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Original Research

The Impact of Preoperative Bowel Exercises on Postoperative Bowel Function in Gynecologic Malignancies

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Abstract

Background: Postoperative gastrointestinal dysfunction remains a significant problem in patients undergoing gynecologic oncology surgery. The aim of this study is to evaluate the effect of a preoperative exercise regimen, including abdominal massage and rectal digital stimulation, on postoperative bowel function in patients undergoing gynecologic oncology surgery. **Methods**: This randomized controlled study was approved by the Tepecik Training and Research Hospital Ethics Committee and conducted between January 1 and August 31, 2023. Patients in the exercise group received abdominal exercises one week before surgery, including abdominal massage and rectal digital stimulation, which they practice throughout the week leading up to the operation. Patients who did not perform exercises were included in the control group. **Results**: A total of 97 patients were included in the study, with 51 assigned to the exercise group and 46 to the control group. There were no significant differences in demographic characteristics between the two groups. The time to first flatus, first defecation, return of normal bowel sounds, and tolerance of solid food was significantly shorter in the exercise group ($p < 0.05$). There was no statistically significant difference between the groups in terms of length of hospital stay ($p = 0.671$). **Conclusions**: Preoperative abdominal exercises performed before gynecologic malignancy surgeries enhance bowel motility, reduce the time to first flatus and first defecation, and expedite the patient's ability to tolerate solid food during the postoperative period. **Clinical Trial Registration**: The study has been registered on https://classic.clinicaltrials.gov/ (registration number: NCT06113718).

Keywords: bowel exercise; bowel function; gynecologic malignancies

1. Introduction

Gastrointestinal dysfunction in the postoperative period is characterized by temporary deterioration in gastrointestinal functions. Postoperative ileus includes symptoms of nausea and vomiting and is common and complex to manage. Vomiting and nausea are among the two most frequent postoperative side effects, with an estimated incidence of approximately 30% in the general surgical population [1].

Paralytic ileus is observed in gynecologic oncology surgery patients at rates ranging from 12.9% to 32% [2]. Postoperative paralytic ileus can lead to delayed initiation of oral food intake, prolonged hospital stays, reduced patient satisfaction, and increased hospitalization costs. Additionally, extended hospital stays can contribute to life-threatening complications such as hospital-acquired infections, deep vein thrombosis, surgical site infections, and pneumonia. Prolonged recovery times can also hinder oncology patients from receiving timely multidisciplinary treatments, such as recommended radiation therapy and/or chemotherapy initiation for selected cases based on estimated risks of recurrence or death.

Supporting the improvement of postoperative bowel function in gynecologic oncology surgery has become an important goal to reduce recovery and hospitalization durations. Many strategies have been proposed to manage bowel function in the postoperative period. These strategies include ensuring adequate analgesic control, maintaining euvolemia, performing minimally invasive surgery, allowing gum chewing and coffee consumption in the postoperative period, early initiation of oral intake, and the use of medications such as metoclopramide and neostigmine, as well as prophylactic nasogastric tube placement [3,4]. Unfortunately, not all of these recommended strategies are entirely successful, and they cannot completely prevent postoperative bowel dysfunction.

Abdominal massage and digital rectal stimulation are traditional methods that have been used for centuries to treat gastrointestinal dysfunction and constipation. These methods have fewer side effects compared to other treatments and are easily applicable by patients [5]. Abdominal massage, performed from the cecum to the rectum along the entire length of the colon, directly stimulates the digestive system by increasing intra-abdominal pressures and bowel

activity [5,6]. Abdominal massage induces rectal loading and peristalsis by stimulating the somato-autonomic reflex [7]. Abdominal massage has been shown to effectively improve constipation in patients with multiple sclerosis, patients with spinal cord injury, immobile patients and older individuals [8].

In the literature, there are several studies that aim to improve postoperative bowel functions with preoperative exercises following gynecologic oncology surgery, and these exercises are designed to be performed by patients in the preoperative period [9,10].

In this study, we aimed to investigate the effect of preoperative abdominal massage and digital rectal stimulation on postoperative period bowel function in patients with gynecologic malignancies.

2. Materials and Methods

2.1 Study Design

This randomised controlled, open-label, trial study was approved by the Tepecik Training and Research Hospital Ethics Committee for Clinical Research. The study was conducted between January 1 and August 31, 2023. The study was conducted in accordance with the Declaration of Helsinki, and all patients included in the study were informed in detail and their written informed consent was obtained (Tepecik Training and Research Hospital Ethics Committee for Clinical Research, Date: 23/11/2022, Decision no: 2022/17/2).

Patients diagnosed with endometrial, cervical, and ovarian cancer, with an American Society of Anesthesiologists (ASA) score of 1 or 2, and aged 18 and above were included in the study. Patients with ASA scores of 3 or 4, those with inflammatory bowel disease, those with abdominal fluid severe enough to hinder exercise, patients with liver, kidney, and thyroid function disorders, patients with orthopedic problems affecting mobilization, patients with a history of abdominal bowel surgery, abdominal radiotherapy, hyperthermic intraperitoneal chemotherapy (HIPEC) or neoadjuvant chemotherapy were excluded from the study. Patients who had intestinal injury during surgery, underwent bowel resection, had anastomosis or colostomy, received HIPEC treatment, or required relaparotomy before discharge due to reasons such as bleeding or evisceration were also excluded from the study.

2.2 Intervention Plan of the Experimental Group

The design and purpose of the study were explained to all enrolled participants at least 10 days before surgery. Participants were randomised after written informed consent was obtained. Randomisation was performed during the preoperative anaesthetic assessment phase of patients scheduled for surgery. Randomisation was performed randomly using a computer program via the online module. Unequal randomisation was planned in view of the potential for non-compliance among patients in the exercise group. The number of participants allocated to the exercise group was planned to exceed the number allocated to the control group by 10. All steps were monitored by a member of the research team who was not involved in data collection or statistical analysis.

Group 1 patients were designated as the control group, while Group 2 comprised patients who engaged in the recommended bowel exercise programme on a regular basis, commencing one week prior to surgery. On the day of preoperative anaesthesia preparations (a minimum of 10 days before surgery), the recommended bowel exercise programme was meticulously elucidated to the patients by a researcher who was not involved in data collection and statistics, utilising visual presentations in the preoperative preparation room.

The recommended bowel exercise programme is comprised of three steps. Firstly, approximately 20–30 minutes after breakfast, patients should perform a 2–3 minutes massage starting from the cecum and progressing along the colon. Secondly, patients should assume a favourable position and perform a circular massage of the anal walls with their fingers for approximately 30 seconds (digital rectal stimulation). Thirdly, patients should attempt to defecate sitting on the toilet.

Throughout the recommended program, patients were advised to follow a fiber-rich diet. The exercise program was implemented daily during the preoperative week, excluding the day of the surgery. Patients were contacted by phone on the 1st, 2nd, and 5th days of the exercise program to monitor their adherence to the exercises. Upon admission to the ward, patients who did not adhere to the exercise regimen as specified in terms of duration and method, as determined by their exercise compliance rate, were excluded from the study.

After admission to the service, all patients were applied a standard common clinical protocol in accordance with the enhanced recovery after surgery (ERAS) protocol. All patients were allowed to consume a protocol diet including light meals until 6 hours before the planned operation, and were allowed to consume water, pulp-free liquids, coffee, and tea until 2 hours before the planned operation.

Patients received similar preoperative treatments and nursing care, including mechanical bowel preparation. All patients included in the study were administered subcutaneous low-molecular-weight heparin the evening before surgery and intravenous prophylactic antibiotics 30 minutes before surgery.

The same anesthesia protocol was applied to all patients included in the study. Patients were sedated with preoperative medication (Midazolam (Dormicum, Deva Holding A.S., Istanbul, Turkiye) and Fentanyl Citrate (Fentanyl-PF, Polifarma Pharmaceuticals Ind.Trade.Co.Ltd., Tekirdag, Turkiye)) and an epidural catheter was placed for postoperative analgesia before the induction with propofol. Maintenance anesthesia for

patients was continued with volatile gas anesthetics, and at the end of the surgery, morphine was administered through the epidural catheter to manage pain.

Surgical procedures were performed by the same gynecologic oncology surgical team, and all surgeries were conducted using a median incision. The surgical procedure included hysterectomy, bilateral salpingo-oophorectomy, and ± lymphadenectomy, ± omentectomy.

After surgery, nasogastric tubes were removed, and standard respiratory physiotherapy was provided to patients upon admission to the ward. All patients were fitted with an abdominal corset within 24 hours. Histamine H2 blockers and antiemetics were administered to patients and nonsteroidal analgesics were given only when needed. Low molecular weight heparin was started at the prophylaxis dose at the 8th hour after surgery for patients without contraindications.

2.3 Evaluation Index and Data Collection Method

Patients were encouraged to mobilize early and ample. To reduce the effects of other variables in the study, the postoperative nutrition regimen was standardized for all patients. After surgery, patients started with a liquid nutrition on the same day, progressed to a semi-liquid diet when exhaust and then transitioned to a solid diet based on individual gastrointestinal tolerance.

Patients were discharged from the hospital if they remained stable in terms of clinical and laboratory parameters for the last 24 hours, had no fever, tolerated solid foods without vomiting, had normal urinary function, and showed no other complications during ward follow-ups.

Our study's evaluation parameters include postoperative time to first exhaust and defecation, time to the return of bowel sounds, duration of solid food tolerance, length of hospital stay after surgery, and the incidence of postoperative gastrointestinal symptoms (nausea and vomiting, abdominal pain and abdominal distension).

Postoperative time to first exhaust and defecation refers to the time elapsed from the end of the surgery to the first occurrence of exhaust and defecation.

Time to the return of bowel sounds is determined by researchers listening to bowel sounds with a stethoscope every 4 hours starting 8 hours after the surgery. It is based on the time when the first occurrence of 3–5 bowel sounds per minute is detected.

Duration of solid food tolerance is recorded as the time during which the patient can tolerate any food that requires chewing after surgery, without experiencing symptoms such as nausea or vomiting within 2 hours of consumption.

Postoperative gastrointestinal symptoms were recorded during the first 3 days after surgery. Symptoms of abdominal distension and nausea/vomiting were documented as either present or absent during the first three days. Abdominal pain symptoms were evaluated using the Prince Henry Pain Scale, as utilized in similar study [9]. Patients were scored as follows: 0 points for no pain during coughing, 1 point for pain during coughing, 2 points for pain during deep breaths, 3 points for mild pain at rest, and 4 points for severe pain at rest.

After surgery, the "Study Observation Form" was placed in each patient's file, documenting the times for the first exhaust, first defecation, return of bowel sounds, and duration of solid food tolerance. Abdominal pain, nausea and vomiting, abdominal distension were recorded in patients' daily observation forms. Blinding was ensured by recording the variables and study results of the patients by blinded assessors.

2.4 Statistical Method

The data were analyzed using IBM SPSS Statistics 26.0 (IBM Corp., Armonk, New York, USA) statistical software package. Continuous data were presented as mean ± standard deviation (SD), while categorical data were presented as percentages (%). The Shapiro-Wilk test was utilized to assess the normal distribution of the data. For normally distributed groups with two categories, independent samples *t*-test analysis was used for comparisons. For groups that did not exhibit a normal distribution and had two categories, the Mann-Whitney U test was employed for comparisons. Chi-square test analyses were used for the analysis of cross-tabulated tables created. When expected cell frequencies were low, Fisher's exact test was applied as a correction. A significance level of $p < 0.05$ was accepted as the criterion for statistical significance.

3. Results

Following randomisation, the number of patients included in the study was 120, with 65 patients in the exercise group and 55 patients in the control group. However, eight patients from the exercise group were excluded from the study in the preoperative period as they did not perform the prescribed exercises according to the plan and time frame. Consequently, the number of participants in the preoperative period was 57 for the exercise group and 55 for the study group. Fifteen patients were excluded from the study due to non-compliance with the inclusion criteria for intraoperative reasons. Six patients from the exercise group and 9 patients from the control group were excluded from the study.

In the exercise group, two patients underwent rectosigmoid resection, while one patient sustained an intraoperative bowel injury. One patient underwent a second operation due to massive bleeding, and one patient was deemed to be unsuitable for surgery. One patient underwent HIPEC.

In the control group, two patients underwent rectosigmoid resection, and three patients sustained intraoperative bowel injury. Two patients underwent further surgery due to massive bleeding, one patient was deemed unsuitable for surgery, and one patient underwent HIPEC (Fig. 1).

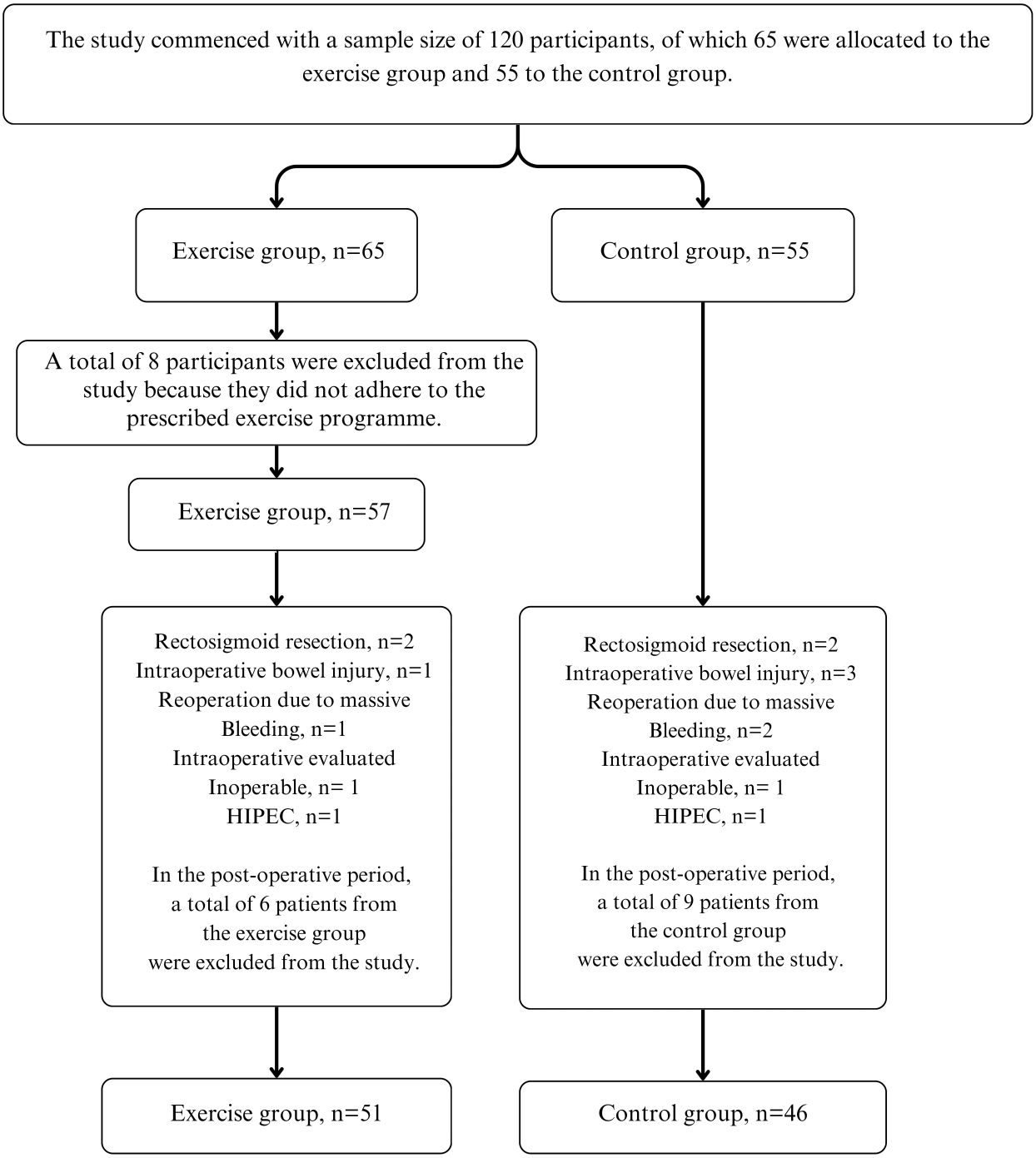

Fig. 1. The following flowchart illustrates the design of the study. HIPEC, hyperthermic intraperitoneal chemotherapy.

The analysis included a total of 97 patients who underwent gynecologic oncology surgery, with 51 (52.6%) patients in the exercise group and 46 (47.4%) patients in the control group. When examining the overall averages, the mean age was 56.9 years (minimum (Min): 21, maximum (Max): 87, SD: 12.8), the mean height was 159.3 cm (Min: 143, Max: 175, SD: 6.6), the mean weight was 76.5 kg (Min: 50, Max: 115, SD: 13.9), and the mean body mass index (BMI) was 30.3 kg/m^2 (Min: 17.3, Max: 51.1, SD: 6.0) (Table 1).

Out of the patients, 60 (61.9%) had no history of smoking, while 37 (38.1%) had a history of smoking. A total of 45 (46.4%) patients had a history of abdominal surgery, while 52 (53.6%) had no history of abdominal surgery. When examining the comorbidities of the patients, 44 (45.4%) had no additional diseases, 27 (27.8%) had hypertension, 23 (23.7%) had diabetes 14 (14.4%) had both diabetes and hypertension, 1 (1%) had arrhythmia, and 2 (2.1%) had hypothyroidism.

Table 1. General averages of the participants.

	N	Min	Max	Mean	SD	Median	IQR
Age (years)	97	21.0	87.0	56.9	12.8	58.0	20.0
Height (cm)	97	143.0	175.0	159.3	6.6	160.0	8.0
Weight (kg)	97	50.0	115.0	76.5	13.9	76.0	16.0
BMI (kg/m^2)	97	17.3	51.1	30.3	6.0	29.7	6.7
Length of hospital stay (n)	97	2.0	19.0	5.5	2.9	4.0	2.0
Operation time (min)	97	80.0	250.0	137.4	45.6	120.0	80.0
Anesthesia time (min)	97	110.0	300.0	171.6	49.4	155.0	90.0
Lymph node count (n)	97	4.0	49.0	18.0	11.2	16.0	11.0
Preoperative potassium (mEq/L)	97	3.0	5.7	4.2	0.4	4.2	0.5
Preoperative hemoglobin (g/dL)	97	8.4	15.9	12.7	1.3	12.7	1.5
Postoperative hemoglobin (g/dL)	97	8.4	14.9	11.8	1.3	11.9	1.5
First exhaust time (hours)	97	12.0	72.0	31.4	10.7	32.0	17.0
First defecation time (hours)	97	24.0	101.0	56.5	18.0	52.0	30.0
Bowel sound recovery time (hours)	97	8.0	44.0	27.8	9.0	28.0	16.0
Time to tolerate solid diet/day	97	2.0	6.0	2.9	0.9	3.0	1.0

BMI, body mass index; Min, minimum; Max, maximum; SD, standard deviation; IQR, inter quarter range.

Table 2. The following table details the indications for surgical procedures in the two groups under consideration.

Indication for surgery	Exercise Group (n: 51)	Control Group (n: 46)	Total
Endometrial cancer (n)	30 (58.8%)	24 (52.2%)	54 (55.7%)
Ovarian cancer (n)	20 (39.2%)	20 (43.5%)	40 (41.2%)
Cervical cancer (n)	1 (2.0%)	2 (4.3%)	3 (3.1%)

Table 3. The following table presents the general data between the two groups.

	Exercise Group (n: 51)	Control Group (n: 46)	Test value	*p* value
Age (years)*	56.1 $\pm$ 13.4	57.7 $\pm$ 12.4	0.603	0.548
BMI (kg/m^2)*	30.6 $\pm$ 5.7	30.0 $\pm$ 6.3	0.504	0.615
Previous abdominal operation (n)**	25 (49.0%)	20 (43.5%)	0.299	0.585
Comorbid diseases (n)**	22 (43.1%)	22 (47.8%)	0.215	0.643
Smoking status (n)**	22 (43.1%)	15 (32.6%)	1.136	0.286
Omentectomy (n)**	18 (35.3%)	11 (23.9%)	1.495	0.221
Lymph node count (n)	19.1 $\pm$ 11.4	16.5 $\pm$ 11.0	–1.010	0.313
Preoperative potassium (mEq/L)*	4.2 $\pm$ 0.4	4.3 $\pm$ 0.5	–1.255	0.213
Preoperative hemoglobin (g/dL)*	12.8 $\pm$ 1.3	12.5 $\pm$ 1.2	1.164	0.247
Postoperative hemoglobin (g/dL)*	12.0 $\pm$ 1.3	11.7 $\pm$ 1.4	1.193	0.236
Operation time (min)*	140.1 $\pm$ 49.2	134.3 $\pm$ 41.6	0.623	0.535
Anesthesia time (min)*	176.5 $\pm$ 53.6	166.3 $\pm$ 44.3	1.011	0.314

BMI, body mass index. For non-normally distributed continuous variables, the Mann-Whitney U test was used, and the test statistic is reported as "z-score". *An independent samples *t*-test was used for normally distributed continuous variables, and the test statistic is reported as "*t*". **The Pearson Chi-square test (χ^2) was used for categorical variables.

When analyzing the indications for the surgeries, it was observed that 54 (55.7%) of the patients underwent surgery due to endometrial cancer, 40 (41.2%) due to ovarian cancer, and 3 (3.1%) due to cervical cancer (Table 2).

When patient age, BMI, preoperative hemoglobin, postoperative hemoglobin and preoperative potassium values were examined, there was no statistically significant difference between the groups. Similarly, no statistically significant difference was detected between the study and control groups in terms of surgery indication, number of patients who underwent omentectomy and number of lymph nodes removed, operation time, anesthesia duration, history of previous abdominal surgery and smoking status (Table 3).

When the time until the postoperative first exhaust time was analyzed, the exercise group had a significantly

Table 4. A comparison of the study results obtained from both groups.

Outcome	Exercise Group (n: 51)	Control Group (n: 46)	Test value	*p* value
First exhaust time (hours)	28.1 ± 8.9	35.0 ± 11.3	3.191	**0.001**
First defecation time (hours)*	50.8 ± 15.3	62.7 ± 18.8	–3.411	**<0.001**
Bowel sound recovery time (hours)	25.7 ± 9.0	30.1 ± 8.5	2.408	**0.016**
Time to tolerate solid diet/day*	2.5 ± 0.8	3.4 ± 0.9	4.874	**<0.001**
Length of hospital stay (day)	5.4 ± 2.8	5.7 ± 3.1	–0.425	0.671
Rehospitalization (n)**	6 (11.8%)	2 (4.3%)	-	0.274

The bold values represent $p < 0.05$. For non-normally distributed continuous variables, the Mann-Whitney U test was used, and the test statistic is reported as "z-score". *An independent samples *t*-test was used for normally distributed continuous variables, and the test statistic is reported as "*t*". The Pearson Chi-square test (χ^2) was used for categorical variables. **If the assumptions of the Chi-square test were not met, Fisher's exact test was used, and only the *p*-value was reported.

Table 5. Postoperative complications between the two groups.

	Exercise Group (n)	Control Group (n)	Total
Paralytic ileus (n)	1	2	3
Deep venous thrombosis (n)	1	3	4
Rehospitalization (n)	6	2	8
Incision infection (n)	4	1	5

shorter duration compared to the control group (28.1 ± 8.9 *vs.* 35.0 ± 11.3, $p = 0.001$). Similarly, when the time until the first defecation time was examined, the exercise group had a significantly shorter duration (50.8 ± 15.3 *vs.* 62.7 ± 18.8, $p < 0.001$). The time for postoperative return of bowel sounds was also significantly shorter in the exercise group (25.7 ± 9.0 *vs.* 30.1 ± 8.5, $p = 0.016$).

When the time to tolerate solid food was analyzed, a statistically significant difference was found between groups (2.5 ± 0.8 days *vs.* 3.4 ± 0.9 days, $p < 0.001$). The exercise group tolerated solid food earlier than the control group. However, there was no statistically significant difference in the length of hospital stay between groups ($p = 0.671$). Similarly, there was no statistically significant difference in the rate of readmission after discharge between groups (Table 4).

When postoperative complications were examined, paralytic ileus was observed in 1 patient in the exercise group and 2 patients in the control group. Deep Venous Thrombosis was observed in 1 patient in the exercise group and 3 patients in the control group. Rehospitalization occurred in 6 patients in the exercise group and 2 patients in the control group. Incision infection was observed in 4 patients in the exercise group and 1 patient in the control group (Table 5).

When abdominal distension was analyzed, it was found that abdominal distension was significantly lower in the exercise group on the first postoperative day ($p = 0.029$). Although abdominal distension was lower in the exercise group on the second day, second and third postoperative days, these differences were not statistically significant ($p = 0.105$, $p = 0.495$).

In terms of nausea and vomiting, it was observed that nausea and vomiting were significantly less common in the exercise group on the first postoperative day ($p = 0.005$). On the second and third postoperative days, nausea and vomiting were less common in the exercise group but these differences were not statistically significant ($p = 0.251$, $p = 1.000$). Regarding abdominal pain, it was found that abdominal pain was less common in the exercise group on the first and second postoperative days, but these differences were not statistically significant (1st day $p = 0.166$, 2nd day $p = 0.105$). However, on the third postoperative day, abdominal pain was significantly less common in the exercise group ($p < 0.001$) (Table 6).

4. Discussion

Gastrointestinal dysfunction is a common issue that leads to decreased patient satisfaction in the postoperative period. Although postoperative gastrointestinal dysfunction may resolve spontaneously, slow return of bowel function is associated with increased cost, morbidity, and additional complications. The present randomised controlled study has demonstrated that a one-week preoperative abdominal massage and digital rectal stimulation consisting of exercises in laparotomic gynaecological oncology operations increased bowel mobility, shortened the time to first exhaust, time to first defecation time, time for the return of bowel sounds to normal, and time to tolerate a solid diet.

Abdominal massage has been proven to be an effective, accessible and cost-effective treatment modality for reducing constipation symptoms, increasing bowel movement frequency and enhancing patients' quality of life [11]. The application of abdominal massage has been demonstrated to induce alterations in intra-abdominal pressure, thereby accelerating the peristaltic motion of the intestines through the combined mechanisms of mechanical and re-

Table 6. The following table provides a comparative analysis of abdominal dstension, abdominal pain and nausea/vomiting between the two groups.

			Exercise Group		Control Group		*p* value
			n	%	n	%	
Abdominal distension	Postoperative Day 1	Negative	19	37.3	8	17.4	0.029
		Positive	32	62.7	38	82.6	
	Postoperative Day 2	Negative	46	90.2	36	78.3	0.105
		Positive	5	9.8	10	21.3	
	Postoperative Day 3	Negative	47	95.9	46	100.0	0.495*
		Positive	2	4.1	0	0.0	
Nausea and vomiting	Postoperative Day 1	Negative	25	49.0	10	21.7	0.005
		Positive	26	51.0	36	78.3	
	Postoperative Day 2	Negative	49	96.1	41	89.1	0.251*
		Positive	2	3.9	5	10.9	
	Postoperative Day 3	Negative	48	98.0	44	100.0	1.00*
		Positive	1	2.0	0	0.0	
Abdominal pain	Postoperative Day 1	0	-	-	-	-	0.166
		1	20	39.2	12	26.1	
		2	23	45.1	20	43.5	
		3	8	15.7	14	30.4	
	Postoperative Day 2	0	-	-	-	-	0.105
		1	46	90.2	36	78.3	
		2	5	9.8	10	21.7	
		3	-	-	-	-	
	Postoperative Day 3	0	34	66.7	14	30.4	<0.001*
		1	17	33.3	31	67.4	
		2	0	0.0	1	2.2	
		3	-	-	-	-	

On postoperative day 3, the evaluability of nausea and vomiting was unclear for two patients from each group. Similarly, the abdominal distension of two patients from the exercise group could not be clearly evaluated on postoperative day 3. *Fisher exact test used.

flex effects. This massage modality has been shown to enhance bowel movements and concurrently reduce abdominal distension. The application of abdominal massage has been demonstrated to significantly reduce colonic transit time. In a study conducted by Ayaş *et al*. [12] in patients with spinal cord injuries, comparable to the present study, it was found that abdominal massage reduced colonic transit time and increased weekly defecation frequency. A review of the literature on the subject reveals a consensus that massage of the abdomen is an effective measure for reducing both gastric residual volume and abdominal distension. Furthermore, a systematic review of the literature on the subject of massage and its effects on gastrointestinal system symptoms has also revealed no adverse effects [13]. In the study conducted by Wang *et al*. [14]., the efficacy of abdominal massage was examined. The findings revealed that this intervention led to a reduction in gastric residual volume, vomiting, abdominal distension, and ventilator-associated pneumonia in patients receiving enteral nutrition in intensive care settings. It is also hypothesised that abdominal massage may have an impact on mortality by reducing the incidence of ventilator-associated pneumonia.

In a randomised controlled study conducted by Uysal *et al*. [15], the application of abdominal massage to patients fed with a nasogastric tube resulted in a reduction in high gastric residual volume, abdominal distension, and vomiting. In addition to the reduced abdominal distension, decreased vomiting, and accelerated bowel movements observed in the exercise group, it is hypothesised that the enhanced food tolerance in patients materialised at an earlier stage. It is hypothesised that abdominal massage and rectal digital stimulation performed one week before the operation may reduce sympathetic system excitability, increase parasympathetic tone, enhance bowel peristalsis, improve circulation, and stimulate the release of gastrointestinal hormones and digestive fluids. In the present study, the time for first exhaust, first defecation, return of bowel sounds to normal and tolerance of solid food was found to be shorter in the patient group that performed abdominal exercise.

The application of mechanical stretching, induced by digital rectal stimulation, has been demonstrated to stimulate mechanoreceptors located within the internal anal sphincter. The sensory inputs received from these regions are responsible for the S2–S4 segments, and the concomitant parasympathetic output from these segments has been shown to enhance motility in the left colon. It has been demonstrated that this activation stimulates peristalsis, thereby facilitating the passage of faeces [16]. Research has indicated that digital rectal stimulation increases left colonic activity and causes an increase in the number and amplitude of peristaltic contractions. This is due to the stimulation of the anal canal and distal rectum, which in turn leads to an excitatory reflex [16,17]. The gastrocolic reflex is responsible for the lower gastrointestinal motility that ensues following food intake. Colon motility is observed to increase in response to the stretching of the stomach wall that occurs with food intake. The ingested food is then propelled through the gastrointestinal system by peristalsis, thereby simultaneously providing more space for further food intake. An increase in electrical activity has been demonstrated with myoelectric recordings shortly after food intake. The gastrocolic reflex is most active in the morning and after meals [18]. The objective of the present study was to optimise the benefits derived from the gastrocolic reflex. To this end, the time frame of 20–30 minutes after breakfast was selected as the optimal time for the performance of the exercise.

During the preoperative period, a daily routine of abdominal massage and digital rectal stimulation was implemented to enhance colonic motility and expedite bowel emptying. The objective of this study was to ascertain the impact of this regimen on gastrointestinal dysfunction in the postoperative phase. The findings indicated that the gastrocolic reflex, established during the preoperative period through abdominal massage and digital rectal stimulation, persisted into the postoperative period.

Patients operated on for gynaecological malignancies have a higher risk of postoperative gastrointestinal dysfunction than patients operated on for benign indications due to the complexity of the procedure, extensive surgery, long general anaesthetic times, wide incisions and excessive gastrointestinal manipulation. Therefore, we believe that the exercise given will result in more favourable clinical outcomes in patients operated on for benign indications.

The present study constitutes a single-centre clinical trial, with a limited sample size. Consequently, there is a requirement for randomised controlled studies with larger sample sizes that encompass a more extensive patient population. The exercise was conducted by the patients in their home environment, and the absence of researcher observation may compromise the validity of the results.

Moreover, the present study boasts numerous merits, including its prospective randomised design. The similarity in demographic characteristics of patients, surgical procedures performed by the same team with analogous techniques through the same incision, and postoperative nursing care provided by the same team serve to enhance the validity of the study's results.

5. Conclusions

The present study demonstrates that the exercise recommended to patients, which includes abdominal massage and digital rectal stimulation, during the preoperative period, effectively improves postoperative gastrointestinal dysfunction in gynecologic oncology surgery patients. The findings show that this treatment shortens the time for the return of bowel sounds and the passage of the first exhaust and defecation.

Availability of Data and Materials

The datasets used and analyzed during the current study are available from the corresponding author on reasonable request.

Author Contributions

CA and NGK designed the study. MFB and ÖE analyzed the data and performed the statistical analysis. SK and AGB informed before surgery, explained the exercise and obtained consent, designed and interpreted the study. ABK and HBL collected data. CA designed of the work. MFK and MS interpreted the study data and supervised the study. All authors contributed to editorial changes in the manuscript. All authors read and approved the final manuscript. All authors have participated sufficiently in the work and agreed to be accountable for all aspects of the work.

Ethics Approval and Consent to Participate

All patients included in the study were informed in detail and their written informed consent was obtained. The study was conducted in accordance with the Declaration of Helsinki, and the protocol was approved by the Ethics Committee of Tepecik Training and Research Hospital (Date: 23.11.2022, Approval Number: 2022/17/2).

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Conflict of Interest

The authors declare no conflict of interest.

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