ORIGINAL ARTICLE

Eastern Journal of Medicine

East J Med 30(1): 167-170, 2025
DOI: 10.5505/ejm.2025.52533

The Effect of Oral Fluid Consumption on Intestinal Motility After Laparoscopic Cholecystectomy

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ABSTRACT

Oral fluid intake after laparoscopic cholecystectomy affects intestinal motility. The aim of this study was to investigate how oral fluid intake affects intestinal motility.

The descriptive and correlational study was conducted with 60 patients who underwent laparoscopic cholecystectomy surgery between October 2023 and May 2024. Data were collected with a form prepared by the researchers. Postoperative patients were interviewed face-to-face, and patients who were discharged early were interviewed by telephone.

The mean amount of fluid consumed by the patients on the first postoperative day was 839.16±604.22 mL, 1665.83±672.61 mL on the second day, and 2070±666.58 mL on the third day. On the second and third days, there was a significant negative correlation between the amount of fluid consumed and the duration of flatulence at a moderate level, and a significant negative correlation between the duration of defecation at a high level.

From this study, it is concluded that the amount of liquid consumed on the first day has no effect on the duration of flatulence and fecal expulsion, while the duration of flatulence and fecal expulsion shortens as the amount of liquid consumed on the second and third days increases.

Keywords: Intestinal motility, Laparoscopic cholecystectomy, Oral fluid consumption

Introduction

Gastrointestinal motility, the rhythmic contraction and relaxation of muscles within the gastrointestinal tract, plays a vital role in the digestion, absorption, and transport of nutrients throughout the body. Surgical interventions required for various medical conditions can disrupt the delicate balance of gastrointestinal function (1). Fluid consumption, which has taken its place in the literature as a critical factor in recent years, has become a subject that attracts attention in medical research with its effects on gastrointestinal motility in the postoperative period. The postoperative phase is characterized by a complex interplay of physiological processes aimed at restoring homeostasis and recovery. However, this phase can lead to more serious gastrointestinal complications, such as gastrointestinal motility dysfunction, delayed recovery, increased length of hospital stay, and even ileus (1-3).

The relationship between fluid consumption and gastrointestinal motility is multifaceted and influenced by various factors. Proper hydration is essential to maintain the structural integrity and function of the gastrointestinal tract. Sufficient fluid is required to maintain mucus secretion, lubrication, and coordination of muscle contractions that facilitate the movement of food and waste through the digestive tract. Excessive fluid consumption can lead to electrolyte imbalances and disturbances in bowel function, potentially adversely affecting bowel movements (4-6). In this direction, the effect of oral fluid consumption on gastrointestinal motility in the postoperative period is important in terms of prevention of gastrointestinal complications.

In recent years, studies have been conducted to elucidate the optimal fluid management strategies for postoperative patients to support gastrointestinal motility. Researchers have investigated the effects of different types of fluids, such as water, electrolyte solutions, and nutritional drinks, on bowel movements and overall recovery. In addition, factors such as timing and volume of fluid intake were also examined to identify patterns that favor gastrointestinal recovery (3,7). The aim of this study is to investigate the effect of fluid consumption on gastrointestinal motility in

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Received: 15.10.2024, **Accepted:** 06.01.2025

the postoperative period. At the same time, with the results of this study, it is aimed at making informed decisions about fluid management for postoperative patients, improving gastrointestinal outcomes, and reducing the incidence of gastrointestinal complications.

In this study, answers to the following questions were sought:

- What is the relationship between the amount of fluid consumed and the time of starting oral intake, and the duration of flatulence after laparoscopic cholecystectomy?
- What is the relationship between the amount of fluid consumed and the time of starting oral intake, and the defecation time after laparoscopic cholecystectomy?

Materials and Methods

Design: The study was descriptive and correlational.

Setting and Sample: Before starting the study, a close group study was taken as a reference (2), and the study population consisted of 75 patients who underwent laparoscopic cholecystectomy surgery in the General Surgery Service of Van Yüzüncü Yıl University Dursun Odabaşı Medical Centre between October 2023 and May 2024, and it was aimed to reach the entire population. Research data were collected by face-to-face interviews with patients and telephone interviews with patients who were discharged early. However, during the data collection process, 10 patients did not respond to the phone call, and 5 patients used laxatives in the postoperative period and were not included in the study in order not to affect the results of the study, and the study was completed with 60 patients.

Inclusion Criteria:

-Voluntary participation in the study
-To be between the ages of 18-75
-To be hospitalised as a patient in the General Surgery Service of Van Yüzüncü Yıl University Dursun Odabaşı Medical Centre
-Having undergone emergency or planned laparoscopic cholecystectomy surgery
-No history of chronic constipation/diarrhoea

Exclusion Criteria:

-Not participating in the study voluntarily
-Under 18 years of age and over 75 years of age
-Use of laxatives in the postoperative period

Data Collection Tools

Identifying Information Form: The form, which was prepared by the researchers by reviewing the literature, consists of questions about the patients' identifying information (age, gender, etc.) and disease history (presence of chronic disease, presence of previous abdominal surgery, etc.). This form also includes questions that may characterize the relationship between fluid intake and intestinal motility (ASA score, amount of fluid intake in the first 3 days after surgery, duration of flatulence, etc.). This data collection form was composed of questions that could define the relationship between fluid intake and intestinal motility and enable patients to express themselves comfortably and clearly.

Data Collection: Before collecting the data from the target population, the patients were informed about the study, and signatures were obtained from the patients for consent. During the data collection process, patients were interviewed in their rooms on the first day of surgery, and the interviews lasted approximately 15 minutes. Patients who undergo laparoscopic cholecystectomy surgery in the General Surgery Service of Van Yüzüncü Yıl University Dursun Odabaşı Medical Centre are discharged on the 2nd day of surgery unless any complications develop. Therefore, the first gas and defecation times of the patients and the amount of fluid they consumed in the postoperative days were questioned and recorded by telephone interviews. The telephone interviews lasted approximately 10 minutes. After the information was given to all patients, they were asked to note down the fluids they consumed after surgery to prevent patients from forgetting.

Statistical Analysis: The Statistical Package for Social Sciences (SPSS) 25.0 package program was used for quantitative evaluation of the data. Arithmetic mean, standard deviation, percentages, and minimum-maximum values were calculated for the evaluation of descriptive data. For the normality distribution of the data, it was checked whether the data were normally distributed by considering the skewness kurtosis value ranges. An independent sample t test was used for normally distributed data. A Pearson correlation test was used to determine the relationship between postoperative data. All test data were evaluated at a 95% confidence interval and 0.05 significance level.

Ethical Statement: Before starting to collect the data, approval was obtained from the Van Yüzüncü Yıl University Non-Interventional Clinical Research Ethics Committee (Decision No. 2023/09-13 Date: 18.09.2023). Explanations that participation was voluntary were added to the questionnaire form for the target group and to the

informed consent form about the research. The Declaration of Helsinki was adhered to.

Results

When the distribution of the descriptive characteristics of the participants was analyzed, it was determined that the mean age was 48.78±14.57 and the mean Body Mass Index (BMI) was 29.24±4.92. At the same time, it was determined that 70% of the participants were female, 65% were ASA 1 group patients, 65% had no chronic disease, and 66.7% had not undergone abdominal surgery before. Among the patients who underwent abdominal surgery (33.3%), 60% had previously undergone caesarean section (Table 1).

When the data of the participants for the postoperative period were examined, it was determined that the mean duration of surgery was 1.11±0.41 hours, the mean duration of postoperative mobilization was 5.45±2.45 hours, the mean duration of starting oral intake after surgery was 6.75±1.95 hours, the mean duration of passing gas was 35.21±24.23 hours, and the mean duration of passing stool was 53.1±29.41 hours. At the same time, the mean amount of fluid consumed by the participants on the first day (the day of surgery) after surgery was 839.16±604.22 mL, 1665.83±672.61 mL on the second day, and 2070±666.58 mL on the third day (Table 2).

When the averages of the amount of fluid consumed on the 1st, 2nd, and 3rd days after surgery and the duration of gas and feces were compared according to the descriptive characteristics of the participants, it was found that there was a significant relationship between the amount of fluid consumed and the previous abdominal surgery status of the patients. When the relationship between the patients' previous abdominal surgery and the amount of fluid consumed on the second and third days after surgery was analyzed, it was determined that the mean score of the patients who had previous abdominal surgery was positively higher than the patients who had not had previous abdominal surgery, and the difference between them was significant ($p<0.05$)(Table 3).

There was no significant correlation between the amount of fluid consumed on the first day, mobilization time, time to start oral intake, and the duration of passing gas and the duration of passing stools; however, on the second day, there was a moderate negative correlation between the amount of fluid consumed and the duration of passing gas ($r = -0.317$; $p =0.014$) and a highly significant negative correlation between the duration of passing stools ($r = -0.381$; $p =0.003$). At the same time, a significant negative correlation was found between the amount of fluid consumed on the third day and the duration of flatulence ($r = -0.290$; $p =0.024$) at a moderate level, and a significant negative correlation was found between the duration of defecation ($r = -0.444$; $p =0.000$) at a high level (Table 4).

Discussion

In this study in which the effect of the amount of fluid consumed orally on intestinal motility after laparoscopic cholecystectomy was investigated, it was determined that the mean operation time of the patients was 1.11±0.41 hours, the mean postoperative mobilization time was 5.45±2.45 hours, the mean time to start oral intake after surgery was 6.75±1.95 hours, the mean gas expulsion time was 35.21±24.23 hours, and the mean stool expulsion time was 53.1±29.41 hours.

Early postoperative oral fluid intake is recommended because of its favorable effects on the gastrointestinal system, and water is usually the first food that patients take orally in the postoperative period (4,8). In this study, the mean amount of fluid consumed by the patients on the first postoperative day (the day of surgery) was 839.16±604.22 mL, 1665.83±672.61 mL on the second day, and 2070±666.58 mL on the third day. In the study conducted by Wu et al. (2019) with patients undergoing laparoscopic cholecystectomy surgery, patients in the experimental group were given water, limited to 3 ml/kg. Patients in the control group did not receive oral fluid intake in the first four hours after surgery. In the study, it was reported that the patients tolerated early oral fluid intake well after laparoscopic surgery, and the application was safe for the patients (8). In another randomized controlled study conducted by Terzioglu et al. (2013), after abdominal gynecological surgery, patients were administered an early oral fluid intake procedure as 45-50 ml of water between the 2nd and 4th hours after surgery, 100 ml of water every hour thereafter, and free fluid consumption when there was gas production with bowel sound. Among the multimodal approaches, early oral hydration was found to be effective in preventing ileus, increasing comfort, and shortening the hospital stay (9). İster et al. (2024) found that patients who fasted longer experienced more pain

Table 1: Descriptive Characteristics of the Participants

	Min-Max	Mean±Std.Deviation
Age	22-75	48.78±14.57
Body Mass Index (BMI)	19.40-43.30	29.24±4.92
	Number (n)	%
Gender		
Female	42	70
Male	18	30
ASA Score		
ASA 1	39	65
ASA 2	21	35
Presence of Chronic Disease		
Yes	21	35
No	39	65
Previous Abdominal Surgery Status		
Yes	20	33.3
No	40	66.7
Surgeries Performed by Abdominal Surgeons (n=20)		
Caesarean	12	60
Hysterectomy	3	15
Splenectomy	1	5
Appendectomy	1	5
Colon Resection	1	5
Myomectomy	1	5
Tubal Ligation	1	5

Table 2: Data on the Postoperative Period

	Min-Max	Mean±Std.Deviation
Duration of Surgery (h)	0.50-3	1.11±0.41
Post-op Mobilisation Duration (h)	0-14	5.45±2.45
Time to Start Oral Intake (h)	5-14	6.75±1.95
Duration of Gas Discharge (h)	6-120	35.21±24.23
Duration of Faecal Discharge (h)	12-123	53.1±29.41
Amount of Liquid Consumed on Day 1 (mL)	0-3000	839.16±604.22
Amount of Liquid Consumed on Day 2 (mL)	300-3300	1665.83±672.61
Amount of Liquid Consumed on Day 3 (mL)	500-3500	2070±666.58

and anxiety (10). When the findings of this study are evaluated with the findings of studies in the literature, the conclusion that early postoperative oral fluid intake has positive effects on the gastrointestinal system is supported.

When the mean amount of fluid consumed on the 1st, 2nd, and 3rd days after surgery and the duration of gas and feces were compared according to the descriptive characteristics of the participants, it was found that the difference between the parameters such as gender, ASA

Table 3: The Comparison of the Mean Amounts of Fluid Consumed on the 1st, 2nd and 3rd Postoperative Days and the Duration of Gas-Fecal Discharge According to the Descriptive Characteristics of the Patients

	Day 1 Liquid Consumed (mL)	Day 2 Liquid Consumed (mL)	Day 3 Liquid Consumed (mL)	Duration of Gas Discharge (h)	Duration of Fecal Discharge (h)
Gender					
Female	836.9±564.72	1644.04±629.09	2053.57±731.8	35.92±24.85	56.61±31.12
Male	844.44±705.62	1716.66±782.15	2108.33±498.3	33.55±23.33	44.88±23.74
	t: -0.044	t: -0.380	t: -0.289	t: 0.345	t: 1.428
	p: 0.965	p: 0.705	p: 0.773	p:0.731	p: 0.159
ASA Score					
ASA 1	794.87±594.69	1752.56±737.34	2043.58±739.14	33.12±19.69	52.41±29.73
ASA 2	921.42±627.8	1504.76±509.63	2119.04±518.52	39.09±31.15	54.38±29.49
	t: -.771	t: 1.528	t:-.415	t: -0.796	t: -0.246
	p: 0.444	p: 0.132	p: 0.679	p: 0.432	p: 0.807
Presence of Chronic Disease					
Yes	921.42±627.8	1504.76±509.63	2119.04±518.52	39.09±31.15	54.38±29.49
No	794.87±594.69	1752.56±737.34	2043.58±739.14	33.12±19.69	52.41±29.73
	t: 0.771	t: -1.528	t: 0.415	t: 0.796	t: 0.246
	p: 0.444	p: 0.132	p: 0.679	p: 0.432	p: 0.807
Previous Abdominal Surgery Status					
Yes	815.9±446.78	1888.63±630.74	2300±594.41	29.13±17.73	45.54±21.52
No	852.63±684.37	1536.84±670.08	1936.84±677	38.73±26.89	57.47±32.60
	t: -.225	t: 2.001	t: 2.091	t: -1.494	t: -1.703
	p: 0.823	p: 0.050	p: 0.041	p: 0.141	p: 0.94

t: independent samples t test

Table 4: Correlation of Postoperative Data

		Duration of Gas Discharge (h)	Duration of Fecal Discharge (h)
Day 1 Liquid Consumed (mL)	r	-0.134	-0.196
	p	0.308	0.134
Day 2 Liquid Consumed (mL)	r	-0.317*	-0.381**
	p	0.014	0.003
Day 3 Liquid Consumed (mL)	r	-0.290*	-0.444**
	p	0.024	0.000
Mobilisation Time	r	0.121	0.005
	p	0.357	0.970
Time to Start Oral Intake	r	0.230	-0.001
	p	0.077	0.992

r: Pearson korelasyon.
*. Correlation is significant at the 0.05 level (2-tailed).
**. Correlation is significant at the 0.01 level (2-tailed).

score, and presence of chronic disease was not significant, while the mean scores of the amount of fluid consumed on the 2nd and 3rd days of patients who had undergone previous abdominal surgery were positively higher than those of patients who had not undergone previous abdominal surgery, and the difference between them was significant. In the study of Baş (2021), it was observed that patients without chronic disease and drug use passed gas in a shorter time, while no significant difference was found in patients with chronic disease and drug use (1). The findings of this study show that factors such as gender, ASA score, and presence of chronic disease do not make a significant difference on postoperative fluid consumption and bowel function. This suggests that the postoperative recovery process is shaped by individual differences, but some demographic and clinical factors are not as decisive as expected. On the other hand, it is noteworthy that the second and third day fluid intake of patients with a history of abdominal surgery was higher than those who had not undergone surgery, and the difference was found to be significant. This finding suggests that patients with a history of abdominal surgery may be more prone to fluid intake during postoperative recovery, or that these patients adapt more rapidly to surgical stress. Patients who have previously undergone surgery may be more familiar with postoperative processes, which may contribute to faster recovery of bowel function by increasing fluid intake. Referring to the study of Baş (2021), it was stated that patients without chronic diseases tended to pass gas faster. This finding suggests that chronic diseases may slow down the healing process. However, in Baş's study, no significant difference was found between patients with chronic diseases and drug use, indicating that these factors do not always have a direct and significant effect on the recovery process. Having a chronic disease can complicate the recovery process after surgery, but the treatment methods and postoperative care processes of these patients can also be important factors affecting the recovery process. Overall, these findings suggest that some groups of patients respond differently to postoperative fluid consumption and gastrointestinal function. A history of abdominal surgery may be an important factor in this process, while the effect of chronic diseases may not always be significant. Therefore, patients' individual health histories and experiences are important factors to be taken into account in postoperative recovery processes.

In this study, no significant correlation was found between the amount of fluid consumed on the first day, mobilization time, time of initiation of oral intake, and the duration of flatulence and defecation, whereas a moderate negative correlation was found between the amount of fluid consumed on the second and third days and the duration of flatulence, and a highly significant negative correlation was found between the amount of fluid consumed on the second and third days and the duration of flatulence and the duration of defecation. In this case, it is concluded that as the amount of fluid intake on the second and third days increased, the patients passed gas and feces earlier. In the study conducted by Aydın Sayılan and Yıldızeli Topçu (2022) to determine the relationship between gastrointestinal motility

and oral fluid intake levels in the postoperative period, a positive correlation was found between the amount of oral fluid consumption on the first day and the duration of flatulence, while a negative correlation was observed between the amount of fluid consumption on the second day and the duration of flatulence and fecal production (2). It has been reported in the literature that ERAS applications, including early postoperative oral fluid intake, provide faster recovery of gastrointestinal function (11,12). In a meta-analysis evaluating ERAS applications in upper gastrointestinal surgery, it was found that patients who underwent ERAS had a decrease in the first postoperative gas and fecal expulsion times (13). In the study of Yin et al. (2019), after colorectal surgery, patients in the experimental group were given water to drink, limited to 0.5 ml/kg in the early postoperative period. Unlike other studies, it was determined that there was no difference between the experimental group and the control group in terms of the duration of initiation of bowel movements by early oral fluid intake (14). The fact that the amount of oral fluid consumed on the second and third postoperative days increased gastrointestinal motility is in parallel with the findings of other studies in the previous literature. The amount of oral fluid consumed by patients in the postoperative period is thought to affect gastrointestinal motility in relation to the surgical stress response. Some study findings suggest that the effects of early oral fluid intake in different types of surgery may be variable and should be evaluated individually for each patient. In conclusion, although the literature generally indicates that early oral fluid intake contributes positively to postoperative gastrointestinal recovery, some studies conclude that the strength and effectiveness of this relationship may vary according to the type of surgery and the patient.

From this study, it is concluded that the amount of fluid consumed by laparoscopic cholecystectomy patients on the first postoperative day has no effect on the duration of flatulence and fecal expulsion, while the duration of flatulence and fecal expulsion decreases as the amount of fluid consumed on the second and third postoperative days increases. However, the results of this study cannot be generalized to all patients because this study was conducted in a single center, the number of participants was limited, and the treatment of patients may be individualized.

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