Early Feeding after Digestive Surgery: Is it Safe?

Edelyn Christina
Faculty of Medicine, Tarumanagara University, Jakarta, Indonesia

ABSTRACT

Withholding nutrients following surgery until the resolution of intestinal function is not supported by scientific evidence. Early feeding after surgery consisted of a liquid diet within 24 hours after surgery, followed by the gradual increase of food consistency and amount until patients can tolerate solid feeding. However, the safety and efficacy of the procedure are still unclear.

Keywords: Digestive surgery, early feeding, nutrient

ABSTRAK

Praktik menghindari asupan nutrisi pasca-operasi hingga terdapat bukti resolusi fungsi pencernaan tidak didukung bukti ilmiah. Nutrisi dini berarti asupan nutrisi berupa diet cair dalam 24 jam pasca-operasi, diikuti peningkatan jumlah dan konsistensi makanan hingga pasien dapat menoleransi makanan padat. Masih terdapat kontroversi terkait keamanan dan efikasi prosedur nutrisi dini tersebut. **Edelyn Christina. Nutrisi Dini Pasca Bedah Digestif: Amankah?**

Kata kunci: Bedah digestif, nutrisi dini, nutrisi

Introduction

The use of a nasogastric tube with avoidance of fluids or nutrients intake (nil by mouth) until the resolution of postoperative ileus, have traditionally become a routine practice of postoperative rehabilitation program.[1] Avoidance of nutritional intake is believed to be necessary to prevent postoperative complications, such as bowel obstruction, aspiration pneumonia, nausea, vomiting, and protect surgical anastomoses from intestinal movement. Ileus paralytic is one of the postoperative side effects that are unavoidable. Flatulence and/or passage of stools signal resolution of postoperative ileus.[2] However, this practice is not supported by scientific evidence.

Early nutrition after surgery is defined by administering a liquid diet within 24 hours after surgery, followed by the gradual increase of consistency and amount of foods until patients can tolerate solid food. It is estimated that over 70% of patients take early feeding after major abdominal surgery.[1,2] However, controversies remain regarding the efficacy and safety of the procedure.

Prior Concerns Affecting the Avoidance of Oral Feeding

Nausea, vomiting, and postoperative ileus are part of obligatory responses to abdominal surgery. The use of nasogastric tube and restriction of feeding following major abdominal surgery is believed to accelerate intestinal function resolution, reducing the risk of associated postoperative complications.[1,2] Postoperative nausea and vomiting (PONV) are estimated to happen mostly in patients undergoing long surgery. Every 30 minutes increase in duration increases the risk of PONV by 59%.[3] Depriving patients of nutritional intake following surgery was believed to prevent nausea and vomiting caused by postoperative paralytic ileus.[1]

Gastrointestinal motility dysfunction is one of the most common problems following major abdominal surgery.[4] The symptoms range from cramps to abdominal pain, nausea, and vomiting. The etiology is multifactorial, involving disturbance of enteric and central nervous systems, hormonal influences, and a neurotransmitter and local inflammation.[4] Normal electrical activity of the stomach, small intestine, and colon are disturbed following a surgery.[4] The rationale behind 'nil by mouth' is to prevent nausea and vomiting and give the anastomosis time to heal, lowering the risk of anastomotic leakage and wound dehiscence.[2] In contrast to popular belief, it is unclear whether deferral of enteral feeding is beneficial for such a purpose.

Accompanying standard practice of 'nil by mouth, nasogastric tube decompression is thought to be necessary to prevent gastric distension, PONV, reduce the risk of pulmonary aspiration, anastomotic leak, wound dehiscence, and infection, and to facilitate the earlier return of bowel function and hospital discharge.[5] Routine practice of nasogastric decompression after abdominal surgery have also been questioned. The earliest meta-analysis of 26 RCTs found that abdominal distension and vomiting were significantly more common in selective nasogastric tube placement groups than routinely decompressed patients.[6] However, other complications thought to be associated with its placement were either less common (pneumonia, atelectasis, fever) or not significantly different (aspiration, wound dehiscence, wound infection, anastomotic leak) in selective decompressed patients.[6] There is, however, a lack of data on which specific cases the use of nasogastric tubes

Alamat Korespondensi *email: edelyn_christina@hotmail.com*


may be appropriate.

Body Response to Surgical Injury and the Rationale of Early Postoperative Feeding

The stress response is initiated after several insults, including infection, hypoxemia, hypovolemia, and tissue injury. Following surgical trauma, there are apparent endocrine and metabolic changes in the body, resulting from the activation of the sympathetic nervous system and increased secretion of pituitary hormones. Activation of sympathetic nervous systems results in the release of epinephrine and norepinephrine, which promote gluconeogenesis, inhibit insulin release, reduce glucose uptake by cells, and increase free fatty acid mobilization and oxygen consumption.[7] Release of catecholamine cause inhibition of alpha-2-adrenergic of pancreatic B cells, resulting in lack of insulin and peripheral insulin resistance; along with reduction of glucose uptake by cells, may result in hyperglycemia; failure to control hyperglycemia may results in increased morbidity and mortality.[7,8] Pituitary hormones also affect target organs, and the production of secondary hormones results in increased protein breakdown, gluconeogenesis in the liver, and lipolysis.[7]

Several studies have found that nutrition immediately improves nutrition intake and even further limits detrimental metabolic responses caused by surgery.[9,10] This benefit has even seen in malnourished individuals; a randomized controlled trial previously tested the benefit of early feeding after surgery; although the early nutrition group had a higher number of malnourished individuals compared to fasting groups, they still had a better recovery, reflected by a shorter hospital stay, lower incidence of diarrhea, despite similar complication rate.[11] Commencement of early intake of food after surgery also enhances anastomosis healing by increasing local blood flow and peristalsis, thus stimulating intestinal motility and enhancing postoperative ileus resolution.[8]

A 13-year prospective observational study of 927 patients sought to determine the effect of surgical manipulation on patients undergoing elective colorectal surgery. Using mesenteric lymph nodes (MLN) sampling, bacterial translocation (BT) was found in 130 of 927 patients (14%), with postoperative sepsis was more common in patients with confirmed BT compared to normal MLN findings (42.3 % vs. 19.9%; p value< 0.001). Even further, the study also described that preoperative total parenteral nutrition (TPN) (p-value: 0.001) and emergency surgery (p-value: 0.015) were independently associated with BT.[12] Bacterial translocation is a fundamental basis of 'gut origin sepsis', which proposes that gut-associated microorganism is often responsible for sepsis in surgical patients.

Although there are still controversies regarding this phenomenon's pathophysiological mechanism, there is a growing presumption that postoperative sepsis associated with BT is more likely to affect immunocompromised individuals. However, following surgery, there is a production of proinflammatory cytokines owing to the activation of innate immunity. The essential cytokines related to surgical trauma is IL-6, with a peak circulating value within 12 to 24 hours after surgery.

The presence of proinflammatory cytokines may predispose to septic infection, which particularly important in cancer patients.[7]

Early nutritional intake within 24 hours after surgery was previously described to be able to reduce bacterial colonization and translocation, thus may reduce the risk of sepsis;[13-15] a meta-analysis of 9 RCTs found a reduced risk of any infection in patients getting early enteral nutrition within 24 hours following gastrointestinal surgery (RR: 0.72 [0.54-0.98]; p-value: 0.036), with no significant evidence of heterogeneity between studies.[13] Other meta-analyses of early nutrition following digestive surgery found a direction of effect toward reduced risk of infection compared to fasted patients.[14,15] The later studies tested those effects on patients undergoing colorectal surgeries.

Postoperative ileus prevents early hospital discharge of patients undergoing abdominal surgery. Surgeons accept that the first passage of flatus and bowel sound is the clinical sign of recovery from intestinal dysmotility. One rather old experimental study using liquid barium and barium-filled gelatin capsule given to patients undergoing gastrointestinal surgery found that disturbance in function differs according to the site. It was found that there is an impairment in gastric and colonic motility up to 24 hours and 3 to 5 days, respectively, following digestive surgery. Interestingly, however, small bowel motility was returned after 4 to 8 hours.[16] thus preserving small bowel absorption capacity and its ability to handle upper gastrointestinal fluid secretion, which physiologically may take up to 2 L/day. Recent RCT on 60 patients who underwent colorectal anastomosis concluded that 93% were able to tolerate early feeding, with significantly quicker flatus (mean(SD): 2.7 ± 0.7 days vs. 3.9 ± 0.7 days; p value<0.0001) and stool passage (mean(SD): 3.9 ± 0.9 days vs. 5.4 ± 0.8; p value<0.0001) in early feeding group compared to the fasted group.[17]

Many attempts to reduce the incidence of PONV exist, including modification of anesthesia techniques, use of medications that work on a variety of receptor sites, pre-surgical carbohydrate load, and acupuncture procedure.[18] Interestingly, a Cochrane systematic review and meta-analysis of 6 trials concluded that the risk of vomiting is 27% higher in post-surgical patients undergoing early feeding than fasted patients (RR: 1.27 [1.01 – 1.61]; p-value: 0.045; I2: 0%).[15] This analysis included all studies assessing the effect of early feeding on patients undergoing all types of digestive surgery, although most participants underwent colorectal surgery. Interestingly, another meta-analysis that sought to determine only the effect of oral feeding on patients with post-elective colorectal surgery failed to find the difference.[14] It should be noted that studies incorporated in the meta-analysis were small, with medium evidence of heterogeneity between studies.

Other than previously described benefits, it is also worth noticing that early feeding has been associated with shorter hospital stay[13,14,17] and lower mortality rate in many studies,[15] perhaps the most important two indicators about patient recovery and safety. However, controversies remain regarding the benefits of early feeding (**Table**). In essence, early nutritional intake within 24 hours after digestive surgery reduces the risk of infection and non-infection-associated complications, length of hospital stay, and mortality. Although some studies did not show significant differences between interventions, there is a trend towards positive effects on the risk of anastomotic dehiscence, intra-abdominal abscess, and death, along

Table . Evidence table includes all meta-analyses assessed the effect of early nutrition on patients underwent gastrointestinal surgery

Objective (Type of studies)	Year	Outcome Measures (Number of studies)	RR (95% CI)	P value	Heterogeneity of studies
Any type of EF vs. no feeding within 24 hours on patients underwent all types of digestive surgery[13] (RCTs)	2001	Anastomotic dehiscence (8) Any type of infection (9) Wound Infection (6) Pneumonia (7) Intra-abdominal abscess (5) Vomiting (6) Death (5) LOS (11)	0.53 (0.26 ; 1.08) **0.72 (0.54 ; 0.98)** 0.71 (0.44 ; 1.17) 0.73 (0.33 ; 1.59) 0.87 (0.31 ; 2.42) **1.27 (1.01 ; 1.61)** 0.48 (0.18 ; 1.29) **-0.84 (-0.36 ; -1.33)***	0.08 **0.036** NA NA NA **0.045** 0.15 **0.001**	Chi^2: 2.10 (P: 0.96) Chi^2: 10.7 (P: 0.22) Chi^2: NA (P: 0.074) Chi^2: NA (P: 0.85) Chi^2: NA (P: 0.84) Chi^2: NA (P: 0.52) Chi^2: NA (P: 0.99) Chi^2: 16.2 (P: 0.094)
Any type of EF vs. no feeding within 24 hours on patients underwent mostly colorectal surgery[15] (RCTs)	2011	Wound Infection (9) Intra-abdominal abscess (10) Anastomotic leakage/dehiscence (11) Mortality (10) Pneumonia (10) LOS (14) Vomiting (6)	0.77 (0.48 ; 1.22) 0.87 (0.31 ; 2.42) 0.74 (0.40 ; 1.39) **0.41 (0.18 ; 0.93)** 0.72 (0.35 ; 1.46) -0.89 (-1.58 ; -0.20)* **1.27 (1.01 ; 1.61)**	0.26 0.79 0.35 **0.033** 0.36 0.011 **0.045**	Chi^2: 10.39 (P: 0.11); I^2: 42% Chi^2: 1.45 (P: 0.84); I^2: 0% Chi^2: 5.75 (P: 0.76); I^2: 0% Chi^2: 0.6 (P: 0.99); I^2: 0% Chi^2: 3.96 (P: 0.86); I^2: 0% Chi^2: 18.88 (P: 0.09); I^2: 36% Chi^2: 4.21 (P: 0.52); I^2: 0%
Early oral feeding vs. no feeding within 24 hours on patients underwent upper gastrointestinal surgery[19] (RCTs)	2011	All complication (except PONV) (15) Mortality (15) Anastomotic dehiscence (13) Passage of flatus (4) Bowel motion (4) LOS (10) NGT reinsertion (8) Nausea and Vomiting (PONV) (7) Days to solid diet (4)	**0.55 (0.35 ; 0.87)#** 0.71 (0.32 ; 1.56)# 0.75(0.39 ; 1.45)# -0.42 (-1.12 ; 0.28)* -0.28 (-1.2 ; 0.64)* -1.28 (-2.94 ; 0.38)* 1.48 (0.93 ; 2.35)# 0.93 (0.53 ; 1.65)# **-3.48 (-4.72 ; -2.24)***	**0.01** 0.39 0.39 0.23 0.55 0.13 0.10 0.80 <0.0001	**I^2: 51.8%; P: 0.0102** I^2: 0%; P: 0.99 I^2: 0%; P: 0.99 **I^2: 96%; P: <0.0001** **I^2: 96.2%; P: 0.00** **I^2: 85.3%; P: <0.0001** I^2: 0%; P: 0.86 I^2: 45%; P: 0.088 **I^2: 81.2%; P: 0.0012**
Early oral feeding vs. no feeding within 24 hours on patients underwent elective colorectal surgery[14] (RCTs)	2013	LOS (5) Anastomotic Dehiscence (6) Pneumonia (6) Wound Infection (4) Total Complication (7) Vomiting (4) NGT Reinsertion (5) Mortality (4)	**-1.58 (-2.77 ; -0.39)*** 0.47 (0.19 ; 1.15) 0.71 (0.31 ; 1.59) 0.69 (0.34 ; 1.37) **0.70 (0.50 ; 0.98)** 1.08 (0.77 ; 1.53) 1.31 (0.78 ; 2.21) 0.61 (0.15 ; 2.50)	**0.009** 0.10 0.40 0.29 **0.04** 0.65 0.30 0.5	**Chi^2: 18.37 (P: 0.001); I^2: 78%** Chi^2: 3.67 (P: 0.6); I^2: 0% Chi^2: 3.53 (P: 0.62); I^2: 0% Chi^2: 2.15 (P: 0.54); I^2: 0% Chi^2: 2.07 (P: 0.91); I^2: 0% Chi^2: 4.62 (P: 0.2); I^2: 35% Chi^2: 0.83 (P: 0.93); I^2: 0% Chi^2: 1.5 (P: 0.68); I^2: 0%
Early oral feeding vs. no feeding within 24 hours on patients underwent upper gastrointestinal surgery[20] (RCTs)	2016	Post-operative LOS (3) Anastomotic leak (8) Pneumonia (3) NGT Reinsertion (2) Reoperation (4) Readmission (3)	**-1.44 (-2.20 ; -0.68)*** 1.00 (0.49 ; 2.04)# 0.77 (0.45 ; 1.32)# 0.36 (0.1 ; 1.28)# 0.76 (0.46 ; 1.26)# 1.16 (0.73 ; 1.85)#	**<0.01** 0.31 0.34 0.12 0.29 0.65	Chi^2: NA (P: 0.222); I^2: 33.5% Chi^2: NA (P: 0.584); I^2: 0% Chi^2: NA (P: 0.846); I^2: 0% **Chi^2: NA (P: NA); I^2: 80.75%** Chi^2: NA (P: 0.762); I^2: 0% Chi^2: NA (P: 0.676); I^2: 0%
Early oral feeding vs. no feeding within 24 hours on patients underwent upper gastrointestinal surgery[20] (Cohort)	2016	LOS (2) Anastomotic leak (6) Pneumonia (5)	**-1.87 (-2.44 ; -1.29)*** 0.72 (0.38 ; 1.36)# 0.46 (0.26 ; 0.8)#	**<0.01** 0.46 NA	Chi^2: NA (P: 0.311); I^2: 2.6% Chi^2: NA (P: 0.996); I^2: 0% Chi^2: NA (P: 0.665); I^2: 0%

*: Mean difference (SD); #: Odds ratio (95%Confidence interval); **Bold** indicates significant result; EF: Early Feeding; NA: Not available in the study; NGT: Nasogastric tube; LOS: Length of hospital stay

with digestive function returns, in favor of early nutrition intake. In contrast, early feeding is associated with PONV, especially in studies that assessed all types of enteral feeding, while no difference was found in studies that assessed oral feeding.

Some results have to be interpreted with caution as heterogeneity between studies was more than 75%. (**Table**)

Early feeding has been shown to reduce hospital stay and days to resumed bowel function.[13,14,17] However, the Cochrane database systematic review and meta-analysis results need to be interpreted with caution as the heterogeneity among studies was significant. Some results were even with low-quality evidence (**Table**). However, incorporating early feeding and perioperative nutrition and other treatment for surgical patients in ERAS (Enhanced Recovery After Surgery) protocol shows that the combination of treatment may show significant benefits. In essence, a nasogastric tube should not be placed if patients can tolerate feeding and do not have other indications of placement. In clinical practice, oral feeding should be the first choice, with emphasis on personalized nutrition.

Conclusion

Recent meta-analyses fail to demonstrate the merit of withholding nutrition before bowel function resumed. Although nutrition intake within 24 hours after surgery may increase the risk of nausea and vomiting, no other adverse effect is associated with early feeding.

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