Comparing early oral feeding with traditional oral feeding in upper gastrointestinal surgery

Üst gastrointestinal cerrahi sonrasında erken oral beslenme ile geleneksel oral beslenmenin karşılaştırılması

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Background/aims: *Due to the lack of interest in using early oral feeding and the need for a trial study in this regard, this study aimed to compare the outcome of early oral feeding and traditional oral feeding in patients with upper gastrointestinal surgery.* ***Methods:*** *Fifty-two patients who underwent upper gastrointestinal surgery were randomly assigned into two groups in a consecutive manner as either the early oral feeding group or traditional oral feeding group. Tolerance of oral feeding, ileus, nausea and vomiting, post-operative stay, and complications were recorded.* ***Results:*** *Tolerance of oral feeding for the two groups was 24 (92.3%) in the early oral feeding group and 21 (91.3%) in the traditional oral feeding group (p=0.89). The post-operative hospital stays were 5.62 and 8.04 days in the early oral feeding and traditional oral feeding groups, respectively (p<0.0001). There were significant differences between the two groups in terms of the time of the first gas passing/defecation, the post-operative hospital stays, starting time of oral feeding, and satisfaction regarding early nasogastric tube removal.* ***Conclusions:*** *The results of this study show that early oral feeding is a safer and more cost-effective procedure in upper gastrointestinal surgery.*

Key words: Early oral feeding, traditional oral feeding, abdominal surgery, upper gastrointestinal surgery

Amaç: *Erken oral beslenme konusuna ilgi olmaması ve bu konu hakkında çalışmaya ihtiyaç olması nedeni ile bu çalışmada üst gastrointestinal cerrahi yapılan hastalarda erken oral beslenme ile geleneksel oral beslenmenin karşılaştırılması amaçlanmıştır.* ***Yöntem:*** *Üst gastrointestinal cerrahi uygulanan 52 hasta sıralı olarak 2 gruba randomize edildi. Bu gruplardan birincisinde cerrahi sonrası erken oral beslenmeye geçilirken diğerinde geleneksel yöntemlere göre beslenmeye geçildi. Oral beslenmenin toleransı, ileus gelişimi, bulantı ve kusma, postoperatif yatış süresi ve gelişen komplikasyonlar tespit edildi.* ***Sonuçlar:*** *Oral beslenme erken oral beslenme grubunda 24 (%92.3) ve geleneksel yöntemlere göre grubunda 21 (%91.3) hastada tolere edildi (p=0.89). Postoperatif hastane yatışları erken oral beslenme ve geleneksel yöntemlere göre gruplarında sırasıyle ortalama 5.62 ve 8.04 gün bulundu (p<0.0001). Her iki grup arasında gaz/gaita çıkışının süresinde, postoperatif hastane yatışında, oral beslenmenin başlanma süresinde, nazogastrik sondanın çekilme süreleri arasında belirgin farklılık tespit edildi.* ***Tartışma:*** *Bu çalışmanın sonuçlarına göre üst gastrointestinal operasyon geçiren hastalarda oral beslenmeye erken geçilmesi güvenli ve maliyeti azaltan bir uygulamadır.*

Anahtar kelimeler: Erken oral beslenme, geleneksel oral beslenme, karın cerrahisi, üst gastrointestinal cerrahi

INTRODUCTION

Traditionally after abdominal surgery, the passage of flatus or bowel movement is considered the clinical evidence for starting an oral diet. The resolution of post-operative ileus defined by the passage of flatus usually occurs within five days (1, 2). Post-operative dysmotility predominantly affects the stomach and colon, with the small bowel recovering normal function 4-8 hours after laparotomy (3). Then the stomach is decompressed with a nasogastric tube and intravenous fluids are given, with oral feeding being introduced as the gastric dysmotility resolves (3). The rationale of nil by mouth is to prevent post-operative nausea and vomiting and to protect the anastomosis, giving it time to heal before being stressed by food. However, it is unclear for how long the deferral of enteral feeding is beneficial (3).

Contrary to the widespread belief, evidence from clinical studies and animal experiments suggests that initiating early feeding is advantageous (1). In animals, starvation reduces the collagen content in anastomosis scar tissue and diminishes the quality of healing (4), whereas feeding reverses the mucosal atrophy induced by starvation and in-

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creases anastomosis collagen deposition and strength (5, 6). Recovery was shown within one week in the enteral nutrition group in some studies (7), and experimental data in both animals and humans suggest that enteral nutrition is associated with improvement in wound healing (5, 8). Early feeding improves the outcome in patients with trauma and burns, although few studies have examined its use after lower gastrointestinal (LGI) anastomosis (1, 9, 10).

Early enteral nutrition (nasogastric tube, NGT) or oral feeding appears to be a useful and safe therapeutic alternative for the post-operative management of patients undergoing upper gastrointestinal (UGI) surgery (2, 5, 11, 12). However, careful selection of patients is necessary in order to obtain the greatest benefit of early oral feeding (EOF) in these patients (11, 13). In this regard, the role of EOF in UGI surgery needs to be clarified by controlled randomized trials (11-14).

Even today, many surgeons do not believe in the effects of EOF in the treatment of UGI surgery patients. Due to the lack of interest in using EOF and the need for a trial study in this regard, this study aimed to compare the outcome of EOF and traditional oral feeding (TOF) in patients who underwent UGI surgery.

MATERIALS AND METHODS

A prospective randomized clinical trial study was carried out in UGI surgical patients of Shafieeh and Vali-Asre Hospitals in Zanjan (Iran) from June 2006 to July 2007. Exclusion criteria were: patients less than 18 and over 75 years old with comorbidity (severe heart disease class III and IV, chronic renal failure, asthma and diabetes), visceral cavity rupture duration of more than 6 hours, acute GI obstruction, trauma with a shock of more than grade I, multiple trauma and pregnancy, abnormal nutritional status, more than 10% weight loss, operation history, abnormal plasma albumin and anemia, and electrolyte imbalance. Written informed consent was obtained from all patients prior to their enrollment in the study. If any of the patients was incapable of understanding the information regarding the study, they were excluded.

Fifty-two patients who underwent UGI surgery were randomly assigned into two groups in a consecutive manner as either the EOF group or TOF group. Both groups received similar prophylaxis antibiotics and anesthetic drugs. The operation techniques and suture ties were similar in all patients. A NGT was placed in all patients during the operation.

In the EOF group, the NGT was removed 24 to 48 hours after the operation (when the NGT secretion was less than 30 cc daily). Afterwards, patients were given 30 to 50 ml of water and liquid fiberless diet every 3 hours after the 2nd post-operative day (i.e. after 48 hours). The patients without ileus and complications received soup, high protein liquid and juice on the 4th post-operative day and were discharged the next day.

In the TOF group, the NGT was removed 3-5 days after the operation (when the NGT secretion was less than 30 cc daily and there was no ileus). Patients were then given liquid fiberless diet after the 5th post-operative day. The patients without ileus and complications received soup, high protein liquid and juice after the 6th post-operative day and were discharged the next day.

All patients were monitored prospectively by the nursing staff and general physician to record the NGT removal time, tolerance of oral feeding, ileus, nausea and vomiting, fever, control of vital signs, time of first passage of flatus, time of first passage of stool, duration of post-operative stay, patient satisfaction and complications (including body temperature >38.5°C after the 2nd post-operative day, wound infection, leakage from anastomosis, intraabdominal abscess, peritonitis, pneumonia, and sinusitis). The criteria for discharge were: absence of nausea, vomiting and abdominal distention, ability to tolerate oral feeding, spontaneous micturition, adequate healing, afebrile, and hospital stay of at least 48 h after the initiation of oral feeding (the ethical committee's recommendation for patient assessment).

In this study, the chi-square test was used for the analysis of the qualitative variables and Student t test for continuous variables. Results of the two groups were compared using Student t test. Values of $p<0.05$ indicated significant difference. Analyses were performed using SPSS software (version 11.5). The study protocol was approved by the Ethics Committee of Zanjan University of Medical Sciences.

RESULTS

A total of 52 patients were divided into two groups, with 26 patients in the EOF group and 23 in

the TOF group. Three patients were excluded from the TOF group due to their drinking juice on the 3rd post-operative day.

There were no significant differences in terms of age, gender, place of residence, operation site, nausea, vomiting, and ileus between the two groups (Table 1). Indications for anastomosis and surgery were approximately similar between the two groups (Table 2).

The mean times of NGT removal were 1.62±0.49 and 4.61±1.99 days in the EOF group and TOF group, respectively (p<0.0001). In 10 (38.5%) patients in the EOF group, NGT was removed on the 1st post-operative day, and for the others the NGT was removed on the 2nd post-operative day. In the TOF group, 3 (13%) patients removed the NGT themselves (when the NGT secretion was less than 20-30 cc daily, and we did not try to reinsert it) and 5 (21.7%) patients after the 6th day. All patients were satisfied with early NGT removal in the EOF group, and 43% of the patients in the TOF group cited discomfort due to the long period of NGT use.

The mean starting times of oral feeding for the two groups were 2.04±0.19 and 5.87±1.32 days for the EOF and TOF groups, respectively (p<0.0001). Twenty-four (92.3%) patients in the EOF and 21 (91.3%) in the TOF group tolerated the oral feeding successfully. Four patients had nausea and/or vomiting in the EOF group, while 3 patients had nausea and vomiting in the TOF group. Two patients in each group were NPO (non-per oral) for 6 to 12 hours, and oral feeding was restarted for these patients afterwards. Two patients in the EOF group had ileus, which was resolved with restriction of oral feeding. In the TOF group, 3 patients had ileus. Eighty-one percent of the patients in the EOF group and 74% of the patients in the TOF group reported no problems (i.e. nausea, vomiting or ileus).

Table 1. Patient demographics

	Early oral feeding (N=26)	Traditional oral feeding (N=23)	P-value
Male	16 (61.5%)	19 (82.6%)	0.10
Female	10 (38.5%)	4 (17.4%)	
Mean age (years)	46.85	43.57	0.50
Range age (years)	(17-74)	(20-70)	
Rural	12 (46.2%)	13 (56.5%)	0.47
Urban	14 (53.8%)	10 (43.5%)	
Nausea	3 (11.5%)	3 (13%)	0.87
Vomiting	3 (11.5%)	3 (13%)	0.87
Ileus	2 (7.7%)	3 (13%)	0.54
Tolerate oral feeding	24 (92.3%)	21 (91.3%)	0.89
X-ray	1 (3.8%)	0	-
Emergency	4 (15.4%)	7 (30.4%)	0.21

Table 2. The site of operation, type of procedure and etiology

	Early oral feeding (N=26)	Traditional oral feeding (N=23)
Stomach	6	6
Resection (Cancer)	5	5
Repair (Stab wound)	1	1
Duodenum	11	12
Choledochoduodenostomy (CBD stone)	8	6
Repair (PPU)	2	6
Stricturoplasty	1	0
Jejunum	5	3
Resection (Cancer)	2	1
Repair (Stab wound)	1	1
Choledochojejunostomy (CBD stone)	1	1
Cholecystojejunostomy (Pancreatic cancer)*	1	0
Stomach + Jejunum	5	3
Gastrojejunostomy (Chronic peptic disease)	4	2
(Pancreatic cancer)*	1	1

CBD: Common bile duct. PPU: Perforated peptic ulcer. *: One patient underwent two procedures.

The vital signs were similar between groups before and after the oral feeding (Table 3). Sodium, potassium, white blood cell count, neutrophil, and albumin were normal before and after the operation in both groups.

The mean time of first gas passing and/or defecation is shown in Table 2. Two patients (7.7%) in the EOF group and 10 (43.5%) in the TOF group had gas passing and/or defecation after the 5th post-operative day. Twenty-four (92.3%) of 26 patients in the EOF group were satisfied with the oral feeding that started on the 2nd post-operative day. In the TOF group, 13 patients (56.5%) complained regarding the feeding delay. No other complications, such as leakage from anastomosis, abscess, wound infection, or pneumonia, were observed in either group.

The post-operative hospital stays were 5.62 and 8.04 days in the EOF group and TOF group, respectively. It should be mentioned that some of the patients in both groups were hospitalized more than 5 and 8 days in the EOF and TOF groups, respectively. There was a significant difference in terms of the time of the first gas passing/defecation, the post-operative hospital stays, starting time of oral feeding, and satisfaction regarding early NGT removal between the two groups (Tables 1 and 3).

For patients with stomach cancer in the EOF and TOF groups (5 in each), there was no significant difference in terms of the time of the first gas passing/defecation (3±1 vs. 4.8±2.8, p=0.22) and the post-operative hospital stays (6.8±1.9 vs 8.4±2.7, p= 0.32). However, there was significant difference in terms of the time of NGT removal (1.8±0.4 vs. 5.2±2.9 days, p=0.034) and starting time of oral feeding (2.0±0.0 vs. 6.6±1.9 days, p=0.001). For patients with choledochoenterostomy (9 in EOF group vs. 7 in TOF group), differences in the first gas passing/defecation, post-operative hospital stay, time of NGT removal, and starting time of oral feeding were significant between the two groups (Table 4).

Table 3. Comparison of the two study groups with respect to several parameters

Variable	Group	N	Mean (SD)	P-value
Age	TOF	23	43.6 (16.8)	0.50
	EOF	26	46.8 (17.4)	
Time of NGT removal (day)	TOF	23	4.61 (1.99)	<0.0001
	EOF	26	1.62 (0.49)	
Start of oral feeding (day)	TOF	23	5.87 (1.32)	<0.0001
	EOF	26	2.04 (0.19)	
Pulse rate before oral feeding	TOF	23	83.5 (9.6)	0.49
	EOF	26	82.0 (4.9)	
Pulse rate after oral feeding	TOF	23	82.5 (5.8)	0.56
	EOF	26	82.4 (10.6)	
Temperature before oral feeding	TOF	23	37.1 (0.39)	0.73
	EOF	26	37.0 (0.45)	
Temperature after oral feeding	TOF	23	37.20 (0.31)	0.76
	EOF	26	37.18 (0.30)	
Time to first gas passing and/or defecation	TOF	23	4.35(1.1)	0.001
	EOF	26	2.73(1.7)	
Post-operative hospital stays	TOF	23	8.04 (2.6)	< 0.0001
	EOF	26	5.62 (1.3)	

SD: Standard deviation. TOF: Traditional oral feeding. EOF: Early oral feeding

Table 4. Comparison of outcomes in patients with choledochoenterostomy according to the two study groups

Variable	EOF (mean ± SD) (n=9)	TOF (mean ± SD) (n=7)	p value
Age	60.3±9.1	49.5±11.3	.054
Time of NGT removal (day)	1.56±0.5	4.43±1.3	<0.0001
Start of oral feeding (day)	2±0.0	5.7±1.2	<0.0001
Temperature after oral feeding	37.1±0.3	37.2±0.4	0.57
Time to first gas passing and/or defecation	2.4±1.2	4.3±0.9	0.006
Post-operative hospital stays	5.1±1	8.7±3.5	0.011

SD: Standard deviation. TOF: Traditional oral feeding. EOF: Early oral feeding. NGT: Nasogastric tube.

DISCUSSION

The results of the present study suggest that EOF in UGI anastomosis or surgery is safer than TOF because it can lead to a reduction in the time of the first gas passing and/or defecation, hospital stay and costs. However, tolerance of oral feeding, post-operative ileus, nausea, vomiting, and post-operative complications are somehow similar between the two groups.

Zhou et al. (15) showed that when the NGT was not inserted routinely, patients experienced an earlier return of bowel function, a marginal decrease in pulmonary complications, and a marginal increase in wound infection and ventral hernia. Anastomotic leakage was similar in the two groups. Huerta et al. (16) suggested that routine placement of an NGT after Roux-en-Y gastric bypass is unnecessary. Thus, it is clear that different studies have reported different results. In our study, early removal of the NGT increased patient satisfaction in all cases and did not increase complications. The removal of NGT before the 2nd post-operative day in UGI anastomosis is recommended.

Fanaie et al. (1) reported in their study that the mean days gas passing and ileus were the same in the two groups. In our study, patient satisfaction from early feeding in the EOF group was higher than patient satisfaction in the TOF group. Tolerance of oral feeding, nausea, vomiting, ileus, and complications were similar in the two groups. The mean time of the first gas passing/defecation in the EOF group was less than in the TOF group.

Post-operative ileus, nausea and vomiting are part of a physiological reaction to abdominal surgery and traditionally have been considered obligatory responses (2). Enteral feeding has long been delayed, classically and traditionally, after abdominal operations until the occurrence of bowel movements or defecation (10, 17, 18). However, some studies have shown tolerance to clear liquids on the 1st post-operative day after GI surgeries (19, 20). There are a number of factors that may facilitate early oral intake after GI surgery including effective pain relief using epidural anesthesia while avoiding opioids, minimizing sodium and fluid administration preoperatively and substantially reducing preoperative fasting (12). Other studies reported that early feeding in UGI and LGI surgery is safe (1, 2, 5, 9-11, 21).

Fukuzawa et al. (5) showed that EOF after UGI surgery leads to prompt anastomotic healing. Ekingen et al. (2) showed that neither anastomotic leakage nor dehiscence was observed in any group. Kamei et al. (7) showed that patients who underwent total gastrectomy for gastric cancer were randomized to receive oral enteral nutrition beginning on the 3rd post-operative day with peripheral supplements or total parental nutrition beginning on the 3rd post-operative day. The complications were similar in both groups. Fanaie et al. (1) reported that the anastomotic complications were similar in early and late oral feeding in GI surgery. There was one case of small bowel suture leakage, but its relation to the tube feeding was not confirmed (11). In our study, no other complications, such as leakage from anastomosis, abscess, wound infection, or pneumonia, were observed in either group.

Kamei et al. (7) showed that treatment cost was less and length of hospital stay was shorter in the oral enteral nutrition group in total gastrectomy. In addition, Velez et al. (11) showed that early enteral nutrition causes faster recovery of bowel function and leads to a shorter hospital stay in GI surgery. It should also be mentioned that in the past, many studies have shown that EOF can improve the return of GI function and shorten hospital stay in colorectal surgery (LGI) (9, 15, 21, 22).

Heterogeneity of the patients can be considered one of limitations of this study. In order to minimize its effect, we reanalyzed the data in the subgroups and then compared the results between the two groups. The results showed a significant difference in patient subgroups with stomach cancer and with choledochoenterostomy in the EOF and TOF groups. Differences in the post-operative hospital stays and the mean time of first gas passing/defecation were not significant between the two subgroups in patients with major surgery (stomach cancer subgroups). However, there were significant differences between the two subgroups in patients with moderate surgery (choledochoenterostomy subgroups). Nevertheless, according to the Textbook of General Surgery, in the case of upper GI surgeries: *During the first 72 hours after operation, the patient is given nothing but parenteral fluids. Small amounts of tap water are allowed on post-operative day 4, and a liquid diet usually is begun on day 5. A post-gastrectomy diet is begun on day 6 or 7 (23).*

In conclusion, the results of this study indicate that EOF leads to patient satisfaction and reduction in the time of the first gas passing, hospital stay, and acceptable complications rates in UGI surgery, especially in a moderate surgery. It is

therefore concluded that early feeding is safer and can be tolerated well by many patients undergoing UGI surgery. Judging the different aspects of EOF requires a separate comprehensive research in gastrectomy, gastrotomy, duodenotomy and choledochoenterostomy subgroups with more patients.

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