
LRYGB: The Circular Stapler Technique (Includes Transoral as well as Transabdominal Anvil Placement)

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Corinne E. Owers and Roger Ackroyd

Abstract

The gastrojejunal anastomosis is arguably the most challenging and crucial step of the laparoscopic Roux-en-Y gastric bypass. Either hand sewn or stapling devices can be used to good effect. Both hand sewn and linear stapled techniques can take time and are not easy. This is a quick, easy and safe method of performing this anastomosis. We describe the circular stapler technique employing different placement methods, and its advantages and disadvantages.

Keywords

Roux-en-Y gastric bypass, laparoscopic, gastrojejunal anastomosis • Trans-oral • Transgastric • Circular stapler

20.1 Introduction

Constructing the gastro-jejunal anastomosis is one of the most challenging, technically demanding and critical steps of performing a Roux-en-Y gastric bypass procedure. Although many techniques exist, none have been shown to have a clear advantage over the other, and therefore the choice between hand sewing, linear stapling or circular stapling, as described in this chapter, is usually determined by cost, operative time, and surgeon preference.

The circular stapler technique for creating the gastro-jejunal anastomosis during laparoscopic Roux-en-Y gastric bypass surgery was originally described by Wittgrove et al. using the orogastric technique [1], and is one of the most common techniques in bariatric practice. It creates an end-to-end (EEA) anastomosis between the stomach and small bowel, thereby reducing the need for closure of a

common opening as created by a linear stapling device. This technique may be seen as an advantage, possibly reducing the risk of an anastomotic leak or necrosis of any remaining redundant bowel distal to the anastomosis. This procedure can be performed using a transabdominal or transgastric technique.

20.2 Patient Positioning and Port Placement

The patient is usually placed legs apart in a steep reverse Trendelenburg position; the surgeon standing between the legs with the first assistant on the patient's left and the scrub nurse on the patient's right. Alternatively, the patient can be placed on the table with the legs together, still in steep reverse Trendelenburg position, with the surgeon and assistant on the patient's left side (Fig. 20.1).

The first 12 mm port is placed under direct vision in the left subcostal region. Following CO₂ insufflation, the camera port is placed in the midline approximately one and a half hand breadths below the xiphisternum. A Nathanson liver retractor is placed in position through a small sub-xiphoid incision. The final three ports are placed in the left upper

C.E. Owers, MBChB, MRCS (✉)
R. Ackroyd, MBChB, MD, FRCS
Department of Upper GI and Bariatric Surgery,
Sheffield Teaching Hospitals NHS Foundation Trust,
Sheffield, UK
e-mail: corinneowers@doctors.org.uk

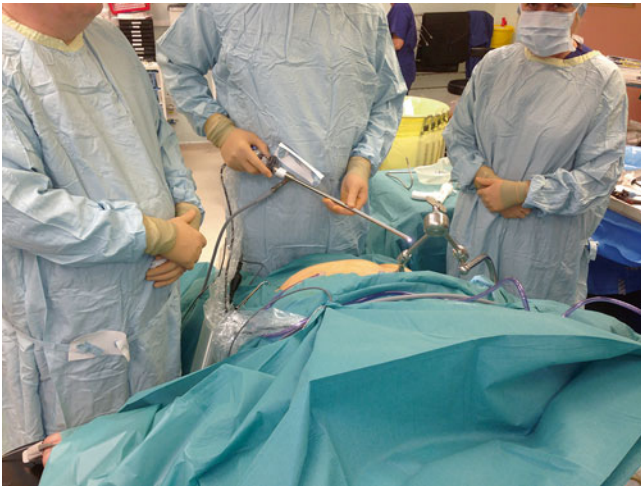


Fig. 20.1 Position of surgeon, assistant and scrub nurse

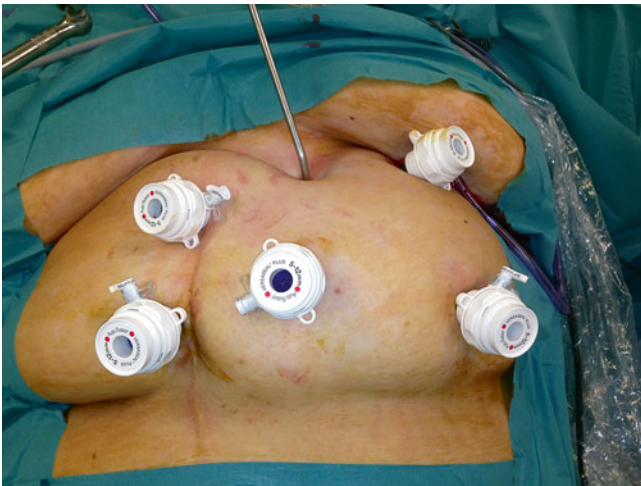


Fig. 20.2 Port positions

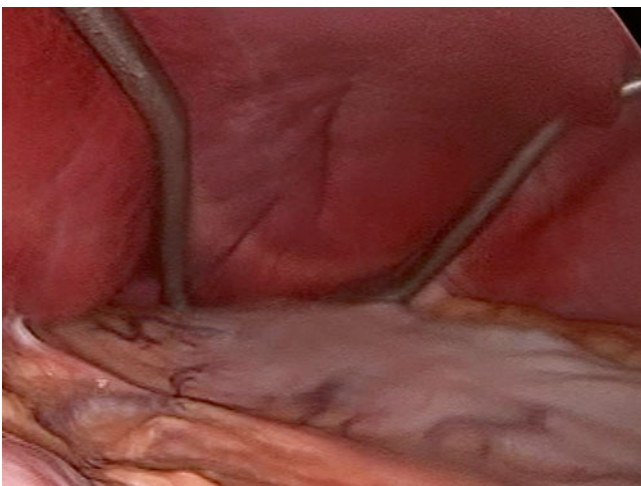


Fig. 20.3 Nathanson liver retractor

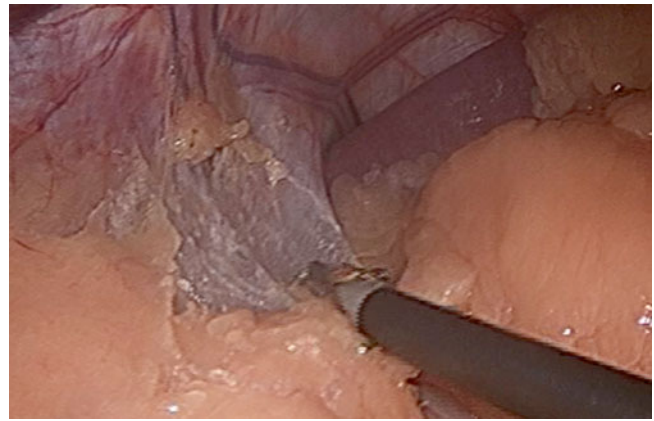


Fig. 20.4 Dissection at the Angle of His

quadrant, approximately 1–2 cm below the camera port in the mid-axillary lines (Figs. 20.2 and 20.3).

20.3 Jejunio-Jejunostomy

Following initial division of the greater omentum to allow better visualization of the small bowel, the duodeno-jejunal flexure is identified. After measuring 100 cm down the small bowel, a suture is placed at this point and the bowel is divided. A further 100 cm is measured down the small bowel and this loop of bowel is brought up to lie adjacent to the divided bowel. A side-to-side anastomosis is fashioned at this point using a triple-stapled technique. Following creation of this anastomosis, the distal end of divided small bowel is brought up to create the anastomosis with the gastric pouch.

20.4 Gastric Pouch Creation

Before creating the pouch, it is often beneficial to incise the peritoneum over the angle of His in order to mobilize this area and help with the subsequent pouch creation (Fig. 20.4).

The lesser curve is mobilized by opening the pars flaccida, approximately two centimeters below the gastroesophageal junction to allow placement of a Covidien blue (or tan tri-staple) 45 mm linear stapler, cutting the stomach transversely. If using a transoral technique, the pouch is completed at this stage with two or three subsequent fires of a blue (or tan tri-staple) 60 mm linear stapler vertically, aiming for the angle of His. If a trans-gastric technique is used, the pouch is completed after placement of the anvil, which is described below (Fig. 20.5).

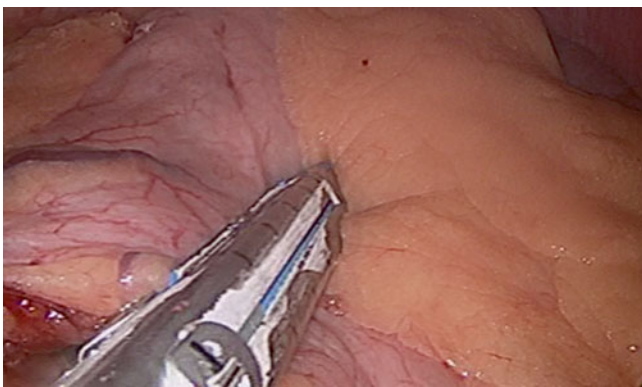


Fig. 20.5 Pouch creation

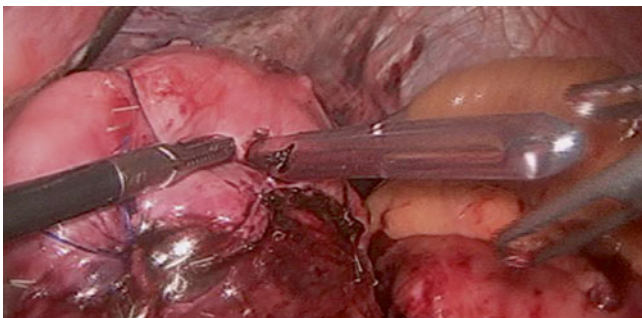


Fig. 20.6 Feeding the orogastric tube through the esophagus

20.5 Trans-oral Technique

The orogastric technique involves the use of the circular stapler with a detachable anvil head (Covidien EEATM). The anvil head is pulled down the esophagus and maneuvered into position within the gastric pouch, reducing the need for a further gastrotomy.

The pre-tilted anvil head is attached securely to the distal end of an orogastric tube (18 F). The proximal tip of the tube is fed down through the mouth and into the esophagus under vision by the anesthetist, and then down into the newly created gastric pouch. A small opening is made in the anterior surface of the stomach, around 1 cm proximal to the pouch staple line and the tip of the orogastric tube fed through this opening into the abdominal cavity (Fig. 20.6).

The orogastric tube has 5 cm markings along its length to help guide passage of the anvil head past the endotracheal cuff. The surgeon and anesthetist gently guide the anvil down the esophagus, pulling the orogastric tube through the wall of the gastric pouch into the abdominal cavity, until the anvil trocar appears. Here, the surgeon grasps the trocar, cuts the sutures that bind the trocar to the orogastric tube, and

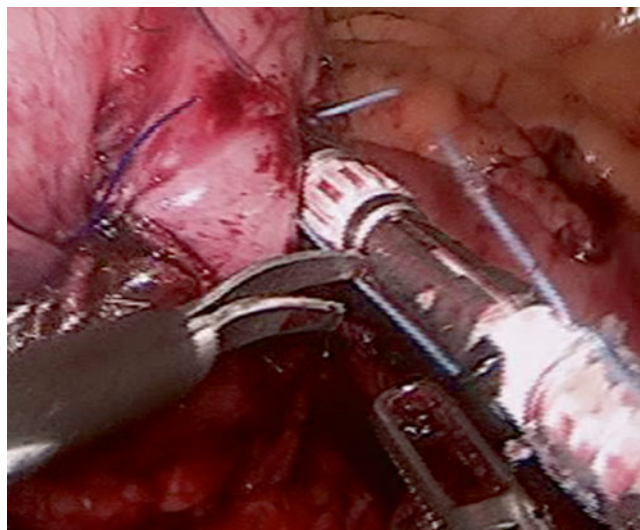


Fig. 20.7 Pulling the anvil trocar through the esophagus

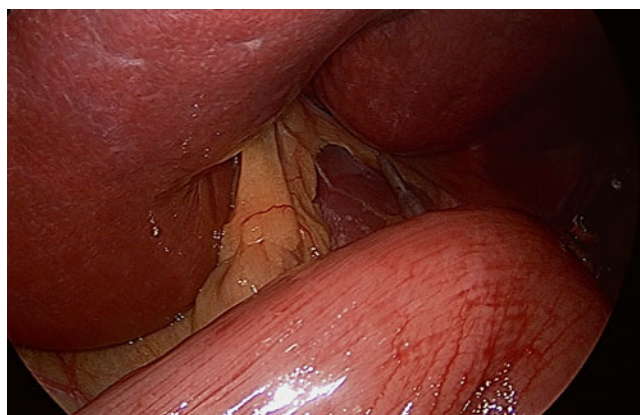


Fig. 20.8 Spike protruding through jejunum

removes the redundant tubing out of the abdominal cavity via one of the laparoscopic ports. This method sometimes causes enlargement of the pouch aperture, and therefore a prolene or PDS purse string suture is occasionally placed before the stapling device is fired (Fig. 20.7).

The blind end of the jejunum is then brought into the upper abdomen by the surgeon and the body of the stapling device is introduced into the abdomen via one of the port sites (usually the lower left). The spike used for anvil attachment is retracted and the device is fed into the open end of jejunum. It is important to feed the jejunum onto the device, rather than pushing the device blindly up the loop of bowel in order to reduce the likelihood of forming tears or enterotomies, which then need repair after the anastomosis has been created. At approximately 5–10 cm from the end of the jejunum, the spike is extended and pushed through the wall of the jejunum on the antimesenteric border (Fig. 20.8).

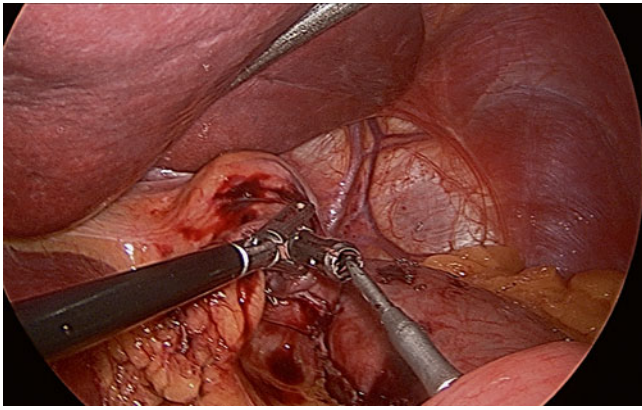


Fig. 20.9 Connecting stapling device

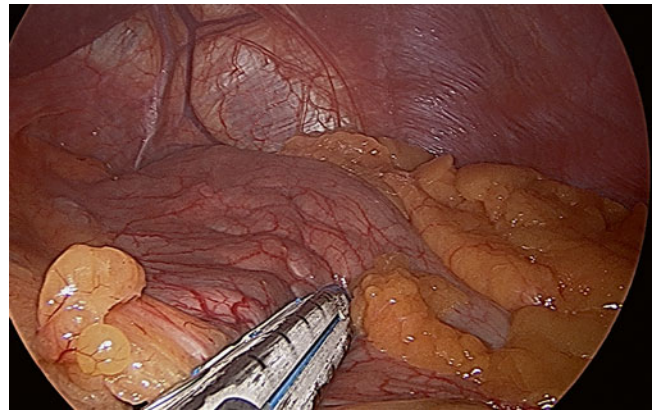


Fig. 20.11 Pouch creation

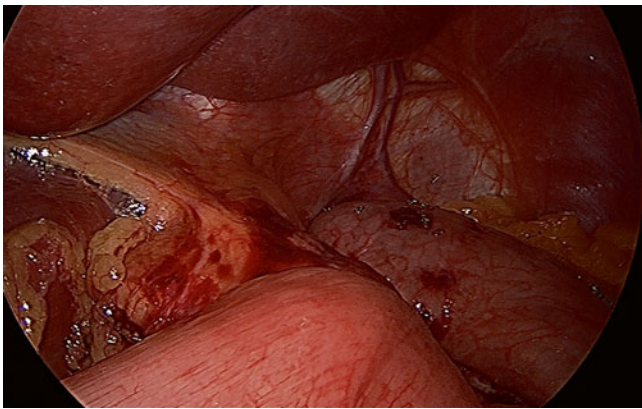


Fig. 20.10 Completed anastomosis

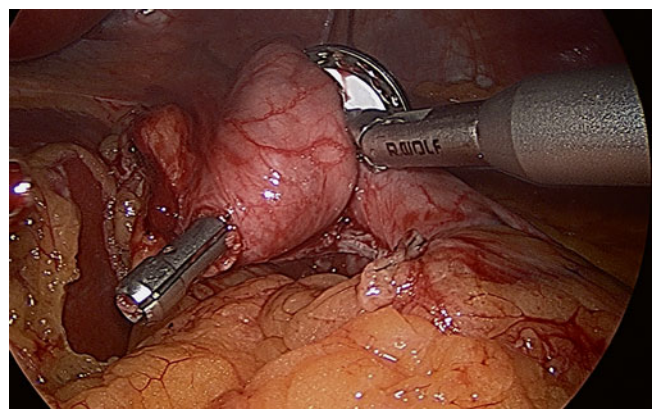


Fig. 20.12 Placement of anvil head into pouch

The anvil trocar is grasped securely and fed onto this spike (Fig. 20.9).

The spike, with the anvil head attached, is then retracted so that the stomach and bowel are opposed and the stapling device fired. The whole device is then removed via the open end of jejunum. A linear stapler is then used to close this blind end of jejunum (Fig. 20.10).

20.6 Transabdominal Placement

Although the transoral approach was the original technique described, a variation on this approach is to place the anvil into the pouch via a transabdominal/ transgastric route, removing the need for orogastric insertion. We describe the technique used in our practice, although slight variations may exist.

As described in the gastric pouch creation, the surgeon staples transversely across the stomach with the blue (or tan tri-staple) 45 mm linear stapler (Fig. 20.11).

A tiny but full-thickness hole is made in the pouch just above the staple line. A larger gastrotomy (approximately 15–20 mm) is then made in the remnant stomach below this position; large

enough to admit the anvil head below and to the patient's left, from the staple line. The stapling device with the anvil head attached is introduced into the abdominal cavity by an enlarged port site (approximately 25 mm) in the left side of the abdomen. The anvil is detached from the circular stapler and the body of the device can then be removed leaving the anvil head within the abdomen. The surgeon then feeds the trocar through the large gastrotomy, and out of the small hole in the pouch, until the anvil head is flush with the inside wall of the stomach (Fig. 20.12).

With the anvil safely in position, the pouch is then completed by two or three vertical firings of a blue (or tan) 60 mm linear stapler across the remaining portion of the stomach. This leaves a closed pouch with the anvil trocar 'poking out.' The large gastrotomy on the now redundant stomach can then be closed using the linear stapler (Fig. 20.13).

The rest of the anastomosis is created in the same manner as when using the transoral circular stapling device.

With either technique, the 'donuts' of stomach and bowel created by the circular stapler should be inspected for their integrity (ensuring they are a complete ring), and/ or a leak test performed. Any leak detected should be repaired or reinforced using hand sewn sutures.

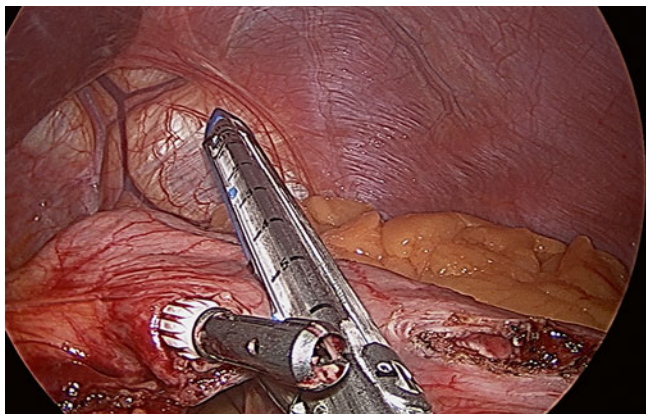


Fig. 20.13 Pouch completion

20.7 Advantages and Disadvantages

As with any stapling device, there are advantages and disadvantages to the circular stapler. The size of the anvil head results in a pre-determined anastomotic aperture, lending uniformity to each gastric bypass operation. Some studies have shown an increased risk of anastomotic stricture with smaller sized staplers [2, 3] such as the 21 mm stapler which provides an inner aperture diameter of 11.8 mm, when compared to the 25 mm circular stapler, which creates an inner diameter of 15.3 mm [3]. Other authors have failed to show any difference between the anvil size, although their follow up was for 12 months only and did not mention any investigation of patients with nausea, dysphagia and vomiting [4].

The detachability of the anvil head makes the device more maneuverable when compared to a linear stapler, which can be an advantage in the confined space of the abdomen, especially if the liver is large or adhesions are present. It does however require more laparoscopic skill, as the device needs some assembly within the abdominal cavity before the anastomosis can be created. The anastomosis can be reinforced with hand sutures, but this is rarely necessary and may decrease the size of the stoma, possibly increasing the risk of a gastro-jejunal (GJ) anastomotic stricture.

A slightly increased incidence of postoperative complications using the circular stapling technique when compared to the linear stapler has been demonstrated by one study, although this was statistically insignificant, and the re-operation rate for anastomotic leak following surgery was higher in the linear technique group than in the circular stapler [5]. The authors of this study noted that using the circular stapler via the orogastric route increased their operative time and wound infection rate. In our practice, using the transabdominal/ transgastric route, we have not found this to be the case.

An advantage of the orogastric anvil placement technique is that it requires fewer laparoscopic skills to maneuver the anvil head into the pouch. This may be advantageous to the trainee surgeon as they learn to create the anastomosis. Disadvantages may be increased risk of esophageal trauma [6], and increased rate of intra-abdominal as well as wound infection [7], as the anvil head is passed through the oropharynx down the esophagus and out into the abdominal cavity, where it is removed via one of the laparoscopic ports. In cases where there is an esophageal stenosis, placement of the anvil head using this technique may be impossible, and the surgeon will have to revert to intra-abdominal placement, which could be difficult if the pouch has already been created. Under these circumstances a linear stapling or hand sewn technique may become necessary. The anvil during esophagogastric placement is pre tilted to minimize esophageal trauma, and this anvil tilt needs to be corrected before stapling so that the head is 90° perpendicular to the trocar. Maneuvering the anvil to correct the tilt is done when the trocar has been passed through the opening in the pouch, and therefore can be tricky to accomplish, especially during the learning curve. This maneuver can often increase the opening diameter, necessitating the need for a purse string suture, thereby increasing the time taken for the operation and requiring more technical skills of the surgeon.

Although rare, the complication of stapling an nasogastric (NG) tube into the anastomosis during GJ anastomotic construction has been reported [8]. A distinct advantage of the circular stapling technique using the orogastric placement technique is that this is impossible, providing only the tube attached to the anvil has been placed. With the transabdominal route, there is no need for NG tube placement until the leak test, thereby negating the chances of stapling an NG into the anastomosis.

In either technique, the abdominal wound, through which the handle of the circular stapling device is inserted, needs to be enlarged, as it will not fit down a standard 12 mm port. Although many small port sites do not need individual closure after finishing the procedure, it is imperative that this particular incision is closed in order to prevent documented complications such as wound infection, scarring and incisional herniae.

20.8 Postoperative Management

The post operative management required for a patient who has had the GJ anastomosis constructed with a circular stapling device is no different from that of a patient who has had an anastomosis created using the hand sewn or linear stapler techniques. There is a slightly increased risk of bleeding after using a stapling device when compared to a hand sewn anastomosis [9]. Serosal surface bleeding can be controlled

using sutures. If an intraluminal bleed is suspected an upper gastrointestinal endoscopy may be performed.

If there is any suspicion about the integrity of the anastomosis, a nasojejunal tube can be placed, although in most cases, this is not necessary. Patients can be allowed to sip water within hours of the procedure, and then can gradually be allowed to increase their fluid intake. The anastomosis usually heals quickly, and although the GJ anastomosis is the most common site for postoperative leaks after laparoscopic bypass surgery (approximately 80 % [10]), the actual incidence of any leak is low, at around 1.7 % of all cases.

Conclusion

The learning curve for performing Roux-en-Y gastric bypass surgery is estimated to be between 75 and 100 cases [11, 12], the most challenging part of which is learning to create the GJ anastomosis. The decision as to which operative technique to use for its creation is down to a number of factors including surgeon's preference, skill (learning curve), and economic factors. Either the transoral or transabdominal approaches using the circular stapler are known to be successful and quicker than hand sewing an anastomosis. Further long-term studies are needed to see if there is a true difference between the transoral or transabdominal approaches. It is useful for the surgeon to be familiar with both techniques, as complications such as esophageal stenosis or strictures can make the orogastric technique difficult, and surgical ability may confer an advantage to one technique over the other.

Key Learning Points

- The GJ anastomosis is the most technically demanding and potentially risky step during a Roux-en-Y gastric bypass, and extra care should be taken to ensure it is performed properly.
- The most common site for anastomotic leaks is at the GJ anastomosis, so this should be checked intraoperatively with a leak test and/or by checking the integrity of the tissue donuts on the circular stapler, to ensure the anastomosis is intact.

- The surgeon and anesthetist need to communicate in order to successfully introduce the anvil during orogastric placement.
- A 25 mm diameter circular stapler is the optimum size to use for this anastomosis.
- Use of the transgastric technique eliminates and potential risk of contamination with oral flora.

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