Jejunostomy—technique and controversies

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Abstract: Malnutrition is quite common in patients with esophageal cancer, and can be secondary to tumor related dysphagia or treatment side effects. Traditionally, open feeding jejunostomy tube was performed in all patients undergoing surgical treatment of esophageal cancer. With the advent of minimally invasive approaches, placement of the jejunostomy tube can be currently accomplished with either robotic or laparoscopic assistance. Here, we discuss the technical aspects as well as the pros and cons of a minimally invasive jejunostomy feeding tube placement.

Keywords: Malnutrition; esophageal cancer; laparoscopy

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Introduction

Malnutrition is frequently encountered is patients with esophageal cancer. It can be directly related to tumor associated dysphagia or the overall catabolic state, and can be exacerbated by the side effects of chemo-radiation treatment, mainly nausea and anorexia. Several studies have demonstrated the importance of peri-operative nutritional optimization before esophageal surgery (1). Enteral nutrition is generally preferred to parenteral nutrition, as it is associated with fewer complications rates and enhanced recovery (2). In fact, there are several negative side effects of parenteral nutrition including electrolyte disturbance, central venous access line infection, hepatic dysfunction and re-feeding syndrome. Enteral nutrition after surgery can be accomplished via oral intake or through a feeding tube.

The need for a feeding jejunostomy (FJ) before neoadjuvant therapy should be individualized depending on the level of pre-operative obstruction and weight loss (3). In fact, FJ placement has its own catheter related complications and should not be performed routinely in every patient undergoing esophagectomy as we discuss later (4,5). However, if the decision is made to place jejunostomy at the time of esophagectomy or even before, either a robotic assisted or laparoscopic approach can be utilized.

Surgical technique

Laparoscopic approach

At the conclusion of the abdominal portion of a minimally invasive esophagectomy, lifting up the transverse mesocolon identifies the ligament of Treitz. About 40 cm distal to that, the jejunum is grasped. A proximal silk or Ethibond stay suture is placed, tacking the bowel to an optimal position on the abdominal wall to ensure minimal tension. The introducer needle is passed through the abdominal wall into the jejunum under direct camera vision and a wire introduced. The needle is retrieved and serial dilation is performed using a Seldinger technique. The catheter is then passed through the peel-away sheath distally into the jejunum. Care must be taken at all times not to cause an inadvertent enterotomy further distally or at the mesenteric side, with the introduction of either the needle, wire or the

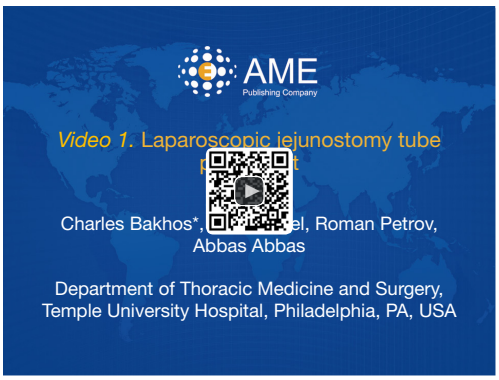

Figure 1 Laparoscopic jejunostomy tube placement (6). Available online: http://www.asvide.com/article/view/30883

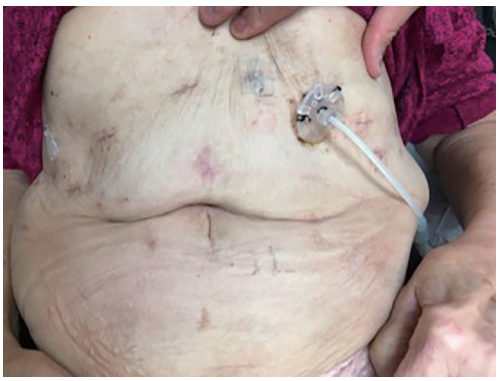

Figure 2 Feeding jejunostomy position on abdominal wall.

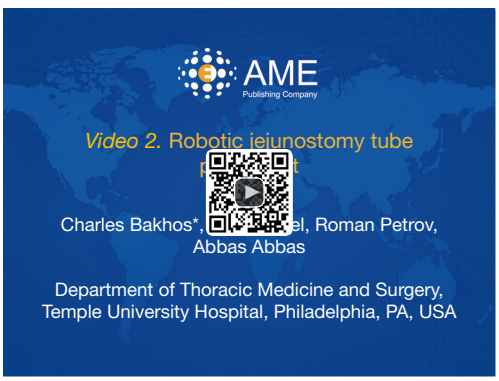

Figure 3 Robotic jejunostomy tube placement (7). Available online: http://www.asvide.com/article/view/30884

dilators. Verification of appropriate positioning of the tube is accomplished by injecting 20 cc of air and observation of distal bowel inflation. The balloon can then be injected with 1–2 cc of water, as not to cause any bowel obstruction. The jejunostomy insertion site can then be fashioned to the anterior abdominal wall in a stamm manner, and the tube pulled back so the balloon is only gently snug, as not to cause bowel wall necrosis. We prefer to use the Endostitch device (Covidien, CT, USA) for that portion (*Figure 1*). Some authors recommend the Witzel technique and prefer to tunnel the catheter proximally with several additional sutures. Finally, the tube is secured to the abdominal wall and skin using several sutures to prevent dislodgement and migration (*Figure 2*).

Robotic approach

If the robotic platform is used to perform the abdominal portion of the esophagectomy, it can also be utilized to perform the jejunostomy. A satisfactory portion of the jejunum is identified 40 cm distal to the ligament of Treitz as usual. The needle is then introduced into the abdomen under vision and the wire is placed into the peritoneal cavity. The tract is then serially dilated and the jejunal feeding tube is threaded into the abdominal cavity through the peel-away sheath. An enterotomy is made in the jejunum using the Maryland forceps and the feeding tube is placed inside the bowel lumen. A purse-string with 3-0 silk suture is then placed around the tube using robotic assistance. The proximal Witzel is then created using additional 3-0 silk sutures and the feeding tube—jejunostomy apparatus is stammed to the anterior abdominal wall with laparoscopic assistance as usual (*Figure 3*).

Outcomes of feeding jejunostomy in esophageal cancer patients

Several studies have shown that jejunostomy feeding in the early post-operative period is safe and does not negatively impact survival in esophageal cancer (8). Álvarez-Sarrado *et al.* for instance showed that 82.9% of patients with feeding jejunostomy reached nutritional requirements post-operatively. In addition, the use of post-operative FJ is usually short lived and more than 77% of patients do not use their tube 30 days after surgery (4). Therefore, FJ is considered a valuable bridge for nutrition and should be considered in any patient who cannot maintain adequate oral intake in the peri-operative period.

Complications and controversies

There are inherent risks and controversies associated

with placement of a jejunostomy feeding tube in patients with esophageal cancer regardless of timing. Some complications related to jejunostomy placement include aspiration pneumonia, tube dislodgement leading to pneumoperitoneum and peritonitis, bowel obstruction, and abdominal wall infections. The incidence of jejunostomy related complications is noted to be as high as 38% (9). A study by Akiyama *et al*. showed that there was no difference in re-admission rates, hospital length of stay or pneumonia in patients who underwent jejunostomy versus those that didn't. However, there was an increased rate of bowel obstruction (9.1%) in the jejunostomy group (5). If a bowel obstruction occurs, re-exploration is necessary and may require bowel resection. In another study, the feeding jejunostomy related overall complication rate was noted to be 51%, with 2.9% of patient's requiring surgical re-intervention (4). A rare but often fatal complication related to early jejunostomy feeding is an entity called non-occlusive mesenteric ischemia. This presents as abdominal pain and nausea with the initiation of early post-operative enteral feeding via FJ and is associated with high osmolarity formula, extensive abdominal adhesiolysis, and pre-operative malnutrition (10).

Given the significant rate of complications that can occur with placement of feeding jejunostomy tubes in patients with esophageal cancer, many authors have advocated for early oral intake after esophagectomy. In fact, several studies have shown that such a policy is safe and is not associated with increased morbidity (11). For instance, an Enhanced Recovery After Surgery (ERAS) program in patients undergoing both minimally invasive and McKeown esophagectomy involved re-institution of a clear liquid diet by post-operative day (POD)#3 and advancement to soft diet by POD#4. The ERAS group was found to have a lower total complication rate compared to the non-ERAS group (27% *vs.* 44%), with earlier extubation and decreased ICU and hospital length of stay (12). Another study from Australia that implemented early oral intake within their ERAS program after esophagectomy found no difference in outcome or length of stay when patients were given clear liquids by POD#3, a soft diet by POD#7 and continued jejunostomy feeds 1-week post-discharge. In fact, they were able to show that implementing such a protocol led to greater adherence to the diet in the outpatient setting (13). On the other hand, early oral intake is not universally accepted after esophagectomy. For instance, a retrospective comparison of 3 diet regimens in 359 patients who underwent esophagectomy found that a "nil by mouth" protocol until POD#7 followed by a slow increase to a blended diet resulted in less complications and a tendency of fewer anastomotic leakages (14). Additionally, other studies have demonstrated that despite the use of enteral nutrition in the peri-operative period, these patients still have a significant decrease in body mass index (BMI), lean body and muscle mass at 6 months (15). In their retrospective review (n=151), Fenton and colleagues found that patients who benefited the most from a feeding tube were those with a BMI <18.5 (16).

In conclusion, malnutrition is frequent in patients with esophageal cancer. Placement of a feeding jejunostomy tube can be performed in a minimally invasive fashion. In view of a substantial complication rate, the decision to place a feeding tube should be individualized, and consideration made to the patients' perioperative nutritional status and their ability to tolerate an oral intake.

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Ethical Statement: The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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