

## Complications Associated with Enteral Nutrition Using Tube Jejunostomy after Esophageal Reconstruction

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### Abstract

**Introduction:** Esophageal reconstruction is a major surgery using a digestive graft. The nutritional support impacts directly outcomes of patients. The enteral route is the preferred one for instituting postoperative nutrition. Most complications was related to the methods of tube-jejunostomy. The purpose of this retrospective study to examine the complications associated with EN using a Witzel-type tube-feeding jejunostomy for postoperative nutritional support in esophageal reconstructive surgery.

**Patients and Methods:** Between 1999 and 2014, 105 patients underwent esophageal reconstruction by colon interposition and gastric tube. The mean age was  $25.52 \pm 13.86$  years and the male/female ratio was 6.10. A Witzel-type tube-feeding jejunostomy was performed. The jejunum was attached to the peritoneum over a length of 5-8 cm. The number of calories administered was increased gradually. The complications associated with tube-jejunostomy and enteral nutrition were noted.

**Results:** The tube-feeding jejunostomy was could be placed in all patients. The postoperative nutrition by tube-jejunostomy was begun at day 1 in 41 patients (39 %) and day 7 in 64 patients after surgery. EN was well tolerated by all patients. The complication associated with the tube-jejunostomy was skin erosion at the entry of tube. One patient was re-operated for obstruction. The dislodgement and blockage of tube were produced respectively in 1 and 2 patients. Abdominal pain and/or diarrhea was experienced by five patient. The complication rates related to the enteral nutrients and to placement of tube jejunostomy, were 4.7% and 2.8%, respectively.

**Conclusion:** The attachment of the jejunal wall to the peritoneum at the place of entry of the catheter/tube is useful to prevent leakage and twisting of the jejunum and to reduce the severity of the complications related to catheter/tube jejunostomy feeding.

**Keywords:** Esophageal Reconstruction, Tube-jejunostomy, Enteral nutrition, Complications

### Introduction

Esophageal reconstruction for esophageal cancer and caustic stricture is a major surgery using a digestive graft. These patients are at high risk of developing a malnutrition because oral intake was often interrupted. Nutritional supports have been used improve the nutritional status of such patients in preoperative period [1]. The nutritionally depleted patients carry a high risk of postoperative complications therefore nutritional support is a treatment modality that may directly impact outcomes. The introduction of postoperative nutrition is to be necessary for the anastomotic healing process in major surgery. The enteral route is the preferred one for instituting nutrition as it conserves gut integrity [2]. Postoperative enteral nutrition (EN) is associated with a lower risk of septic complications in patients who had undergone esophageal surgery [3-5]. However, placement of a feeding catheter/tube is not totally free from complications [6-9]. These complications may diminish the intended benefits of this method of feeding [4]. These complications were mostly related to the methods of tube- jejunostomy and A number of techniques and strategies for catheter/tube placement have been

offered [6,8,10-12]. The purpose of this retrospective study to was examine the complications associated with EN using a Witzel-type tube-feeding jejunostomy for postoperative nutritional support in patients undergoing esophageal reconstructive surgery.

### Patients and Methods

Between 1999 and 2014, 105 patients underwent esophageal reconstruction by colon interposition and gastric tube for principally esophageal caustic stricture. Only 5 patients included in this series underwent reconstructive surgery after esophagectomy for malignant condition. The mean age was  $25.52 \pm 13.86$  years (range 15-50 years), and the male/female ratio was 6.10. Two patients had pathological antecedent of diabetic type 1. A reconstructive procedure using colon graft was employed in 101 patients, the stomach in 3 patients and jejunum in one patient.

The preoperative malnutrition, resulted from mechanical obstruction of the esophagus, was treated by nutritional supports using both enteral and parenteral route. A planned Witzel technique for a feeding jejunostomy was performed before or at the time of reconstructive surgery as a part of the surgical procedure.

The Witzel-type tube-feeding jejunostomy was inserted before or at the time of reconstructive surgery. The jejunostomy site was selected about 40 cm distal from the beginning of the jejunum. An 18-Fr. tube was fed into the jejunal lumen, and the tip of tube was then advanced a further 30-40 cm. The site tube entry was closed by a purse string suture and the tube was buried within the wall of the jejunum for a length of 4-5 cm. By using this method, the intra-peritoneal area of the tube is completely sealed off to prevent leakage of the intestinal fluid, although the site of the tube jejunostomy is not usually sealed off. Furthermore, two or three interrupted sutures were placed to attach the jejunum to the peritoneum over a length of 5-8 cm in order to prevent volvulus of the jejunum occurring around a small fixed point.

An early postoperative enteral nutrition through the jejunostomy tube by continuous infusion, was started 24 hours after surgery in the 41 patients and in others patients (n= 64) , it was begun on 7th postoperative day. The product used was NUTRISON® pack (NUTRICIA Nutrition Clinique. France). The bottle contents 1000 ml with 1500/1530 KCl and it is composed of: Protein 60 g , nitrogen 10 g , Carbohydrates 183/184 g , fat 58 g , fiber 15 g , water 780/760 ml , minerals:1340 mg of Sodium, 2010 mg of Potassium, 1000 mg of Chloride, 1080/840 mg of Calcium, 1080/840 mg of Phosphorus, 340/300 mg of Magnesium , 24 mg of Iron and 1230 mcg of vitamin A, 15 mcg of vitamin D.

A stepwise increase of the intake calories from EN was scheduled and the number of calories administered was increased gradually to achieve the target calorie requirement of the patient. The target calorie and protein was 1500 to 3000 kcal/24 h (35-40 kcal/kg) and 100 to 120 g/24 h (1.5-2.0 g/kg), respectively. The patients were given no food orally until after a contrast study, performed between 8th and 10th postoperative day, had confirmed the integrity of the cervical anastomosis. From then on, an oral diet was introduced gradually. Simultaneous EN continued until the oral diet had been increased to the level of full nutrition. The calories from EN were then gradually decreased according to the increase in the calorie count from the oral diet. EN were discontinued when oral nutrition with a normal diet had been reestablished and adaptation with the neo-esophagus was obtained. The catheter was then withdrawn when oral intake became sufficient. The complications associated with tube-jejunostomy and enteral nutrition were noted. Two patients, died during the immediate postoperative period on day 2 and 3, were excluded from the study.

## Results

The surgical procedure of reconstruction including insertion of tube-jejunostomy was performed by the same surgeon in all patients of this study. The tube-feeding jejunostomy was could be placed in all patients. The postoperative nutrition by tube-jejunostomy was begun at day 1 after surgery in 41 patients (39 %). In 64 patients, a postoperative parenteral nutrition was started for 7 days then the patients were switched to enteral nutrition via tube-jejunostomy. This postoperative nutrition was discontinued after an average of 20 days. The mean duration between the commencement of EN and the day when the administered calories had built up to full strength was 6 days. In postoperative period, two patients developed recurrent nerve palsy, two graft necrosis, fifteen cervical anastomotic leakage and two colocolic anastomotic leak. In the patients with cervical anastomotic leakage, EN was continued until the leak had closed spontaneously , however its end was significantly later and being ceased after an average length of 25 days. In some of these patients, the oral intake had not discontinued. EN was well tolerated by all patients until full oral

nutrition had been reestablished. The complication associated with the placement of tube jejunostomy was the leak of nutrients and intestinal fluid from the site of tube was occurred in one patient. The skin erosion was not serious enough to warrant ceasing jejunostomy feeding and was improved by the application of steroid ointment. The leak at the site of tube was treated by fixation of the tube closely to the skin. No peritonitis or ileus was recognized. One patient was re-operated for obstruction 72 hours after initial operation. The cause was the obstruction of the jejunal lumen by the tube feeding. The dislodgement and blockage of tube were produced respectively in 1 and 2 patients. The blockage could be managed easily by simple bedside maneuvers. Furthermore, an abdominal pain and/or diarrhea was experienced by five patients early after EN was started, the EN was stopped temporarily and was restarted 48 hours after with lower flow. The complication rates of the early phase (from start to full strength) and of the late phase (after full strength) related to the enteral nutrients and to placement of tube jejunostomy, were 4.7% and 2.8%, respectively (Table 1).

No of patients	Complications	Days onset	Treatment
4	Diarrhea	3	Slowed the rate of administration + Prescribed antidiarrhetics
1	abdominal pain	2	Slowed the rate of administration
1	Skin erosion at tube entry site	12	Steroid ointment
1	dislodgement	25	replacement
2	blockage	15	bedside maneuvers.

**Table 1:** Patients with complications related to catheter jejunostomy or enteral nutrition and treatment.

## Discussion

The nutritional status of the patients who undergo esophageal reconstructive surgery must be assessed preoperatively because these patients are often malnourished. This malnutrition, due to malignant diseases and dysphagia , requires preoperative nutritional support to correct. These patients carry a high risk of postoperative complications, therefore, perioperative nutritional management has become more important than ever before to improve nutritional status and decrease postoperative morbidity and mortality in patients undergoing esophageal surgery. In addition, a long-term nutritional support was often required in postoperative period till because oral intake became sufficient. There is no controversy regarding the need of nutritional supplementation in patients undergoing a major surgical procedure [2]. However, as a method of postoperative nutritional support following esophageal surgery, EN has only recently gained widespread acceptance because the rates of jejunostomy-related morbidity and mortality previously reported were unacceptably high. Therefore a serious or fatal complications of tube jejunostomy such as small bowel infarction, peritonitis, aspiration pneumonia, and necrotizing fasciitis at the site of tube insertion and other minor complications were reported [13-18]. These complications were experienced by patients with various diseases undergoing many types of surgical procedures. However and more recently, lower morbidity rates have been reported in patients with esophageal or gastric

malignancies without tube-related deaths [1,19]. The tube-jejunostomy feeding was found to be an effective method of nutritional support during the postoperative period, and it allowed home support for those with poor intake for a prolonged period of time with a low complication rate in esophageal surgery [8,20]. However placement and maintenance of the jejunostomy catheter is not entirely safe and an incidence of 2% of catheter dislodgement was reported [7,21]. In our series, the dislodgement and blockage of tube were respectively occurred in 1 and 2 patients (2.8%). The blockage could be managed easily by simple bedside maneuvers. In the present study. Only one patient developed local skin erosion at the site of tube entry, as a complication associated with placement of the tube jejunostomy, which was not serious enough to warrant ceasing jejunostomy feeding. The skin erosion was improved by the application of steroid ointment. One patient was re-operated for obstruction 72 hours after initial operation. The cause was the obstruction of the jejunal lumen by the tube feeding. The leak of nutrients and intestinal fluid from the site of tube was occurred in one patient and it was treated by fixation of the catheter closely to the skin.

The incidence of gastrointestinal discomfort in the form of distension and diarrhea varies from 5% to 35% [2,7,8,22-26]. However, most of the symptoms are self-limiting and can be easily corrected by alternating the infusion rate, changing the concentration, or temporarily ceasing the feeding for 12 to 24 h [2,7,8,22-26]. In our series and as a complication related to the enteral nutrients, an abdominal pain and/or diarrhea was experienced by three patients (2.8%) early after EN was started. In this cases, the EN was stopped temporarily and was restarted 48 hours after with lower rate of administration. EN sometimes leads to gastrointestinal complaints such as nausea, vomiting, abdominal distention, and diarrhea.

These symptoms are usually seen in the period from the commencement of EN until when the administered calories have built up to full strength, and the majority are self-limiting. The use of a feeding tube/catheter is mandated until oral intake of the patient is adequate. Unpredictable emptying of the denervated intrathoracic stomach, delayed gastric emptying, dumping, or other gastrointestinal dysfunction can further delay adequate oral intake in individuals who otherwise would have an uneventful recovery [27]. A long duration of feeding tube use was reported [8,23,24]. So the indications for the administration of EN by catheter jejunostomy it is particularly suitable for patients with malignant tumors such as esophageal cancer who may require adjuvant chemotherapy or irradiation therapy for which prolonged nutritional support is required [28]. In the present series, the median duration of supplemental enteral nutritional support was 20 days. Although a large number of patients developing postoperative complications and anastomotic failure required feeding through the jejunostomy catheter/tube for a significantly longer period of time. The cervical leak was occurred in 15 patients of the present study and it was treated conservatively by continuous enteral tube jejunostomy feeding. We had observed a lower rate of cervical anastomotic leakage in patients in whom the tube jejunostomy feeding was introduced early in postoperative period. However, the oral intake was delayed in patient with cervical leak and the duration of EN was significantly longer. Concerning the period from surgery to the commencement of EN, many studies showed that early feeding leads to a reduction in risk of anastomotic dehiscence in both cases when anastomosis was proximal or distal to the site of feeding [29-36]. These reported trials seem to indicate that early EN reduced the risk of any type of infection concluding that early postoperative feeding is of value in patients undergoing major operations of the gastrointestinal tract. The

rationale for feeding the gut early after surgery is that peristalsis of the small intestine recovers 6-8 h after abdominal surgery and that an absorptive function is preserved even in the absence of peristalsis [37]. The passage of food in the gut also causes increased splanchnic blood flow stimulating the gut immune system [38,39]. In addition, it is found that if EN is delayed until after the patient becomes hypermetabolic, the benefits are lost [40]. The difference in the morbidity rates between the reported studies is most probably related to the methods of the placement of catheters/ tubes jejunostomy. In view of the complications, many have described selective, rather than indiscriminate, use of jejunostomy catheters/tubes [11,41,42]. Modification of the strategy of placing the jejunostomy tube has also been advocated [11,12,42]. Reichle et al. [42] described fixing of the jejunal loop to the abdominal wall during the laparotomy and performing endoscopically guided intubation later should the need arise. In the present study, the site of tube entry was closed by a purse-string suture and the tube was buried within the wall of the jejunum to a length of 4-5 cm. Furthermore, some interrupted sutures to attach the jejunum to the peritoneum over a length of 5-8 cm were also placed to prevent leakage and volvulus of the jejunum around a small fixed point. Conversely, other studies have frequently reported using needle jejunostomy, which has resulted in some serious complications. With the needle method, the nutrients or intestinal fluid may leak from the site of catheter entry because the catheter is fed into the jejunal lumen through an intramural tunnel and the catheter entry site in the jejunum is not usually sealed off. There is also a risk of volvulus of the jejunum occurring because the fixed point of the needle jejunostomy between the jejunum and abdominal wall is small. The leakage of nutrients or intestinal fluid from the site of catheter entry and intestinal twisting at the point of fixture to the abdominal wall can cause serious complications such as peritonitis or small bowel obstruction. We believe that the attachment of the jejunal wall to the peritoneum at the site of entry of the catheter/ tube is useful to prevent leakage and twisting or angulating of the jejunum, and to reduce the incidence and severity of the complications associated with catheter / tube jejunostomy feeding. It should whenever be associated to the placement of tube jejunostomy. The operative technique of esophageal reconstruction used in all patients of this study (including insertion of tube-jejunostomy) was performed by the same surgeon and this allows to limit bias. However a limitations of this work should be noted, the most important is the retrospective and no randomized character of work. Therefore prospective and randomized further studies are needed for more confirmation of results.

## Conclusion

The Witzel-type feeding tube jejunostomy is a safe and an effective way to provide nutritional support to patients undergoing esophageal reconstructive surgery. The occurrence of complications related to the tube jejunostomy may reduce the efficacy of this nutritional method. Therefore we believe that the attachment of the jejunal wall to the peritoneum at the site of entry of the catheter/ tube is useful to prevent leakage and twisting of the jejunum and to reduce the severity of the complications related to catheter/tube jejunostomy feeding.

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