomized controlled experimental study was conducted in the cardiovascular surgery clinic of Mehmet Akif Ersoy Thoracic and Cardiovascular Surgery Training and Research Hospital between September 2022 and July 2023. A total of 130 patients were randomly assigned to the experimental or control group using a simple randomization method. Abdominal massage was performed on the experimental group, while the control group received routine care. Data were collected from the first day after surgery using a 21-item questionnaire. The first flatulence and defecation times of the patients were assessed and recorded.

Results: The mean age of the experimental group was 55.2 ± 13.3 years, while the mean age of the control group was 60.4 ± 10.6 years (P = 0.015). There was no statistically significant difference between the groups in terms of sociodemographic characteristics. Bowel sounds began earlier in the experimental group (70.8% on the first postoperative day) compared to the control group (46.2% on the first postoperative day) ($X^2 = 16.629$; P = 0.005). The first flatulence time in the control group ($\bar{x} = 46.415$ hours) was higher than in the experimental group ($\bar{x} = 31.262$ hours). Postoperative defecation time was longer in the control group ($\bar{x} = 99.51$ hours) compared to the experimental group ($\bar{x} = 61.611$ hours).

Conclusion: Abdominal massage has been shown to positively impact the prevention of constipation in patients after cardiac surgery. It is a non-invasive, easy-to-apply, and reliable method recommended for use in postoperative care.

Keywords: Abdominal massage, cardiac surgery, constipation, nursing care, patient care

Introduction

Cardiovascular diseases are among the most common causes of death globally and in Türkiye.[1,2] According to the World Health Organization (WHO) 2019 data, 17.9 million people died from cardiovascular diseases worldwide.[3] According to the Turkish Statistical Institute (TUSI) 2022 data, 35.4% of all deaths in Türkiye are due to circulatory system diseases, with 42.3% of deaths due to circulatory system diseases attributed to ischemic heart diseases and 23.5% to other heart diseases.[4] In addition to lifestyle changes and medical treatment, surgical methods hold an important place in the treatment of cardiovascular diseases, facilitated by rapid advancements in technology and knowledge.[5,6] Surgeries performed for cardiovascular diseases include coronary artery bypass graft (CABG), repair or replacement of heart valves, aneurysm repair, removal of cardiac tumors, correction of septal defects, and heart transplantation.[7,8]

During cardiovascular surgery, organ perfusion and tissue oxygenation are often impaired due to the inability to meet the organism's cardiorespiratory and metabolic requirements. In some cases, organ and system dysfunction may occur as a result of cardiopulmonary bypass.[9,10] Additionally, an increased systemic inflammatory response due to surgical trauma may arise, leading to various postoperative complications.[11] Intraoperative hypovolemia and episodes of decreased intestinal oxygenation caused by hypotension are common.[12] Gastrointestinal (GI) complications after cardiac surgery are rare but associated with high morbidity and mortality. Many GI complications present with nonspecific symptoms characteristic of a systemic inflammatory response.[13,14]

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The underlying pathophysiology of intraoperative GI injury involves splanchnic hypoperfusion during extracorporeal circulation (ECC), which may occur even in uncomplicated patients.[15] It was found that 10% of 320 patients who required intensive care due to multiple organ failure after cardiac surgery experienced mesenteric ischemia, the most severe GI complication.[16] A study reported that 77.8% of patients undergoing cardiac surgery experienced constipation within the week after discharge.[17] In another study investigating the problems experienced by patients in the hospital after coronary artery bypass grafting, 9.4% of patients were found to experience constipation.[18] Abdominal distension due to constipation after cardiac surgery can prolong wound healing and increase the risk of paralytic ileus due to decreased blood flow to the intestine. Monitoring and managing constipation is crucial to prevent these complications.[19]

Therefore, preventing constipation in patients is vital for postoperative nursing care. Various evidence-based non-pharmacological methods, such as early mobilization, consumption of fibrous foods, chewing gum, and drinking ample water, are recommended to stimulate bowel function after surgery.[19] Abdominal massage, a non-invasive and non-pharmacological method, has been used for many years and has no side effects, making it one of the most essential independent nursing practices. Abdominal massage exerts a mechanical and reflexive effect on the intestines, accelerating intestinal peristalsis through changes in intra-abdominal pressure. Manual pressure on the organs and superficial tissues in the abdominal area enhances bowel movements and gas passage.[20] Although multiple studies in different fields have reported that abdominal massage stimulates intestinal peristalsis and prevents constipation, no study was found that examined the effect of abdominal massage on gas output and defecation in patients undergoing cardiovascular surgery.[21-29] The aim of this study was to evaluate the effect of abdominal massage on constipation after cardiac surgery.

Study Hypothesis

Hypothesis 1: Abdominal massage administered after cardiac surgery reduces the time taken for first flatulence.

Hypothesis 2: Abdominal massage following cardiac surgery reduces the time taken for first defecation.

Materials and Methods

Study Design

This study used a randomized controlled design. The clinical trial was registered (NCT06596421).

Study Setting

The study was conducted between September 2022 and December 2023 in the Cardiovascular Surgery Clinic of Mehmet Akif Ersoy Thoracic and Cardiovascular Surgery Training and Research Hospital.

Study Sample

The study population consisted of patients hospitalized in the cardiovascular surgery ward during the study period. Sample calculation was performed using power analysis (G-power) with a Type I error rate of 0.05, d = 0.50, and 0.80 power. The sample size was calculated as 128 patients, with 64 in each group. Considering potential data loss during analysis and to maintain the power of the study, the study was completed with 130 patients, 65 in each group.[26] The power of the study was calculated as 99% at the end of the study according to post hoc power analysis.

Inclusion Criteria

- Age over 18 years
- Willingness to participate in the study
- Undergoing cardiac surgery
- No communication barriers
- No mental or cognitive disabilities
- Not using constipation treatments (e.g., laxatives or enemas)
- No history of constipation disorders or gastrointestinal surgery
- Bowel sounds fewer than 6.

Randomization and Blinding

To determine which group the patients meeting the sample selection criteria would be included in, the numbers from 1 to 130 were randomly distributed into two groups without repetition using a computerized program (https://www.randomizer.org/); 65 patients were assigned to the experimental group and 65 patients to the control group.

Patients in both the experimental and control groups were informed about the study, but blinding was maintained by not disclosing whether they were in the experimental or control group. One researcher was chosen by lottery to implement the intervention, while the other was responsible for data collection, ensuring blinding between the researchers. To prevent reporting bias in the study, the research data were evaluated by an expert statistician.

Data Tools

The data were prepared in line with the literature. A form consisting of 21 questions was administered through face-to-face interviews with the patients. The form included questions about the patient's sociodemographic characteristics (age, height, weight, gender, education, marital status, employment status, comorbidities, previous surgeries, smoking and alcohol use, medications used) as well as information regarding constipation and flatulence (frequency of defecation, preoperative fasting time, preoperative bowel cleansing, time of onset of postoperative bowel sounds, time of first flatulence and defecation, time of first oral intake).[30]

Data Collection

Intervention Group

Procedures in the unit where the study was conducted were carried out in accordance with established guidelines.[31] In the cardiovascular surgery intensive care unit, patients are extubated six hours after surgery. Oral intake is initiated two hours after extubation, beginning with water. Regimen 1 (liquid, pulp-free, and soft foods) is introduced orally two hours after the initial water intake. Six hours after starting regimen 1, regimen 2 (soft consistency, easily chewable, and digestible foods) is provided orally. At the subsequent meal, patients are transferred to the cardiovascular surgery ward and receive regimen 3 (adequate and balanced meals from all food groups) orally.

When the patients arrived at the ward 22-23 hours postoperatively, their bowel sounds were assessed, and they were asked whether they had flatulence. This information was recorded in the questionnaire before initiating regimen 3 and starting the massage. The massage

was started in patients with bowel sounds less than 6 per minute. According to the randomization, three patients from the experimental group and four patients from the control group had hypoactive bowel sounds, while the other patients had no bowel sounds.

Details of the massage intervention for the experimental group are presented below. The intervention was designed in line with the literature.[32]

Application Time and Duration: The massage was performed at least one hour after feeding, at 10:00 and 16:00, for 15 minutes.

Required Materials: Liquid Vaseline.

Frequency of Application: The massage was administered twice a day.

Massage Movements: The massage included effleurage, petrissage, and vibration.

Abdominal Massage Steps

- Step 1: Abdominal massage was performed on cardiovascular surgery patients on the first postoperative day, at least one hour after meals, twice a day at 10:00 and 16:00 for 15 minutes.
- Step 2: The patient was placed in a supine position and remained in that position throughout the massage.
- Step 3: To prevent reactive abdominal tension with superficial effleurage, clockwise movements were performed on each quadrant for at least one minute. The massage was then continued.
- Step 4: Deep effleurage and petrissage movements were alternated for 15 minutes.
- Step 5: Finally, clockwise movements were continued for one minute on each quadrant. Vibration was applied, and the process was concluded with superficial effleurage.

After the massage, flatulence and defecation were inquired twice more outside the massage times, and the times were recorded on the form.

Control Group

Patients in the control group were extubated six hours after the operation, similar to the intervention group, and oral intake began two hours later. Oral intake started with water, followed by regimen 1 after two hours and regimen 2 after six hours. When the patient arrived at the cardiovascular surgery ward at 22-23 hours postoperatively, bowel sounds were assessed, and the patient was asked about the presence of flatulence before regimen 3 was provided. In this group, four patients had hypoactive bowel sounds, while the other patients had no bowel sounds. Patients in the control group did not receive abdominal massages. However, all other treatments and care, except for the massage, were continued in the same way as in the intervention group until discharge.

Data Analysis

The study data was analyzed using the SPSS (Statistical Package for the Social Sciences) for Windows 22.0 software. Descriptive statistical methods, including number, percentage, median, and standard deviation, were used to evaluate the data. The ratios of categorical variables in independent groups were analyzed using Chi-square and Fisher exact tests. The independent sample t-test was used to compare quantitative continuous data between two independent groups.

Ethical Considerations

Permission was obtained from the Ethics Committee of the Istanbul Mehmet Akif Ersoy Thoracic and Cardiovascular Surgery Training and Research Hospital, where the study was conducted (Approval Number: 2022.07-50, Date: 29.08.2022). Written informed consent was obtained from each patient participating in the study after the purpose of the study was explained. This study was conducted in accordance with the Declaration of Helsinki.

Results

The mean age of the experimental group was 55.2 ± 13.3 years, while the mean age of the control group was 60.4 ± 10.6 years ($P = 0.015$). There was no significant difference between the groups in terms of body mass index (BMI), gender, educational level, marital status, occupation, comorbidities, previous surgery, previous alcohol use, and defecation habits ($p > 0.05$). Smoking status showed significant differences between the experimental and control groups ($X^2 = 9.079$; $P = 0.011$) (Table 1).

There was no significant difference between the experimental and control groups regarding the type of surgery the patients underwent ($X^2 = 3.305$; $P = 0.064$). Although there was no significant difference in the preoperative fasting period between the groups ($X^2 = 0.901$; $P = 0.825$), more than half of the patients in both groups underwent bowel preparation ($X^2 = 1.074$; $P = 0.246$) (Table 2).

The experimental and control groups showed significant differences in the onset time of bowel sounds ($X^2 = 16.629$; $P = 0.005$). The onset of bowel sounds was shorter in the experimental group. The first flatulence time measurements of the patients in both groups showed a significant difference ($t = -4.763$; $P = 0.000 < 0.05$). The control group had higher first flatulence time measurements ($\bar{x} = 46.415$) compared to the experimental group ($\bar{x} = 31.262$). The first defecation time measurements showed significant differences between the experimental and control groups ($t = -8.796$; $p < 0.05$). Specifically, the first defecation time measurements in the control group ($\bar{x} = 99.508$ hours) were higher than those in the experimental group ($\bar{x} = 61.615$ hours) (Table 3).

Discussion

In this study, significant differences were observed in sociodemographic characteristics between the groups based on age and smoking status. However, since age was found to be independent of the time of first flatulence and first stool passage, it did not affect the study results. Smoking was present in the patients' medical history, but patients ceased smoking four weeks before elective cardiovascular surgery in accordance with the guidelines.[31] Therefore, smoking did not affect the results.

Most of the experimental group began to have bowel sounds on the first postoperative day, whereas less than half of the control group had bowel sounds on the first postoperative day. Additionally, the first flatulence time measurements in the control group were higher than those in the experimental group.

In several related studies,[23] a study comparing connective tissue manipulation and abdominal massage with standard care, as well as standard care alone, found that the number of bowel movements

Table 1. Comparison of Sociodemographic Characteristics of Patients Between Groups

		Experimental Group	Control Group	
		Mean	Mean	P
Age, years		55.26 ± 13.31	60.49 ± 10.61	P = 0.015
		n (%)	n (%)	
Body Mass Index (BMI), kg/m²	Underweight (<18.5)	1 (1.5)	0 (0)	X^2 = 5.473 P = 0.242
	Normal (18.5-24.9)	14 (21.5)	23 (35.4)	
	Overweight (25.0-29.9)	30 (46.2)	21 (32.3)	
	Obese Class I (30.0-34.9)	18 (27.7)	17 (26.2)	
	Obese Class II (35.0-39.9)	2 (3.1)	4 (6.2)	
Gender	Female	17 (26.2)	15 (23.1)	X^2 = 0.166 P = 0.419
	Male	48 (73.8)	50 (76.9)	
Education Level	Primary School	39 (60.0)	46 (70.8)	X^2 = 1.866 P = 0.601
	Secondary School	7 (10.8)	4 (6.2)	
	High School	14 (21.5)	11 (16.9)	
	University	5 (7.7)	4 (6.2)	
Marital Status	Married	59 (90.8)	60 (92.3)	X^2 = 0.099 P = 0.500
	Single	6 (9.2)	5 (7.7)	
Occupation	Laborer	18 (27.7)	11 (16.9)	X^2 = 2.295 P = 0.807
	Officer	1 (1.5)	1 (1.5)	
	Retired	27 (41.5)	32 (49.2)	
	Housewife	10 (15.4)	12 (18.5)	
	Self-employed	6 (9.2)	6 (9.2)	
	Other	3 (4.6)	3 (4.6)	
Comorbidities	No	19 (29.2)	20 (30.8)	X^2 = 0.037 P = 0.500
	Yes	46 (70.8)	45 (69.2)	
Surgery History	No	34 (52.3)	25 (38.5)	X^2 = 2.514 P = 0.079
	Yes	31 (47.7)	40 (61.5)	
Regular Medication	No	15 (23.1)	13 (20.0)	X^2 = 0.182 P = 0.416
	Yes	50 (76.9)	52 (80.0)	
Defecation Frequency	Daily	53 (81.5)	44 (67.7)	X^2 = 5.035 P = 0.169
	Once every 2 to 3 days	12 (18.5)	18 (27.7)	
	Once every 4 to 5 days	0 (0)	2 (3.1)	
	Once a week	0 (0)	1 (1.5)	

*Chi-Square Analysis
*Independent Groups t-Test.

Table 2. Comparison of Surgery-Related Characteristics Between Patient Groups

		Experimental Group	Control Group	
		n (%)	n (%)	P
Type of Surgery	Open	56 (86.2)	62 (95.4)	X^2 = 3.305 P = 0.064
	Closed	9 (13.8)	3 (4.6)	
Fasting Duration Before Surgery	0-5 Hours	1 (1.5)	1 (1.5)	X^2 = 0.901 P = 0.825
	6-10 Hours	46 (70.8)	41 (63.1)	
	11-15 Hours	15 (23.1)	19 (29.2)	
	Over 16 Hours	3 (4.6)	4 (6.2)	
Intestine Preparation	Completed	62 (95.4)	59 (90.8)	X^2 = 1.074 P = 0.246
	Not Completed	3 (4.6)	6 (9.2)	

*Chi-Square Analysis.

increased significantly in the abdominal massage group compared to the connective tissue manipulation and control groups. Another study[24] examined the effect of abdominal massage on constipation in elderly individuals living in a nursing home and found that abdominal massage increased the number of bowel movements, stool weight, and stool consistency. In another study,[25] the effect of abdominal massage on gastrointestinal functions in intensive care patients receiving enteral nutrition through an endotracheal tube was examined, and it

Table 3. Comparison of Bowel Sounds, Flatulence, and Defecation Times Between Groups

		Experimental Group	Control Group	
		n (%)	n (%)	P
Onset of Bowel Sounds	Postoperative Day 0	3 (4.6)	4 (6.2)	X^2 = 16.629 P = 0.005
	Postoperative Day 1	46 (70.8)	30 (46.2)	
	Postoperative Day 2	16 (24.6)	18 (27.7)	
	Postoperative Day 3	0 (0)	8 (12.3)	
	Postoperative Day 4	0 (0)	4 (6.2)	
	Postoperative Day 5	0 (0)	1 (1.5)	
			t	p
First Flatulence Time (hours)		31.26 ± 9.48	46.41 ± 23.83	-4.763	<0.001
First Defecation Time (hours)		61.61 ± 19.31	99.51 ± 28.66	-8.796	<0.001

*Chi-Square Analysis
*Independent Sample t-Test.

was found that abdominal circumference and the prevalence of constipation decreased, while defecation time increased. Additionally, a study[26] showed that the change in bowel sounds of patients in the abdominal massage group before and after the first and fifth day of application was significantly higher than that of patients in the control group. The results of the current study are similar to the literature and the results of the above-mentioned studies. The pressure exerted on the rectum by abdominal massage has a mechanical and reflex effect on the bowel, increasing bowel movements and causing flatulence.[33] This outcome of the study confirms hypothesis H1.

In this study, it was determined that the first defecation time of the patients in the experimental and control groups showed a significant difference. The first defecation time in the control group was higher than in the experimental group. One study included[26] three groups: an acupressure group (n = 30), an abdominal massage group (n = 30), and a control group (n = 31). It was found that patients in the experimental groups defecated earlier than those in the control group. In a randomized controlled trial involving geriatric patients hospitalized in intensive care and fed through a nasogastric tube, 81.5% of the abdominal massage group (n = 30) defecated at the end of the six-day follow-up, compared to only 33% of the control group (n = 30). In a study examining the effect of abdominal massage on constipation management in patients using opioids,[28] it was reported that the rate of defecation at least once a day was higher in the experimental group than in the control group. Another study comparing the effects of abdominal massage and sugar-free gum chewing on the incidence and severity of constipation in male patients undergoing lower extremity skeletal traction[29] found that the incidence of constipation was lower in the massage group compared to the control group. The results of this study, found through a literature review, align with previous research and confirm hypothesis H2.

Limitations

The study was single-centered, and the sample size was limited.

Conclusion

Abdominal massage applied to patients undergoing cardiac surgery was shown to have a positive effect on the onset of bowel sounds, the time of first flatulence, and the time of first defecation. Abdominal massage, which is non-invasive, easy to perform, and reliable, proved to be practical after cardiac surgery. It is recommended for widespread use to prevent constipation. In cardiovascular surgery, larger sample sizes can contribute to the literature, for instance, by comparing heart valve surgery and coronary artery bypass surgery or open cardiac surgery and minimally invasive cardiac surgery.

Ethics Committee Approval: Ethics Committee of the Istanbul Mehmet Akif Ersoy Thoracic and Cardiovascular Surgery Training and Research Hospital, where the study was conducted (Approval Number: 2022.07-50, Date: 29.08.2022).

Informed Consent: Written informed consent was obtained from each patient participating in the study after the purpose of the study was explained.

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