

Effect of Early Postoperative Feeding on the Recovery of Children Post Appendectomy

ABSTRACT

The aim of this study was to determine the effect of early postoperative feeding on recovery after appendectomy in children. It was undertaken as a multicenter study. Patients were randomly assigned to 2 groups, each containing 46 children. Postoperatively, liquid and solid food intake and evacuation of first flatus and stool were recorded for the intervention and routine care groups. Postoperative thirst, hunger, nausea, and pain levels were evaluated at regular intervals using the Visual Analogue Scale. Data were obtained as number, mean, and percentage, and statistically analyzed using the chi-square test and the 2-sample *t* test. A statistically significant difference was found for both the first evacuation of flatus and stool and the length of hospital stay. Patients in the intervention group had evacuated flatus and stool earlier and had a shorter hospital stay than the control group. In addition, a significant difference was found in hunger (48th hour), thirst (36th and 48th hours), and pain (48th hour) levels between the intervention and control groups. Early postoperative feeding in children who have had an appendectomy affects the occurrence of the first evacuation of flatus and stool, the length of hospital stay, and the level of hunger, thirst, and pain.

Postoperative feeding is a significant intervention that supports patients' nutritional requirements. For years, after gastrointestinal surgery, the passage of flatus or bowel movement has been thought to be the necessary clinical evidence for starting an oral diet. Previously, in gastrointestinal tract surgery, when intestinal anastomosis was used, the restriction of oral intake was preferred (Lewis, Egger, Sylvester, & Thomas, 2001; Quin & Neill, 2006; Recel & Segui, 2012; Schulman & Sawyer, 2005). The purpose of taking nothing by mouth was to prevent postoperative nausea and vomiting and protect the bowel,

giving it time to heal before being stressed by food. Nevertheless, clinical studies show that initiating early postoperative feeding is more beneficial than restricting oral intake after gastrointestinal tract surgery (Kuzma, 2008; Lewis et al., 2001; Recel & Segui, 2012; Reismann et al., 2007; Wallström & Gunilla, 2013).

Background

According to Reissman et al. (1995), the term "early feeding" is allowing liquid by mouth within the first 24 hours and then feeding with solid food the next day (Reissman et al., 1995). In some recent studies, regardless of any postoperative criteria, oral feeding was initiated immediately in both children and adults (Kuzma, 2008; Reismann et al., 2007; Yetimlar et al., 2010; Terzioğlu et al., 2013). In these studies, there was evidence of more rapid return of bowel function due to the early oral intake of food and fluids.

There are limited data regarding postoperative fasting in pediatric surgery patients. In a study including 64 children in the pediatric unit of Songklanagarind Hospital (Sangkhathat, Patrapinyokul, and Tadyathikom, 2003), it is suggested that early feeding stimulates bowel sounds earlier and decreases length of hospital stay, but does not increase side effects in

Received August 16, 2015; accepted February 29, 2016.

About the authors: Selda Rızalar, PhD, is Assistant Professor, Department of Surgical Nursing, Health Science Faculty, Medipol University, Istanbul, Turkey.

Ayfer Özbaş, PhD, is Associate Professor, Department of Surgical Nursing, Istanbul University Florence Nightingale Nursing Faculty, Abide-i Hurriyet cad. 34381 Şişli, Istanbul, Turkey.

The authors declare no conflicts of interest.

Correspondence to: Ayfer Özbaş, PhD, Department of Surgical Nursing, Istanbul University Florence Nightingale Nursing Faculty, Abide-i Hurriyet cad. 34381 Şişli, Istanbul, Turkey (ayferozbas@hotmail.com).

DOI: 10.1097/SGA.0000000000000279

children who had colostomy closure. In Germany, a study by Reisman et al. (2007) found that in 113 children older than 4 years who had an appendectomy, pyloroplasty, bowel anastomosis, fundoplication, hypopspadias repair, or nephrectomy, fast-track (FT) surgery including early feeding, early mobilization, and opioid sparing analgesia has decreased the length of hospital stay and increased the comfort level. Fast-track surgery can be defined as a coordinated perioperative approach aimed at reducing surgical stress and facilitating postoperative recovery.

As noted in many studies, early feeding after gastrointestinal tract surgery, either alone or as part of the FT surgery procedure, shortens the duration of hospitalization (Lewis et al., 2001; Reismann et al., 2007; Recel & Segui, 2012; Wallström & Gunilla, 2013). A study by Kuzma (2008) evaluated child and adult patients undergoing appendectomy and their length of hospital stay after surgery. Patients were divided into an intervention group and a control group. Length of hospital stay was 4 days in the control group and 2.1 days in the intervention group. This result showed that early feeding decreased the length of stay (Kuzma, 2008).

In a study performed with children and adults who underwent an appendectomy, it was found that bowel sounds and stool occurred more quickly in the early feeding group, and postoperative ileus duration was shorter in this group as well (Recel & Segui, 2012). Another review stated that the time to first flatus and length of stay were shorter in the early feeding group (Wallström & Gunilla, 2013). In another study, Da Fonseca et al. evaluated adults undergoing colorectal surgery; the length of hospital stay after surgery in the intervention group and the control group was 4 and 7.6 days, respectively, and the time to first flatus was 1.5 versus 2 days (Da Fonseca, Profeta da Luz, Lacerda-Filho, Correia, & Gomes da Silva, 2011).

Nurses, physicians, and dietitians, who compose the care team after surgery, should continuously observe the nutrition parameters of children beginning feedings during the preoperative stage. The nurse has significant roles as a member of a multidisciplinary team in the patient's treatment, care, feeding, and the prevention of complications. In addition, the nurse is responsible for the assessment of the patient's gastrointestinal function and needs.

Nurses should conduct research and use the results in patient care, as evidence-based care will promote positive patient outcomes. There are some studies related to early postoperative feeding in adults (Willcuts, 2010); however, evidence regarding postoperative early feeding in children is limited (Sauerland, Thomas Jaschinski, Edmund, & Neugebauer, 2010). In the field of nursing, there are no studies regarding the

effects of early feeding after appendectomy in children in the Turkish literature. This study was performed to evaluate the effects of early feeding after appendectomy on recovery in children.

Methods

Purpose and Type of Study

This randomized controlled trial was performed to determine the effect of early postoperative feeding on recovery after open and laparoscopic appendectomy in children.

Variables in the Study

The independent variable in this study was postoperative fasting time. The first flatus and stool time; the levels of hunger, thirst, nausea, and pain; and length of hospital stay were identified as the dependent variables.

Population and Sample

This study was undertaken as a multicenter study in the pediatric surgical departments of the Ondokuz Mayıs University, Medical Faculty, and the Maternity and Children's Hospital in Samsun, Turkey between February and December 2012. The study was conducted between February 2, 2012, and December 21, 2012.

To calculate the sample size, the NCSS (Number Cruncher Statistical System)–PASS (Power Analysis and Sample Size) 2006 program was used. In this study, based on a previous study (Reismann et al., 2007), the sample size calculation showed that 46 patients would be needed in each group at the .05 level of significance with a power of 99.9%, and effect size of 1.25. Independent 2-sample *t* test was used for analysis.

Inclusion Criteria

Patients whose families participated in the study voluntarily and could speak, read, and write in Turkish were included in the study sample. All patients in the sample were between 5 and 16 years old, received preoperative bowel preparation, underwent appendectomy with a diagnosis of acute appendicitis, were uncomplicated, had no intellectual disability or communication difficulties, or had no narcotic administration.

Exclusion Criteria

Patients who wished to exit even though they initially participated in the study, or who could not tolerate oral feeding, used drugs for systemic illness that affected the bowel function, developed postoperative complications, or had intellectual disability were not included in the study.

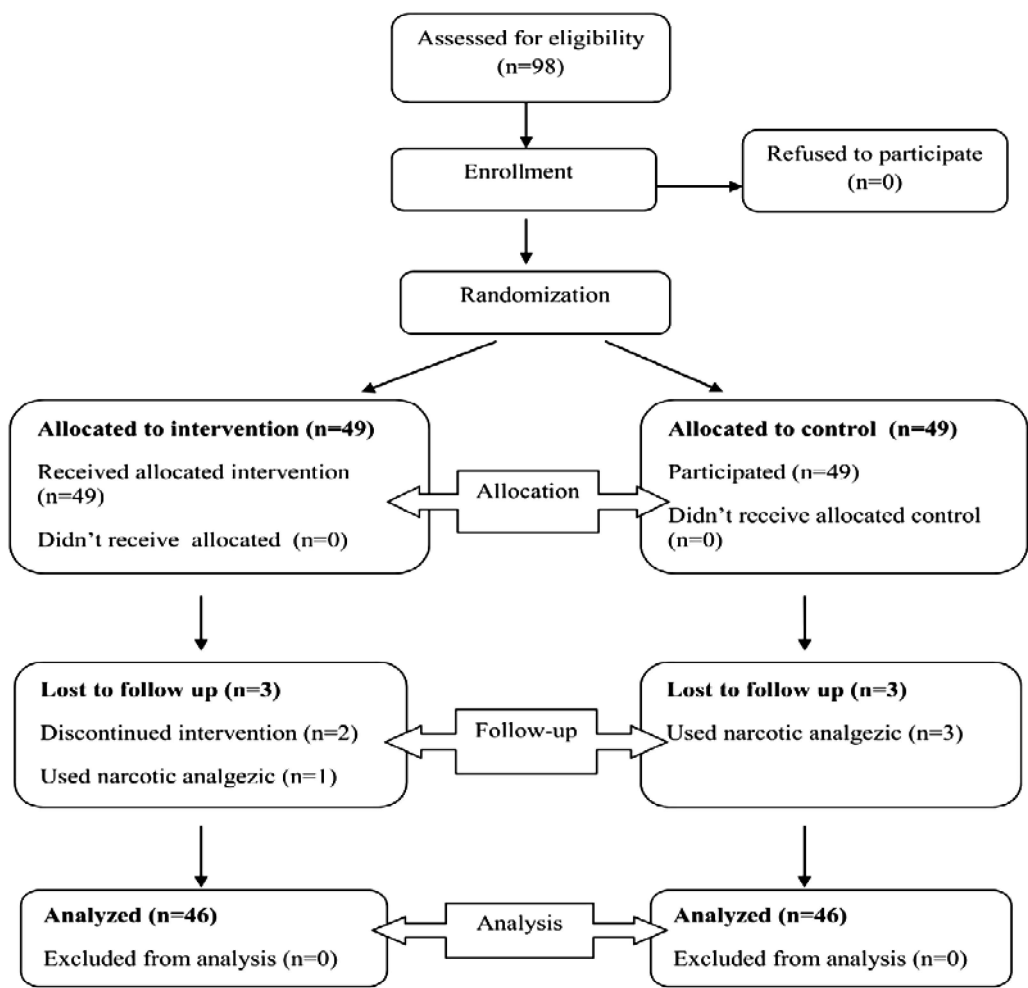


FIGURE 1. Trial profile.

The patients were randomly assigned by the clinical nurse to two groups, each containing 49 children. A computer randomization list was used for assignment. Researchers were blinded to allocation. Data were collected on 98 (49/49) hospitalized patients with a diagnosis of appendicitis. Forty-nine patients were included in the intervention group; in this group, a narcotic analgesic was used for one child. Narcotic analgesics could suppress the bowel function. Two children did not continue in the study because they could not tolerate oral feeding. Therefore, a total of 46 patients were included in the intervention group. In addition, three children in the control group used narcotic analgesics; therefore, they were excluded as well. The flowchart of the study is shown in Figure 1.

Data Collection Tools

When collecting data, the data collection form, which is composed of three parts and was developed according to the literature (Duluklu, 2012; Fanaie & Ziaee, 2005; Güzeldemir, 1995; Hatfield, 2008; Klemetti et al., 2010;

Pasero & Belden, 2006; Quin & Neill, 2006; Schulman & Sawyer, 2005), was used by the researchers. In the first section of the form, questions to determine the patient characteristics were denoted. The second section contained a chart where data regarding the evaluation of the postoperative period and the patient’s condition were recorded. On these charts, the vital signs of the patient, drugs, level of pain, gastric intubation, the first mobilization time, first flatus and stool time, oral feeding and nutritional properties, and the number of hospitalized days were documented. The third section included the Visual Analogue Scale (VAS) that was used to evaluate hunger, thirst, nausea, and pain intensity.

The VAS has usually been used in assessing pain. It has been extensively researched and shows good sensitivity and validity (Baeyer, 2006). In addition, it has been used to quantify the levels of nausea, thirst, and hunger (Gilbert, Easy, & Fitch, 1995; Hausel et al., 2001). Although age is a factor that influences a child’s ability to use the VAS, it has been successfully used in children (Klemetti et al., 2010; Kokki & Salonen, 2002).

The VAS was used in this study as a horizontal line from 0 to 10. On the scale, 0 indicated no hunger, thirst, nausea, or pain, whereas 10 indicated the worst possible situation for all of the parameters. The direction of the increasing intensity of hunger, thirst, nausea, and pain was further clarified for the children by using a laughing face and crying face at the opposite ends of the scale. The researcher assessed and recorded each participating child's level of hunger, thirst, nausea, and pain on a scale of 0–10 on specific intervals.

Implementation on the control group

The control group received postoperative care in the clinic. Patients in the control group received routine care in which oral intake was initiated after the evacuation of flatus. Evacuation of first flatus was reported to the clinic nurse by the patient, and the nurse recorded it on the observation form. After gas passage occurred, patients were given water and then advanced to the soft and solid food regimens. The time of clear liquid, soft, and solid food intake was recorded. Postoperative thirst, hunger, nausea, and pain levels were evaluated at regular intervals using the VAS. First, second, and third parameters were assessed at the 24th, 36th, and 48th hours postoperation; pain levels were assessed at the 12th, 24th, 36th, and 48th hour by the patients. The children had no difficulties with the scale. Scoring was done by the same researcher.

Implementation on the intervention group

In this study, the intervention group was the early feeding group. The children in the intervention group were given oral fluid within the first 24 hours postoperatively without waiting for evacuation of flatus. Patients in the intervention group received water within the first 24 hours after surgery if their general condition was stable and there were no gastrointestinal symptoms. Unless there was nausea or vomiting, they received clear juices. If nausea, vomiting, abdominal distension, or abdominal pain was not observed, the diet was increased to a soft regimen that included yogurt, soup, pudding, or mashed potatoes at the next meal (after 4 hours). When the soft regimen was well tolerated, a solid regimen was started: pasta, rice, boiled egg, meat, and other kinds of solid food were given. The child's food intake and whether the patient tolerated oral intake were also evaluated and recorded.

Implementation in both groups

Preoperative teaching for the patient and/or family included how to use the VAS, enema administration before surgery, general anesthesia, and postoperative prophylactic antibiotic therapy. An infusion of $\frac{1}{2}$ normal saline at 1–2 cc/kg/hour was started for patients in both the intervention and control groups. After oral

feeding was started, the intravenous (IV) fluid infusion was stopped. Drugs affecting the bowel function were not used.

Data Analysis

Statistical analysis was performed using SPSS for Windows, version 16.0 (SPSS Inc., Chicago, IL). The differences in categorical variables between the groups and other associations between the categorical variables were tested using the chi-square test. The differences in the normally distributed variables between groups were compared with a two-sample *t* test. In the case of nonnormally distributed variables, Mann–Whitney *U* test was used. Dichotomous demographic variables were compared via chi-square test. *p* values less than .05 were considered to be statistically significant.

Ethical Aspects of the Study

Written permission was obtained from the Ondokuz Mayıs University, Medical Faculty administration, and the Maternity and Children's Hospital administration in Samsun. Written permission was obtained from the Ondokuz Mayıs University, Medical Faculty Hospital for Medical Research Ethics Commission (number: OMÜ TAEK 2011/474). Before starting the study, pediatric surgery clinic employees, patients, and their relatives were informed about the study. Informed consent was obtained from parents verbally and in writing by using the informed consent form. In addition, assent was obtained from children. Consent was taken in the period from admission to surgery. Only willing volunteers among patients were included in the study.

Results

The distribution of characteristics of the intervention and control groups was similar. Descriptive characteristics of the intervention and control groups did not differ depending on age, height, weight, or gender ($p = .211$, $p = .236$, $p = .265$, $p = .218$ consecutively). The patient characteristics of age, height, and weight are presented in Table 1. The comparison of the intervention and control groups on diagnosis type, previous operation, chronic disease, or surgical method showed no statistically significant difference between the groups ($p = 0.788$, $p = 0.275$, $p = 0.400$, $p = 0.174$ consecutively).

The time points when the intervention and control groups started to take fluid, soft, and solid food are shown in Table 2 and Figure 2. The mean duration of the first fluid intake of patients starting oral intake was 17.8 ± 2.2 hours in the intervention group and 44.3 ± 9.1 hours in the control group. The mean duration of advancing to soft food in the intervention group was 23.9 ± 3.8 hours and 49.4 ± 11.8 hours in the control

TABLE 1. Characteristics of the Children ($N = 92$)

	Intervention Group ($n = 46$)		Control Group ($n = 46$)		P (Test Statistic)
	Mean \pm SD	Min–Max	Mean \pm SD	Min–Max	
Age	11.3 \pm 2.6	6–14	9.7 \pm 3.0	5–14	.211
Height (cm)	136.7 \pm 15.1	98–160	130.3 \pm 17.4	98–160	.236
Weight (kg)	39.1 \pm 11.3	17–65	33.9 \pm 13.9	14–60	.265
Operation time (min)	57.9 \pm 19.9	30–120	64.8 \pm 21.1	35–105	.218
	N	%	N	%	P value (Test Statistic)
Female	14	30.4	17	36.9	.508
Male	32	69.6	29	63.0	

group. The mean length of time with a normal diet of solid food was 37.8 ± 5.7 hours in the intervention group and 64.2 ± 12.6 hours in the control group. A significant difference between the intervention group and the control group was found for the mean time of the first oral liquid, soft, and solid food intake ($p = .000$, $p = .000$, $p = .000$ consecutively).

The first gas and stool passage times during the postoperative period for the intervention and control groups are presented in Table 2 and Figure 3. A statistically significant difference in the duration of first gas and stool passage was found between the two groups ($p = .000$, $p = .006$). It was found that the intervention group, who was fed earlier, had the passage of the first flatus and stool earlier than the control group. Postoperative hospitalization times for children in the intervention group and the control group are shown in Figure 3. A statistically significant difference was detected in the length of stay of patients in the intervention and control groups ($p = .015$). The intervention group with early feeding in the postoperative period was discharged earlier than the patients in the control group.

Children fed early had hunger and thirst scores lower than the children fed late. Significant differences were found in terms of the level of hunger in the 48th hour postoperation ($p = .000$) and in terms of the level of thirst in the 36th and 48th hours postoperation ($p = .000$ and $p = .000$). Late fed children experienced more intense thirst and hunger (Figures 4 and 5).

Nausea levels of the intervention and control groups after surgery are shown in Figure 6. No statistically significant difference was detected between the patients in the intervention and control groups in terms of the average level of nausea at the 24th, 36th, and 48th hour postoperation ($p = .759$, $p = .073$, $p = .115$).

In Figure 7, the pain levels of patients in the 12th, 24th, and 48th hours after appendectomy in the

intervention and control groups are shown. A statistically significant difference was found in terms of the averages of pain scores at the 48th hour postoperation between the intervention and control groups ($p = .025$). Patients in the intervention group had a lower level of pain.

Discussion

After abdominal surgery, oral feeding is usually restricted in the early postoperative period. Traditionally, oral intake is allowed after the first flatus or stool. The purpose of this practice is to protect the surgical area, avoid adverse effects such as nausea and vomiting, and thus prevent aspiration (Quin & Neill, 2006; Schulman & Sawyer, 2005; Wilcuts, 2010). The concept of early feeding has emerged so that harmful effects in patients with postoperative fasting can be prevented.

In early feeding, oral fluid was given in the first postoperative day, and the next day, solid food was allowed (Reissman et al., 1995). Other studies of early feeding in the first 24 hours after the operation support the early feeding intervention (Fanaie & Ziaee 2005; Kassi Assamoi et al., 2010; Kuzma, 2008; Lucha, Butler, Plichta, & Francis, 2005; Recel & Segui, 2012). In previously published studies in the literature, the time to full oral feedings was 15 hours (Reissman et al., 2007), 24 hours (Kassi Assamoi et al., 2010), or 1.67 days (Recel & Segui, 2012) as indicated. In this study, a significant difference was found between the intervention and control groups in terms of the start time of liquid, soft, and solid foods.

The mean duration of time until patients received oral intake of a normal diet of solid food was 37.8 hours in the intervention group and 64.2 hours in the control group. In an early postoperative feeding study performed with 88 patients between the ages of 3 and 67 years with an uncomplicated appendectomy (Recel & Segui, 2012), the first feeding was provided after

TABLE 2. Comparison of the Recovery Parameters of the Subjects (N = 92)

	Intervention Group (n = 46)		Control Group (n = 46)		p value (Test Statistic)
	Mean ± SD	Min–Max	Mean ± SD	Min–Max	
Length of stay (hour)	58.3 ± 14.1	38–96	97.1 ± 25.6	53–144	.015
First flatus time (hour)	19.0 ± 3.7	14–34	28.9 ± 6.6	16–40	.000
First stool time (hour)	47.2 ± 7.4	32–78	68.2 ± 11.5	36–96	.006
The first oral intake					
Clear liquid	17.8 ± 2.2	12–22	44.3 ± 11.1	28–72	.000
Soft	23.9 ± 3.8	16–36	49.4 ± 11.8	33–92	.000
Solid	37.8 ± 5.7	24–44	64.2 ± 12.6	44–106	.001
Hunger level					
24th hour	5.9 ± 1.7	2.8–9.8	6.8 ± 1.6	2.8–9.8	.820
36th hour	3.6 ± 1.6	1–9	6.2 ± 1.7	2.8–9	.324
48th hour	1.1 ± 1.2	0–8.5	4.6 ± 2.5	0–8.5	.000
Thirst level					
24th hour	4.5 ± 1.9	1.3–9.8	7.5 ± 1.6	4–10	.140
36th hour	2.0 ± 1.4	0–6.5	6.2 ± 2.4	1–9.2	.000
48th hour	0.4 ± 0.8	0–4	3.2 ± 2.5	0–9	.000
Nausea level					
24th hour	2.4 ± 1.5	0–6	2.9 ± 1.4	0–7.8	.759
36th hour	0.1 ± 0.2	0–1	0.2 ± 0.1	0–0.5	.073
48th hour	0.4 ± 0.7	0–2	0.7 ± 0.9	0–3	.115
Pain level					
12th hour	6.1 ± 1.5	3.5–9.7	7.0 ± 1.3	3.2–10	.155
24th hour	3.9 ± 1.2	2–7.1	5.0 ± 1.3	2–7.1	.619
48th hour	2.3 ± 0.9	0.1–5	2.9 ± 1.3	1–6	.025

Note. Bold characters are used to specify statistically significant results.

1.67 days (approximately 40 hours) in the early feeding group and after 2.16 days (51.4 hours) in the late feeding group. According to the study conducted by Vargün et al. on 337 children after appendectomy, children who had an open appendectomy had adequate oral intake within 24 ± 1.1 hours postoperation; for those with a laparoscopic appendectomy, this was achieved in 14 ± 0.5 hours (Vargün et al., 2006). According to findings of Reismann et al. (1995), full oral feeding during the postoperative period was achieved in 15 ± 13.9 hours. Full oral feeding in our study started at 37.8 hours, which is shorter than that in Recel and Segui’s (2012) findings, but longer than the period of time in findings of Vargün et al. and Reismann et al. According to our study and the other studies mentioned earlier, more and more patients after surgery began feeding and tolerated oral feeding at earlier postoperative times.

Early postoperative feeding in children undergoing gastrointestinal surgery is known to shorten the duration of the evacuation of flatus and stool. It has an accelerative effect on the return of bowel activity. According to our findings, earlier evacuated flatus and stool were detected in children in the early feeding

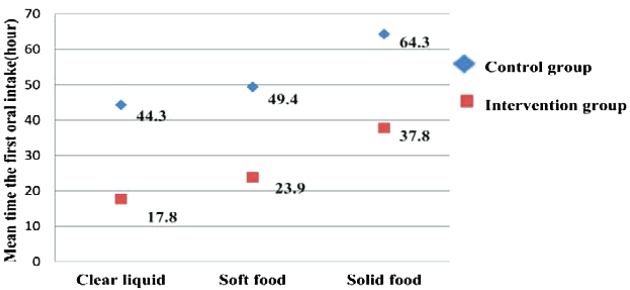


FIGURE 2. The mean time of the first oral intake of patients (N = 92).

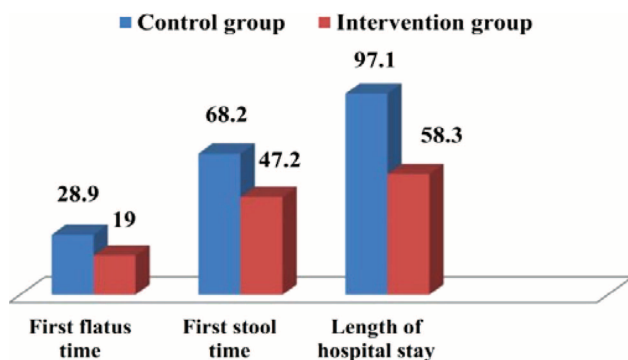


FIGURE 3. The averages of length of stay, first flatus, and stool time (hours).

group than in the control group. In the Recel and Segui (2012) study performed in patients after appendectomy, it was observed that early bowel movement and stool had occurred, and it was also found that postoperative ileus duration was shorter in the early feeding group (Recel & Segui, 2012). In some recent studies, regardless of any criteria, oral feeding was initiated immediately or within a few hours after the surgery in children and adults (Kassi Assamoi et al., 2010; Kuzma, 2008; Reismann et al., 2007; Terzioglu et al., 2013). In these studies, there is evidence of more rapid return of bowel function due to early ingestion of food and fluids.

Although there are a few studies stating that early feeding accelerates the recovery of bowel movements, there are also some studies showing the opposite. In a study by Kassi Assamoi et al. (2010) on early postoperative feeding compared with conventional oral feeding, the average age of patients with acute appendicitis was 26. They found that the first flatus time was 23.5 hours postoperation in the control group and 21 hours postoperation in the intervention group, and there was no significant difference between groups. Kuzma evaluated the efficacy of an accelerated surgical care protocol. The first flatus time was 1.7 days in the early fed group and 2.1 days in the late fed group. However, the traditional and early feeding groups did not statistically differ (Kuzma, 2008).

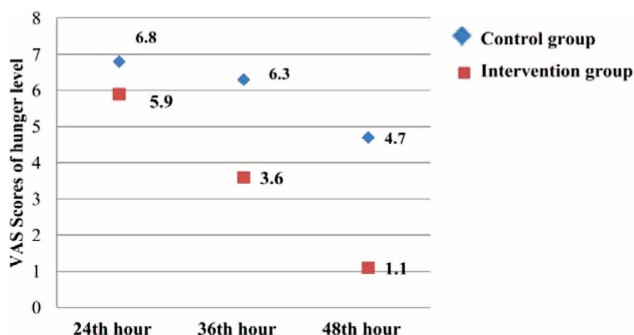


FIGURE 4. The children's postoperative hunger level ($N = 92$).

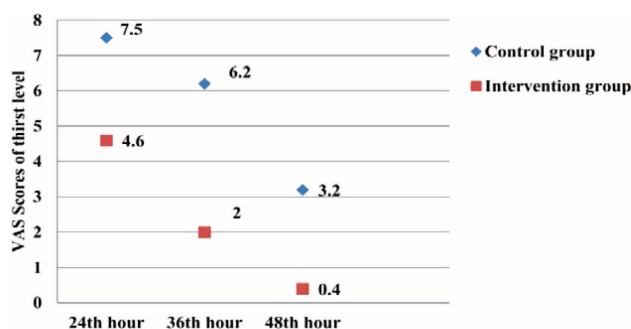


FIGURE 5. The children's postoperative thirst level ($N = 92$).

As noted in many studies on gastrointestinal tract surgery, early feeding after surgery, either alone or as part of FT procedure, shortens the duration of hospitalization (Da Fonseca et al., 2011; Kuzma, 2008; Lewis et al., 2001; Reismann et al., 2007; Recel & Segui, 2012; Wallström & Gunilla, 2013). In the present study, a shorter hospital stay, which is a potential advantage of early postoperative feeding, was demonstrated. Because early feeding significantly shortens the duration of ileus, it also promotes recovery parameters and shortens the length of hospitalization. Kuzma's (2008) study evaluated patients undergoing appendectomy; the length of hospital stay after surgery in the intervention group and the control group was 2.1 and 4 days, respectively, and early feeding shortened the length of stay (Kuzma, 2008).

In the study by Reismann et al. (2007), the postoperative hospital stay was 3.7 days in the intervention group and 6.3 days in the control group. A shorter length of stay occurred in the earlier fed group. In a study by Kassi et al., diet and nutrition in the early postoperative stage were compared with traditional feeding methods in a randomized controlled study. They found no difference in the duration of hospitalization between the intervention and control groups, and a significantly lower cost of hospitalization among the early feeding group (Kassi Assamoi et al., 2010). In the study by Lucha et al. (2005), it was suggested that early feeding decreases the duration and cost of hospitalization (Lucha et al., 2005).

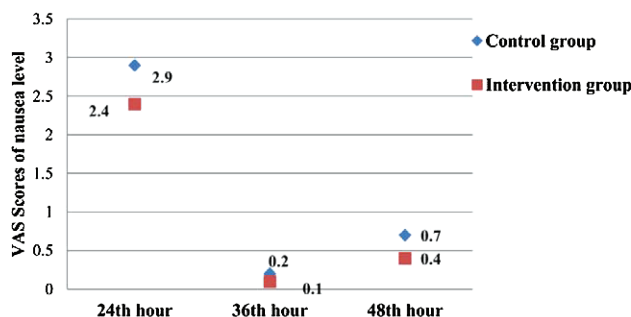


FIGURE 6. The children's postoperative nausea level ($N = 92$).

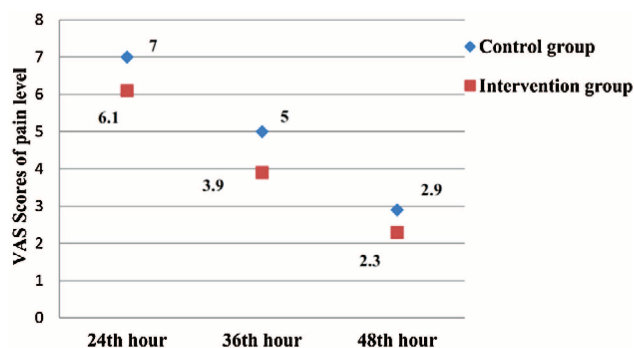


FIGURE 7. The children's postoperative pain level ($N = 92$).

The other parameters regarding postoperative recovery are hunger, thirst, pain, and nausea (Alatas et al., 2006; Asiri, Abu-Bakr, & Al-Enazi, 2006; Klemetti et al., 2010). The time and quality of postoperative oral intake can affect the aforementioned parameters and may improve recovery (Klemetti et al., 2010). In our study, we noted that the levels of hunger and thirst of early-fed children were lower than those of late-fed children. In another study where the preoperative time interval of hunger and thirst and postoperative effects in children were analyzed, the level of hunger and thirst of the patients in the postoperative morning intervention group were determined to be lower (Klemetti et al., 2010). This finding, a reduction of hunger and thirst levels in early postoperatively fed children in the study by Klemetti, is parallel to our findings. In a different study, early oral intake was investigated in elective surgery postoperatively, and it was found that the late postoperatively fed patients felt a higher level of hunger (Wallström & Gunilla, 2013).

Postoperative nausea and vomiting are limiting factors in starting early oral feeding and are of vital importance to consider (Maessen, Hoff, Jottard, & Kessels, 2009). Nausea is usually experienced in the postoperative period and is one of the major causes of discomfort in patients. Sometimes it may result in vomiting. The resolution of nausea is considered to be one of the criteria for postoperative recovery (Alatas et al., 2006; Asiri et al., 2006; Klemetti et al., 2010). Postoperatively, in traditional feeding, nausea has been seen in patients until the first flatus or stool. There are advantages found in the studies on early postoperative feeding such as the decline in the level of nausea in patients (Klemetti et al., 2010) as well as in the controversial data that early feeding leads to nausea (Willcuts, 2010). In our study, no significant difference was found in the level of nausea between the early and late fed patients. Accordingly, it can be said that postoperative early feeding did not decrease the level of nausea; however, it did not increase it either. We can conclude that early feeding does not seem to be a factor in increasing the nausea level.

The difference in nausea levels between the intervention and control groups was not statistically significant in this study. In line with this finding, early feeding was not taken as a factor in increasing the level of nausea. The prevalence rate of postoperative nausea and vomiting is 20%–41% (Maessen et al., 2009; Wang & Kain, 2000). In our study, it was found that 4 children (8.69%) in the intervention group and 7 children (15.21%) in the control group who underwent an appendectomy experienced vomiting. In their study, Klappenbach et al. (2013) reported more vomiting in the early fed group than in the late fed group. However, in studies by Kuzma et al. (2008) and Radke et al. (2009) in patients after appendectomy, there was no difference in the frequency of vomiting between the early and late feeding groups.

Postoperative pain, which is caused by an inflammatory response, starts with surgical trauma and acute pain and decreases gradually with tissue healing. Improvement in the level of pain in the postoperative period is considered as one of the criteria of postoperative recovery. When pain is adequately controlled, this may shorten the healing time and reduce the length of hospital stay (Düzel, 2008); however, if pain cannot be controlled, it is a major factor that may lead to a delay in recovery (Alatas et al., 2006; Asiri et al., 2006; Bopp et al., 2011; Klemetti et al., 2010). In our study, at the 48th hour after appendectomy, the pain level was found to be significantly lower in the early fed patients when compared with the control group. Our result is important for clinical practice indicating that pain level decreases with early feeding.

Kuzma's (2008) study was conducted with patients undergoing appendectomy and assessed postoperative pain levels using a scale of 0–6 points on the Faces Pain Scale. The mean pain score was 2 ± 2 on the second postoperative day in the conventional care group and 1 ± 2 in the FT surgical care group. There was no significant difference between the mean scores in terms of postoperative pain. In the study by Reismann et al. (2007), even though the pain level of children in the intervention group in the early postoperative period was slightly more than 5 (10-point scale), all other measurements indicated that postoperative pain was well controlled.

In Klemetti's study, the pain level of patients in the control group was higher than that in the intervention group. The level of pain in children in the control group did not decline in the first 24-hour period (Klemetti et al., 2010). Radke et al. (2009) studied children postoperatively who had undergone general anesthesia, and nutrition was provided on the basis of the request of the child. The children in the intervention group were allowed to eat at their request postoperatively. The control group's oral intake was

restricted for 6 hours postoperatively. The child's healing (0–6 scale, hunger, pain, nausea, vomiting level) was evaluated over a 24-hour period. The children in the intervention group were significantly happier and experienced less pain than the group that had restricted oral intake. Studies by Klemetti and Radke also support our findings stating that early postoperative feeding decreases the pain level.

Limitations

There are some limitations in this study. Patients who underwent laparoscopic or open appendectomy were included in this study. Although the type of surgical method could affect the results, the numbers of open and laparoscopic surgeries were similar between the groups.

Relevance to Clinical Practice

Postoperative early feeding results in faster overall recovery; therefore, patient discomfort and hospitalization costs could be decreased. Without waiting until the first flatus, liquid diet can be given to children after appendectomy and be advanced. These results indicate that nurses can efficiently enhance the patients' quality of life by sharing this new evidence with the postoperative care team, asserting the development of clinical early feeding protocols.

Conclusion

In this study, it was found that postoperative early feeding promoted postoperative recovery parameters. Our results indicate that early postoperative feeding leads to earlier first flatus and stool and shorter length of hospital stay. Children who were fed early felt less hunger, thirst, and pain in the postoperative period. In addition, early postoperative feeding did not cause increased nausea.

Based on these results, early feeding, which is an inexpensive, economic, and simple method to promote healing in the postoperative period, may be recommended as a routine procedure. Because of the short duration of hospitalization of patients after appendectomy, home care research after discharge may be recommended as a future research perspective. ✪

REFERENCES

Alatas, N., San, I., Cengiz, M., Iynen, I., Ahmet Yetkin, A., Korkmaz, B., & Kar, M. (2006). A mean red blood cell volume loss in tonsillectomy, adenoidectomy and adenotonsillectomy. *International Journal of Pediatric Otorhinolaryngology*, 70, 835–841.

Asiri, S. M., Abu-Bakr, Y. A., & Al-Enazi, F. (2006). Paediatric ENT day surgery: Is it safe practice? *Ambulatory Surgery*, 12, 147–149.

Baeyer, C. L. (2006). Children's self-reports of pain intensity: Scale selection, limitations and interpretation. *Pain Research Management*, 11, 157–162.

Bopp, C., Hofer, S., Klein, A., Weigand, M. A., Martin, E., & Gust, R. (2011). A liberal postoperative fasting regimen improves patient comfort and satisfaction with anesthesia care in day stay minor surgery. *Minerva Anestesiologica*, 77, 680–686.

Da Fonseca, L. M., Profeta da Luz, M. M., Lacerda-Filho, A., Correia, M. I., & Gomes da Silva, R. (2011). A simplified rehabilitation program for patients undergoing elective colonic surgery—randomized controlled clinical trial. *International Journal of Colorectal Disease*, 26, 609–616. doi:10.1007/s00384-010-1089-0

Duluklu, B. (2012). *Sol Kolon ve/veya Rektum Cerrahisi Sonrası Bağırsak Fonksiyonlarının Sağlamasında Sakız Çiğnemenin Rolü* (pp. 15–20). Surgical Nursing Master's Thesis. Ankara, Turkey.

Düzel, V. (2008). *Hemşire ve hastaların postoperatif ağrı değerlendirmelerinin karşılaştırılması. Yüksek Lisans Tezi* (pp. 18–20). Surgical Nursing Master's Thesis. Adana, Turkey.

Fanaie, S. A., & Ziaee, S. A. (2005). Safety of early oral feeding after gastrointestinal anastomosis: A randomized clinical trial. *Indian Journal Surgery*, 67, 185–188.

Gilbert, S. S., Easy, W. R., & Fitch, W. W. (1995). The effect of pre-operative oral fluids on morbidity following anaesthesia for minor surgery. *Anaesthesia*, 50, 79–81.

Güzeldemir, M. E. (1995). Ağrı Değerlendirme Yöntemleri—pain assessment methods. *Sendrom*, 6, 11–21.

Hatfield, N. (2008). *Broadribb's introductory pediatric nursing. Chapter 23: The school age child with a major illness* (7th ed., pp. 546–547). Philadelphia, PA: Wolters Kluwer Lippincott Williams & Wilkins.

Hausel, J., Nygren, J., Lagerkranser, M., Hellström, P. M., Hammarqvist, F., Almström, C., ... Ljungqvist, O. (2001). A carbohydrate-rich drink reduces preoperative discomfort in elective surgery patients. *Anesthesia & Analgesia*, 93, 1344–1350.

Kassi Assamoi, B. F., Yenon, K. S., Lebeau, R., Traore, M., Akpa-Bedi, E., & Kouassi, J. C. (2010). Early oral feeding versus classic oral feeding after appendectomy for acute appendicitis. *Revue Medicale de Bruxelles*, 31, 509–512.

Klappenbach, R., Yazici, F., Alonso Quintas, F., Horna, M., Alvarez Rodriguez, J., & Oría, A. (2013). Early oral feeding versus traditional postoperative care after abdominal emergency surgery: A randomized controlled trial. *World Journal of Surgery*, 37, 2293.

Klemetti, S., Kinnunen, I., Suominen, T., Antila, H., Vahlberg, T., Grenman, R., & Leino-Kilpi, H. (2010). The effect of preoperative fasting on postoperative thirst, hunger and oral intake in paediatric ambulatory tonsillectomy. *Journal of Clinical Nursing*, 19, 341–343.

Kokki, H., & Salonen, A. (2002). Comparison of pre- and postoperative administration of ketoprofen for analgesia after tonsillectomy in children. *Paediatric Anaesthesia*, 12, 162–167.

Kuzma, J. (2008). Randomized clinical trial to compare the length of hospital stay and morbidity for early feeding with opioid-sparing analgesia versus traditional care after open appendectomy. *Clinical Nutrition*, 27, 694–699. doi:10.1016/j.clnu.2008.07.004

Lewis, S. J., Egger, M., Sylvester, P. A., & Thomas, S. (2001). Early enteral feeding versus “nil by mouth” after gastrointestinal surgery: Systematic review and meta-analysis of controlled trials. *British Medical Journal*, 323, 773–776.

Lucha, P. A., Jr., Butler, R., Plichta, J., & Francis, M. (2005). The economic impact of early enteral feeding in gastrointestinal surgery: A prospective survey of 51 consecutive patients. *American Journal of Surgery*, 71, 187–190.

- Maessen, J. M., Hoff, C., Jottard, K., & Kessels, A. G. H. (2009). To eat or not to eat: Facilitating early oral intake after elective colonic surgery in The Netherlands. *Clinical Nutrition*, 28, 29–33.
- Pasero, C., & Belden, J. (2006, June). Evidence-based perianesthesia care: Accelerated postoperative recovery programs. *Journal of PeriAnesthesia Nursing*, 21, 168–176.
- Quin, W., & Neill, J. (2006). Evidence for early oral feeding of patients after elective open colorectal surgery: A literature review. *Journal of Clinical Nursing*, 15, 696–709.
- Radke, O. C., Biedler, A., Kolodzie, K., Cakmakkaya, O. S., Silomon, M., & Apfel, C. C. (2009). The effect of postoperative fasting on vomiting in children and their assessment of pain. *Paediatric Anaesthesia*, 19, 494–499. doi:10.1111/j.1460-9592.2009.02974.x
- Recel, J. R., & Segui, R. D. (2012). *Early oral feeding after appendectomy: A prospective study—Region I Medical Center*. Retrieved April 6, 2013, from http://r1mc.doh.gov.ph/index.php?option=com_content&view=article&id=99&Itemid=101
- Reismann, M., Mirja von Kampen, M. V., Laupichler, B., Suempelmann, R., Annika, I., Schmidt, A. I., & Ure, B. M. (2007). Fast-track surgery in infants and children. *Journal of Pediatric Surgery*, 42, 234–238.
- Reissman, P., Teoh, T. A., Cohen, S. M., Weiss, E. G., Nogueras, J. J., & Wexner, S. D. (1995). Is early oral feeding safe after elective colorectal surgery? A prospective randomized trial. *Annals of Surgery*, 222, 73–77.
- Sangkhatat, S., Patrapinyokul, S., & Tadyathikom, K. (2003). Early enteral feeding after closure of colostomy in pediatric patients. *Journal of Pediatric Surgery*, 38, 1516–1519.
- Sauerland, S., Thomas Jaschinski, T., Edmund, A. M., & Neugebauer, E. A. M. (2010). *Laparoscopic versus open surgery for suspected appendicitis (Review) The Cochrane Collaboration*. Hoboken, NJ: John Wiley & Sons. Retrieved March 15, 2013, from <http://www.thecochranelibrary.com>
- Schulman, A. S., & Sawyer, R. G. (2005). Have you passed gas yet? Time for a new approach to feeding patients postoperatively. *Practical Gastroenterology Triton Issues in Gastroenterology*, 32, 82–88.
- Terzioglu, F., Simsek, S. S., Karaca, K., Sariince, N., Altunsoy, P., & Salman, M. C. (2013). Multimodal interventions (chewing gum, early oral hydration and early mobilisation) on the intestinal motility following abdominal gynaecologic surgery. *Journal of Clinical Nursing*, 22, 1917–1925. doi:10.1111/jocn.12172
- Vargün, R., Yağmurlu, A., Bingöl Koloğlu, M., Özkan, H., Gökçora, H., Aktuğ, T., & Dindar, H. (2006). Management of childhood appendicitis: laparoscopic versus open approach. *Ankara University Medical Faculty Bulletin*, 59, 32–36.
- Wallström, A., & Gunilla, H. F. (2013). Facilitating early recovery of bowel motility after colorectal surgery: A systematic review. *Journal of Clinical Nursing*, 23, 24–44. doi:10.1111/jocn.12258
- Wang, S., & Kain, Z. N. (2000). Preoperative anxiety and postoperative nausea and vomiting in children: Is there an association? *Anesthesia & Analgesia*, 90, 571–575.
- Willcuts, K. (2010, December). Postoperative ileus. *Practical Gastroenterology*, 16–27.