

Access Procedures for Nutritional Support

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Learning Objectives

1. Nutritional Support and Modes of Access

Nasogastric tubes or gastrostomy tubes allow for feeding into the stomach.

- The tip of the tube terminates prior to the pyloric sphincter.
- The pyloric sphincter controls the stomach's emptying into the small intestine. Postpyloric nasoenteric tubes or jejunostomy tubes allow for feeding into the small bowel.
- Postpyloric nasoenteric tubes ideally follow the duodenal sweep to cross the midline and terminate in the fourth portion of the duodenum or the proximal jejunum.
- Jejunostomy tubes are placed beyond the ligament of Treitz.

Gastrojejunostomy tubes allow for stomach decompression while feeding into the small bowel. See the SCORE module [Nutritional Support](#), Methods of Enteral Nutrition for more information.

2. Questions to Ask Prior to Tube Placement

- Why does the patient need the tube?
- Is enteral access expected to be temporary or permanent? If it is expected to be temporary, what is the anticipated duration?
- What is the optimal level for feeding tube placement?
 - Certain conditions should be considered such as altered anatomy or in situ malignancy.
 - Important factors such as gastric emptying, GERD, and aspiration risk should be considered.
- What are some contraindications for gastric feeding tube placement?
 - Nasogastric or gastrostomy tubes. Contraindications include severe gastroesophageal reflux, gastric outlet obstruction, gastroparesis, gastric or esophageal cancer (due to the need to preserve potential conduit), uncorrectable coagulopathy, and in some cases, gastric varices or arteriovenous malformations.
 - Percutaneous endoscopic gastrostomy (PEG) tubes. Contraindications to PEG tube placement, if a gastrostomy tube is otherwise indicated, include the inability to safely access the stomach percutaneously/transilluminate, inability to endoscopically access the stomach, inability to appose the stomach and abdominal wall, peritonitis, and uncorrectable coagulopathy.
- What are the risks and benefits of different types of feeding access?
 - Risks include intra-abdominal gastric or enteric leak requiring operation; gastrocutaneous fistula; [leakage of gastric or enteric contents around the tube](#); injury to the esophagus (PEG only), stomach, small intestine, or colon; tube dislodgement and need for replacement; bowel obstruction; buried bumper syndrome; and bleeding.
 - Benefits include enteral feeding, access for enteral medications, potential for bolus feeding (gastrostomy tubes), and long-term feeding access (gastrostomy and jejunostomy tubes).

3. Key Steps in Enteral Access Techniques

- Steps required for safe nasogastric and nasoenteric tube insertion and prevention of inadvertent passage into the airway
 - Use a large-bore (Salem sump, double-lumen, 14F-18F) nasogastric tube or a small-bore (Dobhoff, single-lumen, 8F-12F) nasoenteric tube.
 - Position the patient upright with the neck flexed if awake or supine with the head in midline if not conscious.
 - Keep in mind that postpyloric advancement of small-bore nasoenteric tubes may be aided with right lateral recumbent positioning in blind placement techniques, direct visualization placement techniques (endoscopic), or real-time indirect visualization placement techniques (magnetic, fluoroscopic).
 - Confirm placement location using x-ray prior to using the tube for medications or feeding.
 - Air insufflation through a 60-mL syringe has low specificity and can produce false-positive results with inadvertent tracheobronchial intubation.
 - Aspiration of gastric contents may lead to false-positive results when gastric contents have refluxed into the esophagus.
- Key steps in the placement of a gastrostomy tube and a jejunostomy tube
 - **PEG placement**
 - “Pull” method
 - Obtain endoscopic access to the stomach and insufflate the stomach.
 - Once the stomach is insufflated, locate the anterior wall of the stomach by transillumination, ballottement, and needle entry under direct visualization via endoscopy with simultaneous aspiration of air from the insufflated stomach.
 - If the stomach cannot be clearly abutted to the anterior abdominal wall, abort the procedure, and perform laparoscopic or open gastrostomy tube insertion.
 - Note that gas aspirated into the syringe prior to visual entry of the needle into the stomach indicates perforation of interposed hollow viscus, commonly the transverse colon.
 - Insert a guidewire through the needle in the abdominal wall and grasp it by a snare inserted via the endoscope.
 - Pull out the guidewire retrogradely through the patient’s mouth.
 - Secure the gastrostomy catheter to the guidewire or thread it over the guidewire at the patient’s mouth (kits may vary).
 - Pull out the guidewire via the abdominal insertion site to pull the gastrostomy tube into place.
 - Make a note of the depth of the gastrostomy tube.
 - “Push” method (avoids transoral passage of the gastrostomy tube)
 - Under direct visualization via endoscopy, insert a guidewire transabdominally.
 - Then serially dilate the tract. Insert the gastrostomy tube into the stomach via this dilated tract by pushing it through the abdominal wall. T fasteners may be used to secure it in place prior to inflating the balloon.
 - Make note of the depth of the gastrostomy tube.
 - Laparoscopic placement of a gastrostomy tube
 - Stand on the patient’s right.

- Place a camera port at the umbilicus, and place a second port in the left upper/lower quadrant at the premarked gastrostomy tube site.
- Note that it may be necessary to place an additional port in the right upper quadrant or midline between the xiphoid process and the umbilicus for further assistance with dissection or retraction.
- Select a site on the anterior gastric wall; approximately two-thirds of the distance between the lower esophageal sphincter and the pylorus is ideal. Do not select a site too close to the pylorus because the balloon on the gastrostomy tube can cause obstruction.
- Secure the stomach to the anterior abdominal wall, with two to four sutures or T fasteners on either side of the gastrostomy insertion site.
- Pass a needle, then wire, through the abdominal wall into the stomach under direct visualization.
- Serially dilate the track.
- Insert the gastrostomy tube, inflate the balloon, and ensure correct placement with aspiration of gastric contents.
- Laparoscopically watch the stomach approximate the abdominal wall when tightening sutures or T fasteners.
- Secure the tube outside the body and make a note of the depth of the gastrostomy tube.
- Open (Stamm) gastrostomy
 - Obtain abdominal access through a midline incision or a left upper quadrant incision.
 - Grasp the stomach along the greater curvature and bring it into the operative field.
 - Select a site on the anterior gastric wall; approximately two-thirds of the distance between the lower esophageal sphincter and the pylorus is ideal. Do not select a site too close to the pylorus because a future balloon on the gastrostomy tube can cause obstruction.
 - Encircle the site on the stomach of the intended gastrostomy with a square purse-string suture that is left untied.
 - Place a second purse-string suture outside of the first and leave it untied.
 - Make a stab incision on the abdominal wall, and pull the gastrostomy tube through the abdominal wall.
 - Check the balloon for rupture after it is brought through the abdominal wall.
 - Create a puncture in the center of the concentric purse-string sutures with electrocautery.
 - Insert the tube into the stomach and fasten first with the inner, then outer, purse-string sutures.
 - Tack the area of stomach in proximity to gastrostomy to the abdominal wall at four points.
 - Inflate the balloon and pull the tube back to bring the stomach flush with the abdominal wall, and tie down any tacking sutures.
 - Secure the tube outside the body, and make note of the depth of the gastrostomy tube.
- Open placement of jejunostomy tube (Witzel jejunostomy)
 - In an open procedure, deliver a loop of jejunum approximately 30 cm distal to the ligament of Treitz into the wound.
 - Make a stab incision on the abdominal wall, and then pull the jejunostomy tube through the abdominal wall. Check the balloon for rupture after bringing it through the abdominal wall.

- Place a purse-string suture on the antimesenteric border of the selected jejunum, and make an incision in its center.
- Insert the tube into the jejunum, and secure the purse-string suture.
- Create a serosal tunnel with Lembert sutures for 5 cm proximal to the incision.
- Anchor the intestine with seromuscular sutures proximally and distally to prevent volvulus or obstruction.
- The balloon is inflated with 2-3 mL of sterile water. Overinflation of the balloon can lead to small bowel obstruction.
- Laparoscopic placement of a jejunostomy tube (refer to the [SAGES Manual, Volume 1, Chapter 29, Laparoscopic Placement of Jejunostomy Tube](#))
 - [Patient positioning and room setup \(Section B\)](#)
 - [Trocar position and instrumentation \(Section C\)](#)
 - [Technique of jejunostomy tube placement \(Section D\)](#)

4. Administration of Parenteral Nutrition

Central administration is preferred.

- [Internal jugular](#). Ultrasound should be used. Venipuncture should occur two-thirds of the way up the neck between the medial and lateral heads of the sternocleidomastoid muscle and lateral to the carotid artery.
- [Subclavian](#). The patient should be in the Trendelenburg position, with slightly extended shoulders if possible. Venipuncture should occur 2 cm lateral to the curvature of the middle third of the clavicle in the delta pectoral groove, with the needle pointing horizontally directed at the sternal notch.
- Femoral. Ultrasound should be used. Venipuncture should be medial to the femoral artery and the femoral nerve below the inguinal ligament. It is important that the puncture occurs 1 to 2 cm below the level of the inguinal ligament.

Discussion Questions

Question 1

A 67-year-old man presents with a 2-month history of worsening dysphagia to solids and now to liquids with associated severe protein-calorie malnutrition. EGD demonstrates an esophageal mass, and biopsy confirms a diagnosis of esophageal adenocarcinoma. He wishes to discuss potential esophagectomy. How would you address his preoperative nutritional status?

Key Discussion Points

- a. Understand the need for enteral access for nutritional support given his dysphagia to both solids and liquids.
- b. Consider, in detail, contraindications to gastrostomy tube placement to preserve a future conduit.
- c. Discuss the potential for nasogastric or nasoenteric access preoperatively compared with placement of a surgical jejunostomy tube.

Question 2

A 22-year-old woman sustains a severe traumatic brain injury in a motor vehicle crash. She remains intubated in the ICU, and she is unable to protect her airway, so a tracheostomy is discussed with her family. How would you counsel her family regarding nutritional support?

Key Discussion Points

- a. Understand that if this patient is unable to protect her airway, she will unlikely be unable to eat and swallow safely and will require some form of enteral access.
- b. Discuss the anticipated duration of nutritional support (likely > 6 weeks in this clinical setting) and the preferred location of nutrient delivery (gastric rather than jejunal or intravenous).
- c. Describe methods for durable enteral access in this patient (gastrostomy placement via PEG with “pull” or “push” technique and open or laparoscopic-assisted technique) and the risks and benefits of each technique.

Question 3

A 72-year-old woman with a recent history of stroke presents to your office. She is scheduled to undergo PEG tube placement. You obtain endoscopic access to the stomach, and insufflation proceeds without complication. However, transillumination is unsuccessful. How would you manage this patient?

Key Discussion Points

- a. Understand the requirements for safe PEG tube placement (transillumination, ballottement, and needle entry under direct visualization via endoscopy with simultaneous aspiration of air from the insufflated stomach).
- b. Describe reasons why transillumination may not have been successful (eg, overlying organs, obesity).
- c. Discuss alternate methods for gastrostomy tube placement (eg, laparoscopic-assisted PEG, open method).

SCORE Resources

Sabiston Textbook of Surgery: The Biological Basis of Modern Surgical Practice, 21st ed. Ch. 23: Bedside surgical procedures.

The SAGES Manual, Vol 1, Basic Laparoscopy and Endoscopy, 3rd ed. Ch. 29: Laparoscopic placement of jejunostomy tube.

Surgery: Basic Science and Clinical Evidence, 2nd ed. Ch. 6: Nutrition; Enteral Access.

SCORE videos:

- [Central Venous Catheter Insertion \(CVC\)](#)
- [Gastrostomy, Percutaneous Endoscopic \(PEG\)](#)
- [Internal Jugular Line Catheterization](#)
- [Percutaneous Endoscopic Gastrostomy \(PEG\) Tubes](#)

Additional Resources

Allen JW, Spain DA. Open and laparoscopic surgical techniques for obtaining enteral access. *Tech Gastrointest Endosc.* 2001;3(1):50-54.

American Society of Gastrointestinal Endoscopy (ASGE). Guideline. The role of endoscopy in enteral feeding.

Rahnemai-Azar AA, Rahnemai-azar AA, Naghshizadian R, Kurtz A, Farkas DT. Percutaneous endoscopic gastrostomy: indications, technique, complications and management. *World J Gastroenterol.* 2014;20(24):7739-7751.