

Percutaneous Endoscopic Gastrostomy

Gady Barutwanayo and Richard Davis

Introduction:

Percutaneous endoscopic gastrostomy tube has the same role as open gastrostomy tube; both allow administration of feeds directly to the stomach in patients with conditions which make oral intake difficult or even impossible such as:

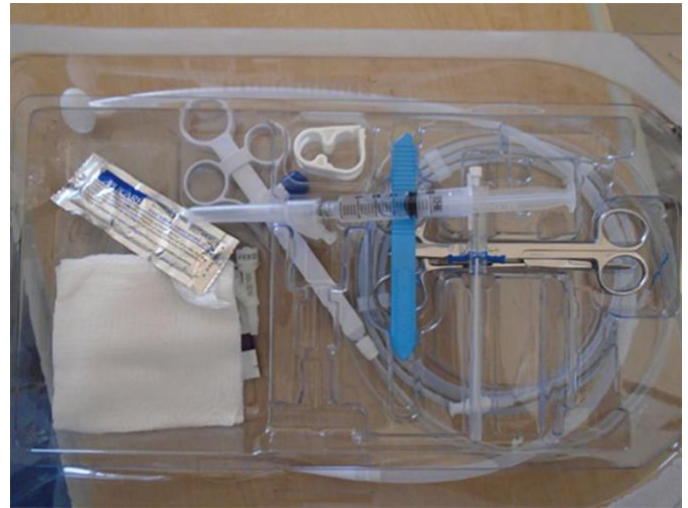
- Neurologic injury
- Ischemic or hemorrhagic stroke
- Motor neuron disease
- Head and neck malignancy
- Palliative gastric decompression for malignant bowel obstruction

The only differences between open and endoscopic gastrostomy are technical skills, equipment and indication of the procedure.

Obstructing tumors of the esophagus are a contraindication for endoscopic tube placement—open gastrostomy is indicated. (See [Stamm Gastrostomy](#).)

Gastrostomy tube placement should never be done in patients with gastric outlet obstruction. In such cases, a gastrojejunostomy anastomosis or jejunostomy feeding tube will be suitable, though their management are quite difficult compared to a simple gastrostomy, and are associated with technical or post operative complications.

Endoscopic gastrostomy requires a special dedicated gastrostomy tube and equipment which make the procedure more expensive and difficult to access compared to open gastrostomy. Other varieties of tubes such as Foley catheters, often used in resource limited settings, cannot be used in this procedure.



Typical percutaneous endoscopic gastrostomy kit containing the cannula, the tube, the guidewire, the snare for endoscopic retrieval, and various other equipment. Source: Wei M, Ho E, Hegde P. *J Thorac Dis* 2021;13(8):5277-5296. doi: 10.21037/jtd-19-3728

Post-operative management of the tube is the same as for open gastrostomy as detailed in the Stamm gastrostomy chapter.

A two-person technique is the most preferred, one person to the endoscopy and the other person to insert and secure the tube. With some practice both duties can be performed by one person.

In general, the steps of endoscopic gastrostomy tube placement are:

- Flexible upper endoscopy
- Localization of the gastrostomy site
- Introduction of the guidewire through the abdominal wall to the stomach
- Retrieval of the guidewire through the scope by a biopsy forceps
- Pulling the guidewire out through the esophagus and mouth
- Connection of the gastrostomy tube to the guidewire
- Placement of the tube by pulling it back through the abdominal wall
- Fixation of the tube to the skin

Steps:

1. General anesthesia is preferred if there is no contraindication. If the generation condition of the patient or his/her comorbidity doesn't allow

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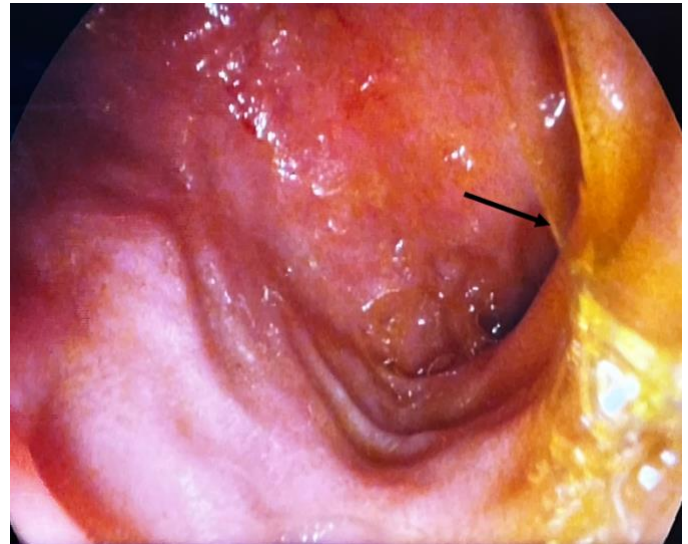
it or puts the patient at high risk, the procedure can be done under light sedation, topical anesthesia sprayed in the throat, and local anesthesia injected during the procedure as described further below.

2. The patient lies supine, abdomen prepared and draped from the inframammary line to the umbilicus.
3. The scope is inserted through the mouth down through the esophagus to the stomach. An assistant provides jaw thrust as the scope is passed gently into the hypopharynx and cervical esophagus. We do this “by feel” rather than watching the tip of the scope on the screen.



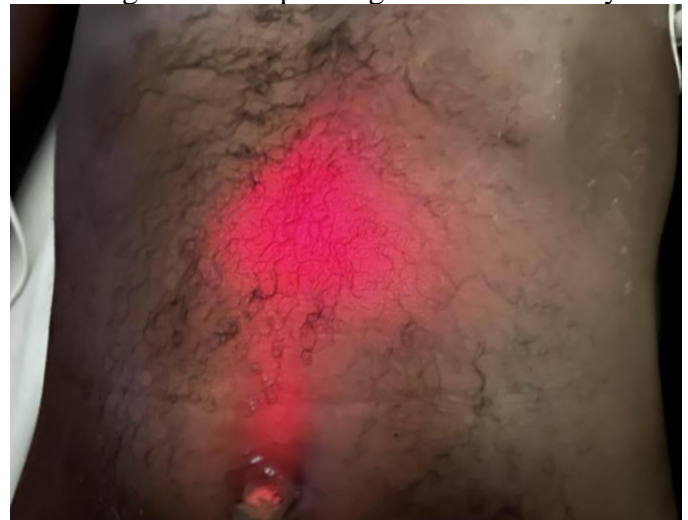
Assistant provides jaw thrust by pushing forward at the angle of the mandible bilaterally while the scope is gently inserted and passed into the esophagus.

4. The stomach is insufflated to allow good visualization of the gastrostomy site with finger pressure.
5. Pass the scope into the duodenum to make sure the pylorus is patent. Patients who are ill enough to need a gastrostomy tube may have a duodenal ulcer, so inspect the first and second portions of the duodenum carefully.



View of the first portion of the duodenum immediately after passing through the pylorus. The posterior bulb, seen on the right side of the screen (Black arrow) should be examined closely as an ulcer here can erode into the gastroduodenal artery and cause life-threatening hemorrhage.

6. Return the scope into the stomach and pass the tip towards the anterior stomach wall. When the scope is at the gastroesophageal junction, the anterior stomach is on the left side of the screen. The stomach must be fully insufflated for this maneuver to succeed. Inspect the anterior abdominal wall for transillumination. Turn out the lights in the operating room if necessary.



In this very thin cachectic patient, the light of the scope can be well seen in the epigastrium. In obese patients this visualization can be more difficult.

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7. A finger is pressed against the abdominal wall where the light is located. The indentation from the surgeon's fingers can be seen through the endoscope. The tube should be placed in the anterior distal stomach body or antrum.



Press on the area where the light was previously seen while watching on the screen to further confirm the area where the tube will be placed.

9. The large needle provided in the gastrostomy kit is inserted with the same direction and angle as the local anesthetic. On the endoscope monitor, its tip is seen to enter into the stomach.

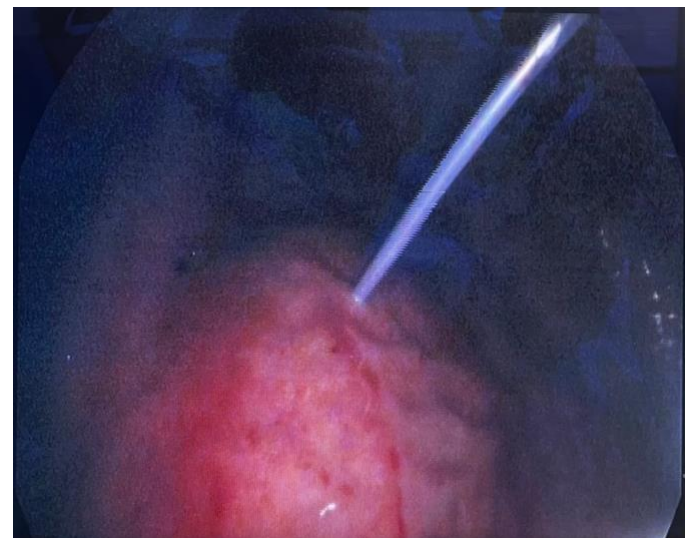


Insert the large cannula provided in the kit through the skin and muscle of the anterior abdominal wall.



When finger pressure is applied, an indentation in the anterior stomach wall is seen. This should be in the center of the stomach, not to the cranial (lesser curve) or caudal (greater curve) sides.

8. Localize the site and inject local anesthetic. A 21G needle is inserted while pulling back on the plunger to make sure no blood, air, or stool returns before the needle reaches the stomach. Inject the skin and the fascia.

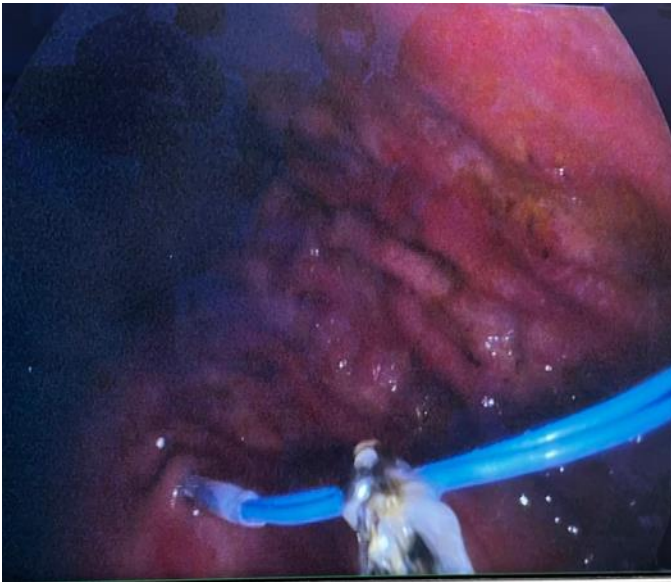


The cannula is seen to enter into the stomach.

10. The inner cannula is removed. The guidewire is passed through the cannula into the stomach. Waste no time doing this, if the cannula comes out during this stage, a hole is left in the stomach.
11. Once the guidewire is in the stomach, it is grasped through the scope by a biopsy forceps.

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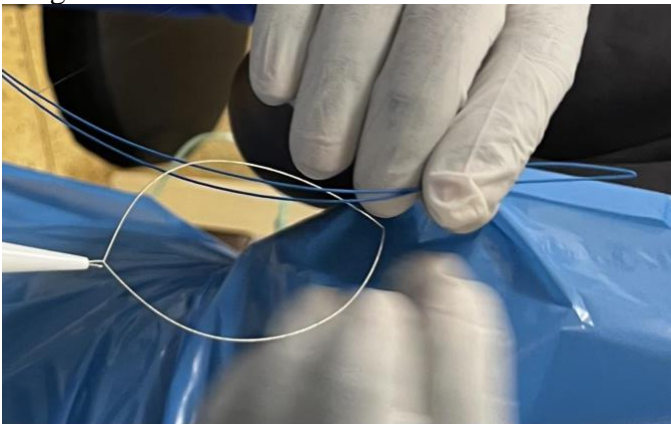
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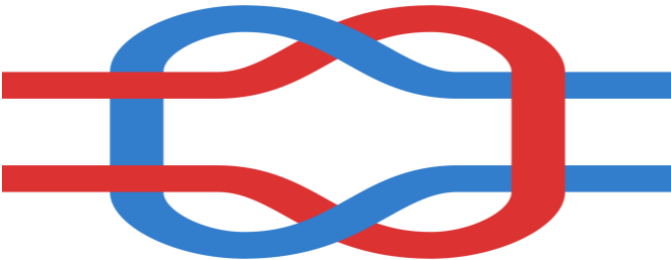
Using a biopsy forceps, grasp the guidewire

12. Maintaining a tight grasp on the guidewire, the scope is withdrawn up through the esophagus with the guidewire

13. The gastrostomy tube is connected to the guidewire.



Pass the guidewire through the wire loop on the end of the gastrostomy tube. Then pass the other end of the gastrostomy tube through the loop of the guidewire, resulting in a "square knot" holding the gastrostomy tube's wire to the guidewire.

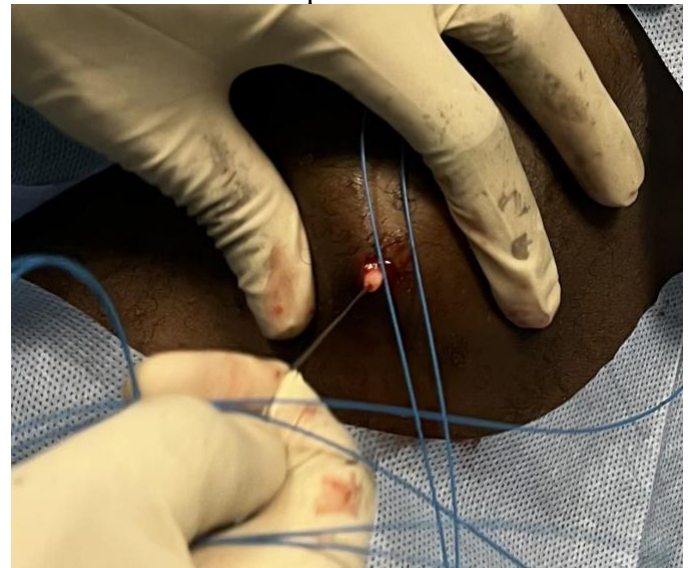


The gastrostomy tube's wire and the guidewire will be

connected in this configuration. Source: Image:SquareKnot.png by PAR, Public Domain <https://commons.wikimedia.org/w/index.php?curid=2269260>

14. Grasp the guidewire where it emerges from the abdominal wall and pull firmly, causing the gastrostomy tube to enter the patient's mouth and pass down the esophagus into position. Be careful to pull in a controlled manner, it is possible to pull the tube completely through the abdominal wall. If this occurs, perform laparotomy and open gastrostomy tube placement through the hole in the stomach, otherwise this hole will leak freely into the peritoneum.

15. When the tip of the gastrostomy tube begins to emerge through the skin, cut the skin with a #11 blade to allow it to pass.

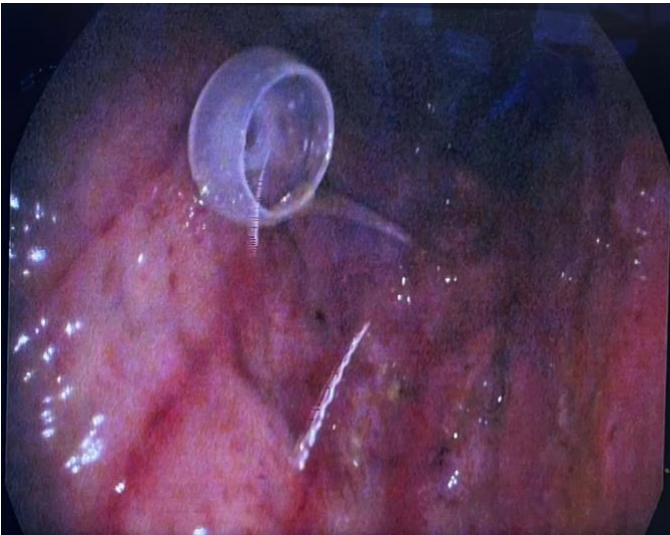


At the abdominal wall, the guidewire is pulled until the tube starts to emerge. Cut the skin to allow the tube to pass and continue pulling until it is in position.

16. The scope is reintroduced following the gastrostomy tube revealing the internal view of the bumper in the correct position.

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Confirm that the tube is positioned and seated well.

16. The flange is cinched down on the skin to prevent leakage and secure the tube



The flange slides over the gastrostomy tube with some difficulty. Be careful to cinch it down but not to over tighten it.

Pitfalls

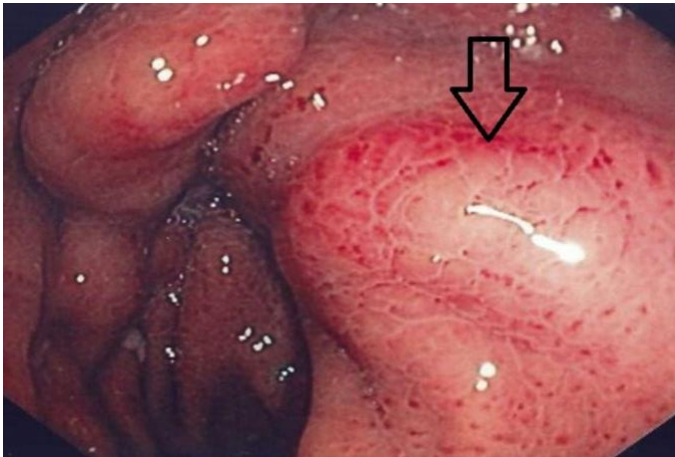
- Early dislodgement of the tube may result in a hole in the stomach that drains freely into the peritoneal cavity. The surgeon must be aware of this possibility. It is generally acceptable for an experienced hand to try to replace any dislodged tube, but a contrast study is mandatory before using a tube that has fallen out and been replaced within two weeks of its placement.
- Commercially available open and percutaneous gastrostomy tubes include a flange that is cinched

down on the skin to prevent leakage and secure the tube. If this flange is too loose, leakage will occur. If it is too tight, necrosis of the skin or even the full thickness abdominal wall can occur. Our practice is to cinch it down until it is tight, then release it 1cm. Full thickness necrosis of the abdominal wall leads to gastrocutaneous fistula. This is a devastating complication that is best avoided by erring on the side of “too loose” rather than “too tight.”

- All gastrostomy tubes will allow some degree of leakage around the tube. Proper care of the tube includes keeping the skin clean including under the flange, assuring proper tightness of the flange, and protecting the skin with zinc barrier cream if irritation starts to occur. Most skin complications will occur after discharge, so the patient and family should be taught proper care of the tube. Other solutions to persistent leakage around the tube include changing the tube to a larger size, increasing frequency of feeds while decreasing volume, assessing gastric emptying function and treating with prokinetics if appropriate. In extreme cases the patient may need closure and placement of the tube in another part of the stomach, or conversion to Janeway gastrostomy.
- Buried bumper syndrome is a rare but difficult complication: the wide end of the tube becomes encased in the stomach wall. The risk factors for this complication include poor nutrition and excess pressure on the tube flange. Management depends on the condition of the patient: for frail patients with poor long-term prognosis, the tube can be cut at the skin, left in place, and another placed at a different site in the stomach. If there is associated infection or abscess, the tube must be surgically removed by wedge resection of the involved stomach and abdominal wall.

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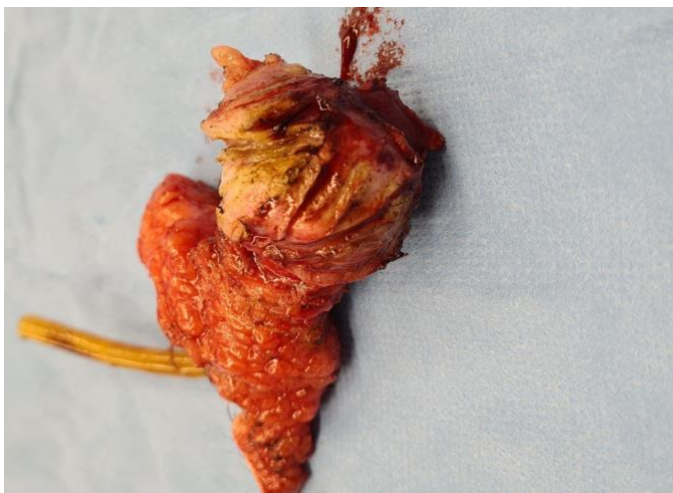
Buried bumper syndrome. The tube is embedded in the gastric wall and covered with mucosa (Black arrow.) Source: Boeykens K, Duysburgh I BMJ Open Gastroenterology 2021;8:e000628. doi: 10.1136/bmjgast-2021-000628

measures to improve the patient's nutrition do not lead to fistula closure, laparotomy and closure of the fistula may be required. Assess the patient's nutritional status carefully before attempting operation (See Chapter, Nutritional Assessment.)

Gady Barutwanayo MBBS
AIC Kijabe Hospital
Kenya

Richard Davis MD FACS FCS(ECSA)
AIC Kijabe Hospital
Kenya

June 2022



Specimen after wedge resection of the abdominal wall and stomach for buried bumper syndrome. Source: Boeykens K, Duysburgh I BMJ Open Gastroenterology 2021;8:e000628. doi: 10.1136/bmjgast-2021-000628

- When gastrostomy tubes are no longer needed and removed, the tract usually closes spontaneously within 2-5 days at most. When it does not close, a gastrocutaneous fistula is present. The most common causes of this are poor nutrition or distal obstruction. This complication can make nutrition difficult, as the patient will often voluntarily restrict feeds to decrease fistula output, leading to a “vicious cycle” in an already malnourished patient. If