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ORIGINAL ARTICLE

The Role of Nasogastric Intubation on Postoperative Gastrointestinal Function in Patients with Obstructive Jaundice

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Abstract It is the practice of many surgeons to use the routine nasogastric tube after biliary operations, but its usefulness has been questioned. This study was designed to determine the effect of postoperative nasogastric intubation on gastrointestinal function in patients with obstructive jaundice. In this randomized clinical trial, 40 patients who underwent choledochoduodenostomy or hepaticojejunostomy were randomly divided into two groups. Patients in the experimental group did not have the nasogastric tube, and in the control group the nasogastric tube was routinely applied after surgery. Gastrointestinal function was compared in these two groups. Patients with no nasogastric intubation did not show any postoperative complications or prolonged hospital stay. On the contrary, nasogastric tube insertion postponed return of bowel function and increased the incidence of nausea and vomiting, while it did not affect the incidence of postoperative ileus. Routine use of the nasogastric tube after choledochoduodenostomy or hepaticojejunostomy can delay normal gastrointestinal function and increase postoperative discomfort.

Keywords Nasogastric intubation · Gastrointestinal function · Postoperative ileus

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Introduction

Today, insertion of a nasogastric tube into the stomach is a common medical intervention indicated for a wide range of situations. Because many believe that postoperative ileus significantly increases the risk of postoperative complications including nausea, vomiting, aspiration, wound dehiscence and infection, herniation, fascia adhesions, and late bowel function that may lead to a longer hospital stay, nasogastric intubation following laparotomy, as a prophylactic measure for the prevention of the associated complications, has been the standard of care in most medical centers [1, 2].

The results of the study by Gerber and Robert (1958) showed that routine use of the nasogastric tube after surgical operations is unnecessary, and it increases patient's stress and discomfort [3]. Recently, several studies on nasogastric intubation questioned its efficacy in upper gastrointestinal surgeries [4, 5]. Data from the study by Wittbrodt demonstrated that patients with no nasogastric tube after the operation had a shorter length of hospital stay [6].

The aim of the study is to evaluate effects of nasogastric tube insertion on postoperative gastrointestinal function after choledochoenterostomy in patients with the obstructive jaundice.

Patients and Methods

This study is a randomized clinical trial of 40 patients with the obstructive jaundice hospitalized in the Department of General Surgery, Imam Reza University Hospital, Mashhad, Iran, between October 2006 and May 2007. The sample size was estimated using NCSS and PASS software for the independent sample *T*-test. The patients were randomly divided into experimental (20) and control (20) groups. Our institutional review board approved the study, and informed consent was obtained from all participants.

Patients were randomly assigned to two groups using sealed envelopes and were unaware of their group assignment.

Data were collected through different questionnaire surveys, interviews, and clinical and paraclinical finding forms. The sociodemographic characteristics in terms of age, gender, location, marital status, level of education, family income, and employment status were assessed through a questionnaire. Also the data for variables such as previous gastrointestinal disorders and underlying diseases were recorded in these questionnaires.

Interview with the patients included the time to start to walk after surgery, the time to first gas passing and defecation, and questions including associated problems with nasogastric intubation and tolerance of diets.

Clinical and paraclinical findings forms including the type and dose of antibiotic used, type and dose of opioid used, type and quantity of liquids administered intravenously, quantity of oral liquids, cause of the obstructive jaundice, length of hospital stay before surgery, duration of anesthesia, and complications associated with nasogastric tube insertion were collected through a questionnaire. All patients were trained to record frequency and severity of their postoperative nausea, vomiting, and flatus in special standard forms. A 100 mm length horizontal line used for estimating the severity of the nausea (0 mm, no nausea; and 100 mm, severe nausea) in which the distance from 0 to the location of the patient's mark in millimeter represents the relative severity of the nausea. Vomiting was graded on a four-point scale as 0=nothing; 1=mild; 2=moderate, and 3=severe, and the patients were asked to choose a number on this basis. Also, the patients were asked to mark on a 10 cm horizontal line graded from 0 to 5 representative of the severity of their flatus.

Furthermore, abdominal circumference was measured with a tape as a way for estimating the degree of the ileus on a daily basis. Bowel sound auscultation was performed three times a day on the morning, evening, and night of the first and second postoperative days with a stethoscope.

Exclusion criteria included the following:

a) At the beginning of the study
    1) Patients with diseases affecting gastrointestinal function (chronic diseases of upper and lower gastrointestinal tract, chronic constipation, inflammatory bowel disease, gastric, and duodenal ulcers), metabolic disorders (diabetes mellitus, hyperthyroidism, hypothyroidism), extrabiliary malignancies, systemic diseases, genetic diseases of the gastrointestinal tract, psychological disorders, cerebral brain lesions, chronic respiratory diseases, renal disorders (necessity for dialysis or transplantation)
    2) Those with a history of bowel obstruction
    3) Consumption of tobacco, and addiction to cigarette, alcohol, and opioids
    4) Taking drugs that might affect gastrointestinal function (cisapride, antacids cimetidine, ranitidine, famotidine, omeprazole, corticosteroids, laxatives, compositories)
    5) Experienced major stress during the last week (death of a loved one, job loss, divorce)
b) During the study
    1) Administration of any type of analgesia except general anesthesia
    2) Performing operations with no biliary tract bypass
    3) Any intraoperative complications leading to the specific interventions
    4) Constant vomiting, excessive nausea, and flatus after surgery necessitating nasogastric intubation or medical treatment

Before the operation, patients received 1 g ceftriaxone in combination with a single dose of intravenous clindamycin or metronidazole. All patients underwent general anesthesia with the same anesthetic protocol. Operation was performed through a midline or subcostal incision. Cholecystectomy along with choledochoduodenostomy or hepaticojejunostomy was performed based on the surgeon's preference.

Following surgery, antibiotics were continued for two doses. The prescribed analgesic was pethidine or methadone to be injected in event of pain.

All patients were non per os (NPO) for 3 days and received 3 liters of 1/3 2/3 per day. On the second day, potassium chloride (20 cc/L) was added to the serum. All of them were encouraged to walk the day after the operation. In the control group, the nasogastric tube was removed on the morning of the third day after operation. On the fourth day, a diet limited to liquids was initiated, and on the next day, complete liquid diet was given. A regular or low-fat

diet was commenced on the sixth day. Postoperative complications were recorded. Providing there were no postoperative complications, and if the patient could tolerate the diet, and had a feeling of defecation, she or he would be discharged on the sixth day after the operation.

Finally, collected data were analyzed by SPSS software, version 13, and statistical methods such as chi-square, Mann–Whitney, T-Student, and Fisher's exact test.

Results

Participants included were 37% male and 63% female. The average age of the two groups was 61.65±11.97 and 56.55±12.24 years, respectively. The two groups were similar in terms of marital status, location, education level, family income, employment status, nutritional regimen, appetite status, underlying diseases, drug use, and cause of the obstructive jaundice (choledocholithiasis or malignant obstruction of the biliary tract).

There was no significant difference between the two groups regarding the type of postoperative antibiotics administered intravenously and times of intravenous analgesic administration (*P* value=0.82). During the study, the mean time of intravenous analgesic administration was 0.5 and 0.85 time in the experimental and control groups, respectively (Table 1).

A *T*-test demonstrated that there were no statistically significant differences between the two groups regarding the received liquids as well as the first time to walk after surgery (Table 1).

Bowel sounds were auscultated in 85% of the experimental group and 20% of the control group until the end of the first postoperative day. The results indicated that there was a significant difference between the two groups in terms of the time to return of bowel sounds (*P* value=0.001).

The mean time to the first passage of flatus in the experimental and control groups was 48.25±14.63 and 65.45±22.84 h, respectively. Analysis of these data revealed a significant difference between the groups (*P* value=0.007).

Half of the patients in experimental group had gas passing until the second postoperative day and the other half until the third day, while in control group, the first passage of flatus occurred only in 15% of the patients, and in the others, gas passing was postponed until the fourth postoperative day.

All participants experienced nausea on the day of surgery. The incidence rate of nausea on the day of operation and the first day after operation showed no significant difference between the two groups. In the control group, 70% on the second day and 50% on the third day reported nausea after surgery, while they were 15 and 5%, respectively, in the experimental group. According to the Fisher's exact test, there was a statistically significant difference between the groups in the proportion of patients reporting nausea in the second (*P* value=0.01) and third days (*P* value=0.003) after surgery.

The frequency of nausea on the second (*P* value=0.001) and third (*P* value=0.007) days after the operation was significantly different in the two groups. We also compared the severity of nausea between the groups, which was more severe in the control group than in the experimental group on the second and third postoperative days (Table 2).

The highest rate of vomiting occurred on the day of operation (40% in each group); there were no reports of vomiting since the third day after the operation. Fisher's exact test showed that there was no significant difference between the two groups regarding incidence of vomiting on the day of surgery, the first and second postoperative days. Also, the frequency and severity of vomiting did not have significant difference between the two groups during these three days (Table 3).

The highest incidence rate of flatus was reported on the day of operation (40% in the experimental group and 30% in the control group); patients in the experimental group reported no flatus since the third postoperative day. Fisher's exact test showed no significant difference between the two groups regarding incidence of flatus on the day of surgery (*P* value=0.37), the first day (*P* value=1), and 2 days after that (*P* value=1). The frequency and severity of flatus was also

Table 1 Comparison of some parameters between experimental and control groups

	Experimental group	Control group	p-value
Mean time of IV analgesic administration[a]	0.5	0.85	0.82
Received liquids[b]	3.17±0.73	3.05±0.95	0.38
First time to walk (hour)	13.95±5.6	11.00±8.01	0.20
Mean length of hospital stay (day)	6.15±1.98	6.05±2.74	0.77

[a] Mean time of intravenous analgesic administration per day during hospitalization

[b] Mean intravenous liquids received by the patients before starting oral liquids (lit/day)

Table 2 Comparison of the postoperative nausea between experimental and control groups

		P–Value			
		Operation day	1st day	2nd day	3rd day
Nausea	Incidence			0.01	0.003
	Severity	0.21	0.41	0.001	0.005
	Frequency	0.75	0.24	0.001	0.007

Table 3 Comparison of the postoperative vomiting between experimental and control groups

		P–Value		
		Operation day	1st day	2nd day
Vomiting	Incidence	1	0.66	1
	Severity	0.92	0.64	0.79
	Frequency	0.89	0.43	0.3

compared, which showed no significant difference between the two groups (Table 4).

Also, no significant difference was found in terms of increase in abdominal circumference on the day of operation, the first and second postoperative days (P value=0.65, 0.82, and 1, respectively). No diet intolerance was noted in each group.

Comparison of postoperative complications showed no significant difference between the two groups. Increased pulmonary secretions, the only complication, occurred in the control group. The control group was evaluated regarding complications associated with routine nasogastric tube insertion. The results indicated that majority of these patients suffered from the related problems. On the other hand, the mean length of hospital stay after surgery was equal in both groups (Table 1).

Discussion

Results of the study indicate that bowel sounds returned earlier in the experimental group than in the control group. These results agree with those of Cheadle et al. [7].

The time to first passage of flatus after surgery was shorter in the experimental group than in the control group, which confirms the earlier studies by Cutillo et al. and Zhou et al. [5, 8]. These data show that the nasogastric tube postpones return of bowel movements.

The rates of nausea on the day of surgery and the first postoperative day were equal in both groups. This could be because of anesthetic drugs and surgical manipulation. The control group showed a significant difference in severity of nausea on the second and third postoperative days when compared to the experimental group. Thus, it seems that nasogastric tube insertion may exacerbate incidence of nausea in these patients. Numerous studies have indicated that patients with no nasogastric intubation show decreased pharyngolaryngitis and nausea resulting in patient convenience. These results are in agreement with the observation of Lee et al. [9].

Table 4 Comparison of the postoperative flatus between experimental and control groups

		P–Value		
		Operation day	1st day	2nd day
Flatus	Incidence	0.37	1	1
	Severity	0.65	0.54	1
	Frequency	0.58	0.85	1

There was no significant difference between the two groups regarding incidence of vomiting on the day of surgery and the first and second days after surgery.

A comparison of the two groups in terms of severity and times of vomiting after surgery also showed no significant difference. These results agree with the studies by Cutillo et al., Lee et al., and Michowitz et al. [5, 9, 10].

A meta-analysis by Cheatham et al. demonstrates that although the incidence of abdominal distension and vomiting is increased in the absence of nasogastric decompression, patients may develop these complications even with a nasogastric tube in place. In the meta-analysis of all 26 clinical trials, 8.2% of selectively decompressed and 8.3% of routinely decompressed patients developed abdominal distension, whereas 10.1% of the former group members and 8.5% of the latter one developed vomiting. Thus, routine nasogastric decompression neither prevents the development of abdominal distension and vomiting nor precludes the need for nasogastric tube replacement once it is discontinued [11].

The study by Cheadle et al. [7] indicated that incidence of vomiting was 42% in the control group compared to 64% in the case group (P value <0.001). They concluded that although the incidence rate of vomiting was more in patients with the nasogastric tube, the length of hospital stay was longer in these patients and they experienced more inconvenience than patients without nasogastric decompression. Furthermore, the frequency of vomiting was low and did not accompany with aspiration pneumonia. Other studies do not agree and conclude that this rate seems trivial but may result in significant morbidity [12, 13].

The incidence of vomiting in child patients without nasogastric decompression is estimated to be more (23%), but this rate is reported to be about 10% in adult patients [14, 15]. In our study it was 5–10%, which agrees with previous studies.

This study showed that the incidence, frequency, and severity of the flatus (according to objective data) did not have significant difference between the experimental and control groups, which confirms previous studies such as Cheadle et al's [7]. We can conclude that routine nasogastric decompression does not affect the incidence of flatus in surgical patients.

The abdominal circumference, as a way for estimating the degree of the ileus, was increased in both groups but

without significant difference, which shows that surgical patients experience a period of ileus in the postoperative period but nasogastric decompression does not reduce it. This is in agreement with Zhou et al's conclusion [8].

According to Cutillo et al. [5], patients without the nasogastric tube tolerated a regular diet significantly earlier than did the patients with the nasogastric tube (P value <0.01). Our study reveals no significant difference in this regard between the two groups. This discrepancy may be due to our different policy in initiation of oral diet; that is, the liquid diet was initiated in all patients without attention to return of bowel sounds and presence or absence of gas passing.

Cutillo et al. and Zhou et al. [5, 8] in different studies concluded that the first defecation occurred earlier in the experimental group (P value <0.01), while according to our data, there was no significant difference between two groups. This discrepancy probably comes from different protocols in starting oral diet. We initiated the oral diet in all the patients at a regular time (the fourth postoperative day), but in other studies oral diets were begun after the first passage of flatus, and because this time it usually occurs sooner in the experimental group than in the control group, it may result in earlier oral intake and in turn earlier passage of fecal material.

Many surgeons refuse abdominal operations without the nasogastric tube because they worry about the risk of aspiration pneumonia, anastomotic leakage, and latent bleeding, but this study and some previous studies such as those by Zhou et al. and Lee et al. have shown that there is no significant difference in the incidence of postoperative complications between patients with and without the nasogastric tube [8, 9].

According to Zhou et al., the length of hospital stay does have statistical significant difference between patients with and without the nasogastric tube, but Cheadle et al. [7] shows that this time is longer in patients with routine use of the nasogastric tube. The origin of these opposite conclusions probably lies in the different selection criteria for the patients in these studies. In the former studies, the patients were limited to a particular abdominal operation, but in the latter studies, different abdominal operations were compared.

Results of the study revealed that patients with no nasogastric intubation did not show any postoperative complications or prolonged hospital stay. On the other hand, the nasogastric tube postpones return of bowel sounds and the first passage of flatus; increase the incidence of nausea while does not affect the incidence of postoperative ileus. Therefore, routine nasogastric tube usage is not recommended after surgery of patients with the obstructive jaundice.

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