Laparoscopic Adjustable Gastric Banding (LAGB)

8

Seong Min Kim

8.1 Introduction

Obesity has reached epidemic proportions worldwide and is often associated with metabolic disorders, such as type 2 diabetes, hypertension, and dyslipidemia, which increase the risk of cardiovascular disease. Bariatric surgery is known to be the most effective and long-lasting treatment for obesity and its comorbidities. Laparoscopic adjustable gastric banding (LAGB) is a minimally invasive operation that is being performed increasingly since it was introduced in the early 1990s. In Asia/Pacific, LAGB held steady from 2003 (80.4 %) to 2008 (82.5 %) and then fell in 2011 (32.6 %) [1]. However, considering the number of the LAGB performed in private clinic, it is still one of the most frequently performed bariatric procedures for morbid obesity. It is a safe procedure, easy to perform, reversible, and effective. Unlike other bariatric surgical procedures such as sleeve gastrectomy or gastric bypass, which alter the anatomy of the alimentary tract, LAGB is essentially a restrictive procedure that limits food capacity. These limits can be adjusted by injecting saline into the band system through a reservoir port, which alters the stoma diameter. With the adequately adjusted stoma, patients fitted with gastric band can be satisfied with small amount of nutritious food and resulting weight loss. A systematic review shows substantial and similar long-term weight losses for LAGB and other bariatric procedures [2]. Although minor (access port, pouch, infection) and major (slippage, erosion) complications of LAGB are increasingly reported recently, proper surgical technique and intensive patient education with good aftercare program can minimize the incidence of these complications.

8.2 Eligibility/Candidate for LAGB

Patients in our clinic are selected for LAGB procedure according to recent recommendations for use of Bariatric and Gastrointestinal Metabolic Surgery for Treatment of Obesity in the Asian Population [3] (Fig. 8.1). Patients with extreme age (<18 or >65 years), BMI below 30 kg/m^2, untreated major depression, drug or alcohol abuse, schizophrenia, previous surgery of esophagogastric junction, malignancy, and connective tissue disease were excluded as a candidate for LAGB. Some individuals have end-stage organ dysfunction of the heart, lungs, or both; they are unlikely to gain the benefit of longevity and improved health. Prader-Willi syndrome is another absolute contraindication because no surgical therapy affects the constant need to eat by these patients.

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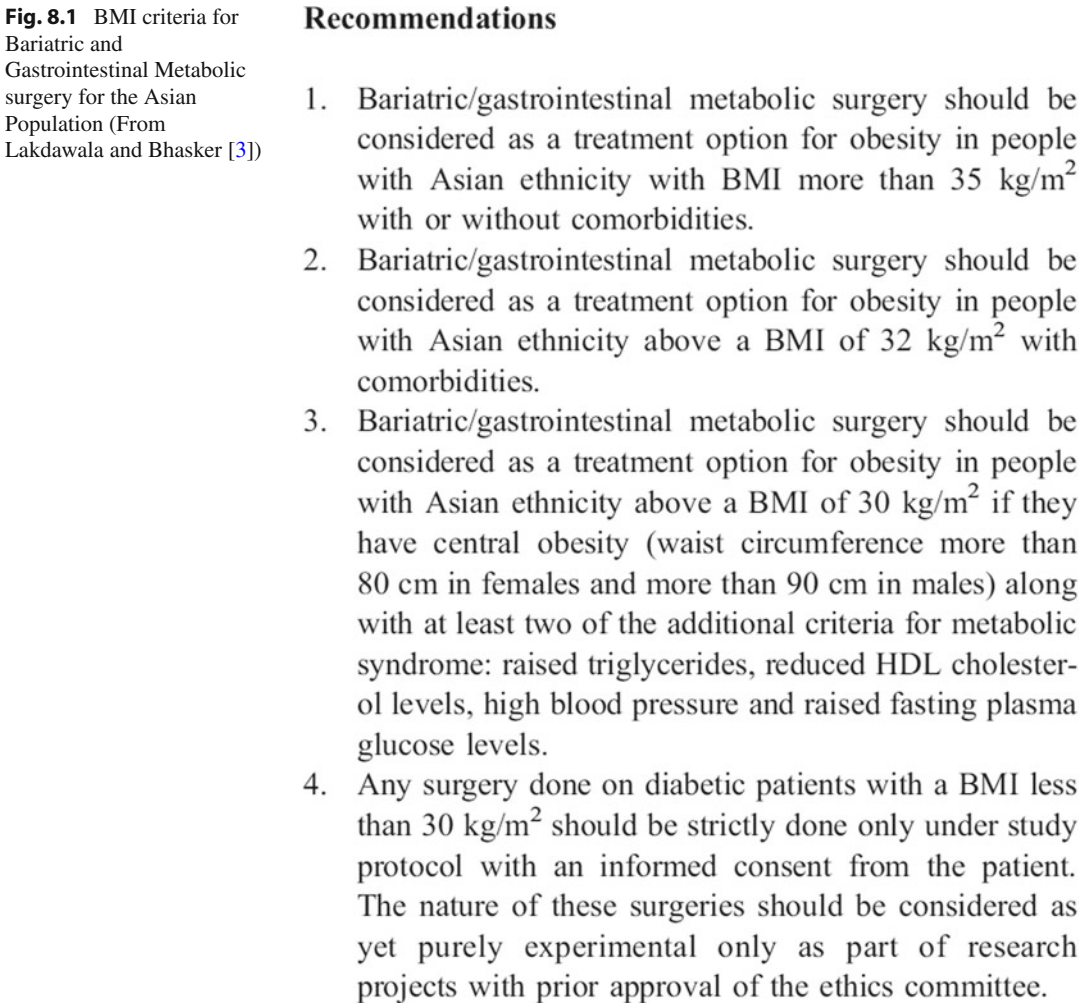

Recommendations

1. Bariatric/gastrointestinal metabolic surgery should be considered as a treatment option for obesity in people with Asian ethnicity with BMI more than 35 kg/m^2 with or without comorbidities.
2. Bariatric/gastrointestinal metabolic surgery should be considered as a treatment option for obesity in people with Asian ethnicity above a BMI of 32 kg/m^2 with comorbidities.
3. Bariatric/gastrointestinal metabolic surgery should be considered as a treatment option for obesity in people with Asian ethnicity above a BMI of 30 kg/m^2 if they have central obesity (waist circumference more than 80 cm in females and more than 90 cm in males) along with at least two of the additional criteria for metabolic syndrome: raised triglycerides, reduced HDL cholesterol levels, high blood pressure and raised fasting plasma glucose levels.
4. Any surgery done on diabetic patients with a BMI less than 30 kg/m^2 should be strictly done only under study protocol with an informed consent from the patient. The nature of these surgeries should be considered as yet purely experimental only as part of research projects with prior approval of the ethics committee.

Fig. 8.1 BMI criteria for Bariatric and Gastrointestinal Metabolic surgery for the Asian Population (From Lakdawala and Bhasker [3])

In our clinical experience, the ideal LAGB candidate includes relatively young (age <40) and well-motivated patients, female, BMI <50 kg/m^2, and simple obesity without serious comorbidities.

8.3 Pre-op Evaluation wwand Preparation

Proper preoperative patient education is essential and attendance at educational sessions is mandatory. Poor understanding of the concept of food restriction in AGB can be a potential risk factor for post-op complications. We routinely check chest PA, EKG, CBC, serum biochemistry, urinalysis, coagulation profiles, thyroid function test, HbA1C, and lipid profiles (TG, cholesterol, HDL, and LDL). Cholelithiasis or steatohepatitis are the most prevalent of the several gastrointestinal conditions in morbidly obese patients. Abdominal ultrasound is performed for evaluating the gall bladder and liver for patients showing relevant symptoms or elevated liver enzymes. Gynecologic specialist checks the ovary and uterine diseases if there are menstruation-associated problems. Patients with a history of recent chest pain or a change in exercise tolerance need to undergo a formal cardiology assessment, including stress testing and echocardiogram as indicated. Patients with suggestive histories of clinically significant sleep apnea need to undergo preoperative sleep study testing. If found to have the condition, use of a continuous or bi-level positive airway pressure apparatus postoperatively while sleeping can eliminate the stressful

periods of hypoxia. Gastroesophageal reflux disease (GERD) is common in severely obese patients because of the increased abdominal pressure and shortened lower esophageal sphincter. Gastrofibroscope is not routinely performed before LAGB, but we performed that for patients who have not undergone an endoscopy before, have GI symptom such as reflux, have epigastralgia, have antireflux medications, and have familial history of esophagogastric malignancy.

The size of the left lobe of the liver often inhibits the surgeon's ability to complete LAGB. Patients with a known enlarged fatty liver may benefit from hypocaloric diet tried for several weeks before surgery for shrinkage of the left lobe of the liver. This facilitates the LAGB procedure without complications such as inaccessibility of the cardiac region or liver capsular bleeding. Preoperatively, SC injections of heparin or low-molecular-weight heparin (LMWH) for DVT prophylaxis is not routinely performed except for those who are high-risk thrombophilic patients including superobese patients anticipating longer procedure, those with history of DVT, venous stasis ulcer, and hypoventilation syndrome of obesity. Recent data have shown that pulmonary embolism is uncommon after laparoscopic bariatric surgery and that measures such as early ambulation and sequential compression devices(SCD), without pharmacologic agents, such as heparin, can be used successfully to prevent DVT and PE in many patients undergoing LAGB [4]. We routinely use perioperative SCD and encourage patients' early ambulation after LAGB. A prophylactic intravenous first-generation cephalosporin, in a dose appropriate for weight, is given preoperatively and, if deemed necessary, intraoperatively (long procedure or contamination). Antibiotics are continued for less than 24 h. Oral antibiotics are prescribed several days as discharge medications with narcotics, antacids, and prokinetics.

8.4 Operation

After induction anesthesia, patients' prep is very important for safely and easily performing the procedure. Urinary catheterization is seldom necessary except in case of difficult case of revisional surgery or complication surgery in which expected procedure time is longer than 2–3 h. Nasogastric tube is not necessary except in case of significant gastric distension after induction anesthesia. Before skin prep of the patients, we always test the mobility of operation table whether or not the steep reverse Trendelenburg position is possible. For most morbidly obese patients, the huge fatty omentum prevents adequate view of the GE junction. Therefore, reverse Trendelenburg position is important for easily accessing the cardia in these patients. Vertical foot plate fixed in the table is very useful for maintenance of the steep reverse Trendelenburg position in this circumstance. The skin is soaped with skin soap. Skin prep with Betadine ranges from upper limit nipple level to lower limit anterior superior iliac spine level. Laterally, margin of surgical prep is slightly lateral to both anterior axillary lines. Antimicrobial Ioban™ incise drape is preferred by some surgeons. We have found a 10 mm/30° telescope, extra-long, atraumatic graspers, and other instruments to be most useful. Extra-long trocars may be needed for superobese patients. An ultrasonic scalpel is helpful in all aspects of the dissection even in AGB procedure. A fixed retractor device secured to the operating room table for clamping and holding the liver retractor is also essential. The surgeon stands to the patient's right, the assistant is to the patient's left, and the camera operator is adjacent to the surgeon.

The standard trocar placement for AGB we usually perform is as follows (Fig. 8.2): The first trocar used is 15 mm trocar at or just above the umbilicus. We usually do this with open Hasson techniques. After CO_2 insufflation until 15 mmHg and under the direct view from the umbilical trocar, additional four trocars are inserted: two 5 mm trocars at both subcostal areas, one 12 mm trocar at left upper quadrant, and 5 mm epigastric trocars for Nathanson liver retractor. For the superobese (e.g., BMI >60), three abdominal trocars need to be moved slightly cephalad direction for better surgical view of cardiac region. Pneumoperitoneum usually ranged within 12–15 mmHg. In case of superobese patients, adjustment up to 20 mmHg level is often necessary for elevating thick abdominal wall. Communication with the anesthesiologist for

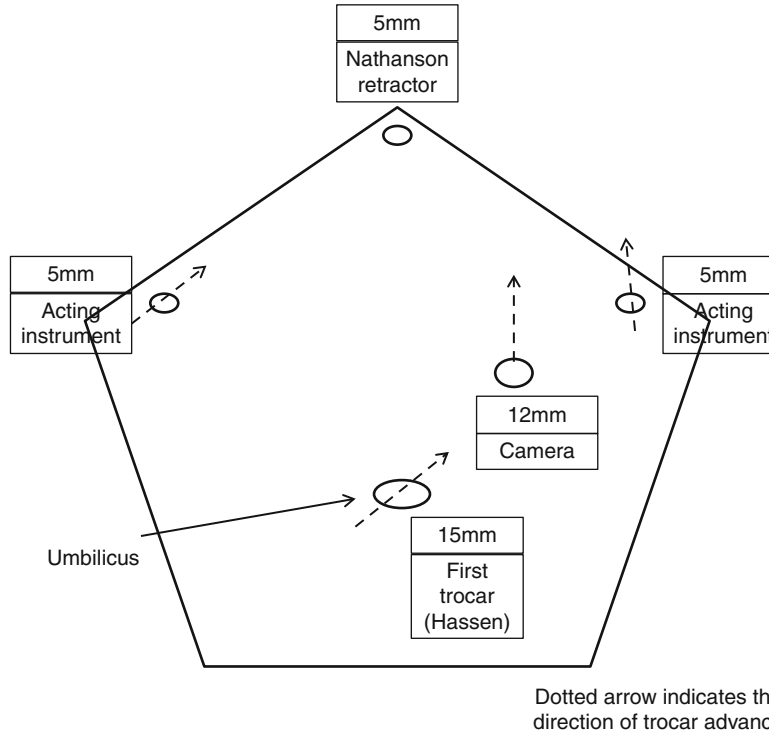

Fig. 8.2 The standard trocar placement for AGB. *Dotted arrow* indicates the direction of trocar advance

adjusting the pressure of air insufflations is very important for preventing CO_2 retention or hypoxia induced by excessive pressure from abdominal cavity.

All operations are performed by the author utilizing LAP-BAND® (Allergan, Irvine, CA, USA) with different modifications (9.75/10.0, AP series). However, the AGB procedure may be performed with any of various types of adjustable bands. They all work on the principle of reduction of oral intake by augmenting the early satiety and decrease in appetite triggered by distention of the proximal part of the stomach. The two bands approved for use by the FDA in the United States are the LAP-BAND® (Allergan, Irvine, CA, USA) and the Realize Band (Ethicon Endo-Surgery, Cincinnati, Ohio). The Swedish Adjustable Gastric Band (Obtech Medical, Baar, Switzerland), the MIDBAND (Medical Innovation Development, Villeurbanne, France), and the Heliogast band (Helioscopie, Vienne, France) are other banding systems used in Europe, Asia, the Middle East, and South America. Key points of the techniques of placement of the AGB include (1) very small pouch formation by placement of the band on top of the stomach just below the gastroesophageal junction. A calibration tube with a 25 cc balloon may be used depending on surgeon's preference for proper band placement and detection of the hiatal defect. (2) The pars flaccida technique, in which entry into the lesser sac is avoided by placement of the band supra-bursally around gastric vessels and fat instead of close to the gastric wall. (3) Anterior fixation of the gastric fundus using three to four nonabsorbable sutures between above and below the band.

After adequate liver retraction with Nathanson retractor, access to the gastroesophageal junction becomes much easier. The telescope is placed through the left upper quadrant 12 mm port for this part of the operation to maximally view the angle of His area. Fundus is grasped with babcock forceps and retracted downward to the patient's right side for stretching that area. With a hook diathermy, peritoneal membranes on the phrenoesophageal fat pad at the angle of His are

minimally dissected to create an opening in the peritoneum (Fig. 8.3a). Swabbing with suction device in that area is useful for clearly exposing the His angle and left pillar of the crus muscle (Fig. 8.3b). The pars flaccida technique has become the approach of choice for placing the adjustable band. The filmy membranous gastrohepatic ligament onto the caudate lobe (pars flaccida) is divided for accessing the right pillar of the crus muscle of the diaphragm (Fig. 8.3c). The anterior branch of the vagus nerve and any aberrant left hepatic artery should be preserved at this point of time. Caudate lobe and crus muscle should be seen clearly because occasionally the vena cava can lie close to the caudate lobe. With an ultrasonic device (or hook diathermy), the peritoneal membrane above the right pillar of the crus muscle fascia is minimally dissected and advanced about 1–2 cm toward the patient's left with a gentle spreading and pushing technique (Fig. 8.3d). With laparoscopic grasper, omentum encasing the perigastric vessels is carefully grasped away to the left of the patient. This facilitates band passer entry into the band tunnel opening. Special tunneling instrument (band passer), which follows the surface of the

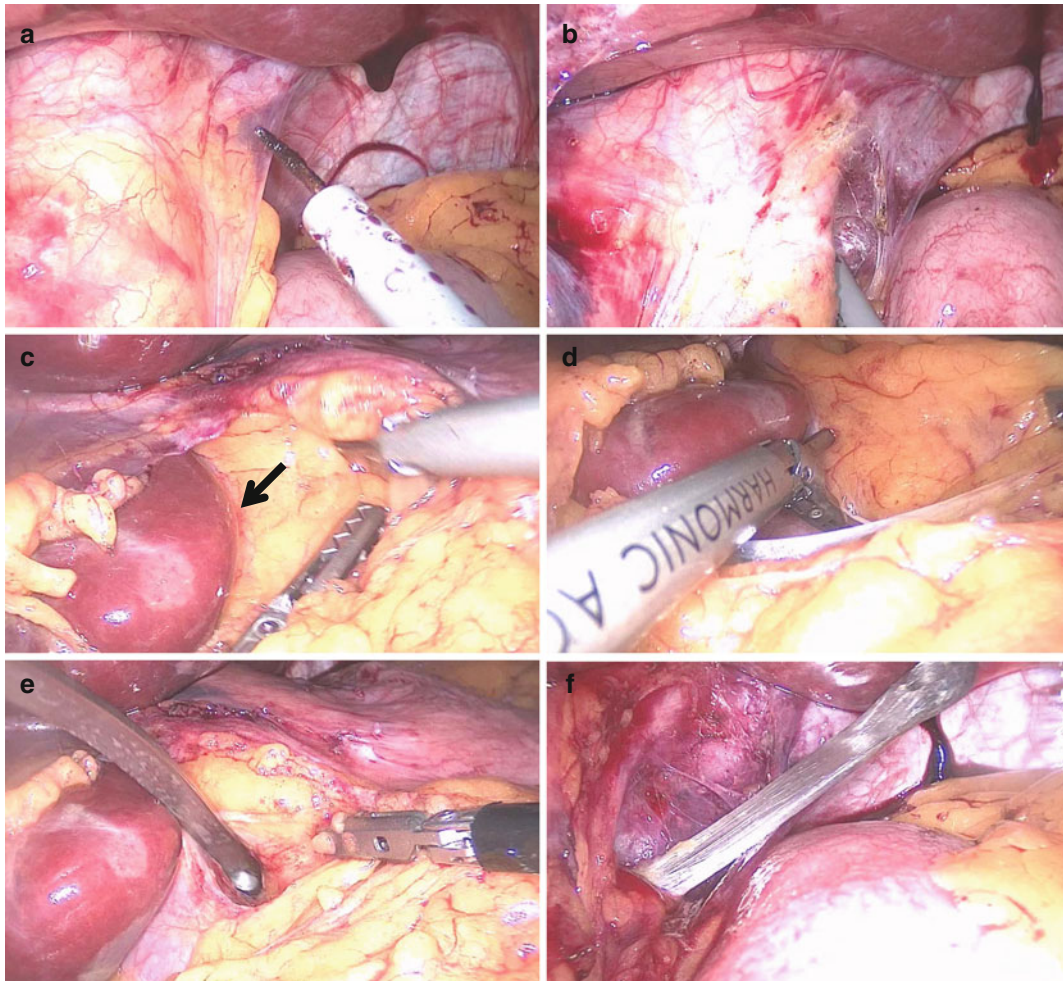

Fig. 8.3 (**a**) Create an opening in the peritoneum. (**b**) Expose the His angle and left pillar of the crus muscle. (**c**) Divide the membranous gastrohepatic ligament. *Arrow* indicates landmark area for starting retrogastric tunneling (between crus muscle and perigastric fat). (**d**) Dissect minimally the peritoneal membrane above the right pillar of the crus muscle fascia. (**e**, **f**) Insert the Band passer smoothly on the surface of the right crus posterior and inferior to the esophagus

right crus posterior and inferior to the esophagus while aiming for the angle of His, should be advanced smoothly without any resistance until it can be seen at the other side near the top of the spleen (Fig. 8.3e, f). Resistance often can be felt during advancement of the band passer in case where the retrogastric tunnel is made incorrectly, for example, (1) below the right crus muscle fascia (2) penetrating the left crus fascia (3) entering the bursa omentalis (lesser sac). In these circumstances, the band passer should be withdrawn and it should be advanced with direct vision carefully. Small blood vessels can bleed, but it usually stops spontaneously or is easily controlled with coagulation. The adjustable band is placed through the large 15 mm trocar. With the guidance of the band passer, the band tubing is introduced into the posterior tunnel and pulled through from the greater to the lesser side of the stomach. The band is locked using the atraumatic forceps. A 5-mm grasper inserted between the band and stomach ensures that the band is not too tight. Three or four gastrogastric plications over the band with 2-0 nonabsorbable suture material are performed. The first stitch should be located as far posterolateral on fundus as possible because this region has been the most frequent area of fundus herniation through the band. Suture should not be performed in front of the band buckle. The accurate seromuscular bites are very important because inaccurate gastrogastric sutures can be loosened with time and eventually make the portion of the fundus redundant below the band, which is the culprit of the partial fundal prolapse causing anterolateral band slippage. Removal of the fat pad on the cardia with coagulation greatly facilitates the accurate seromuscular bites (Fig. 8.4). Adequate

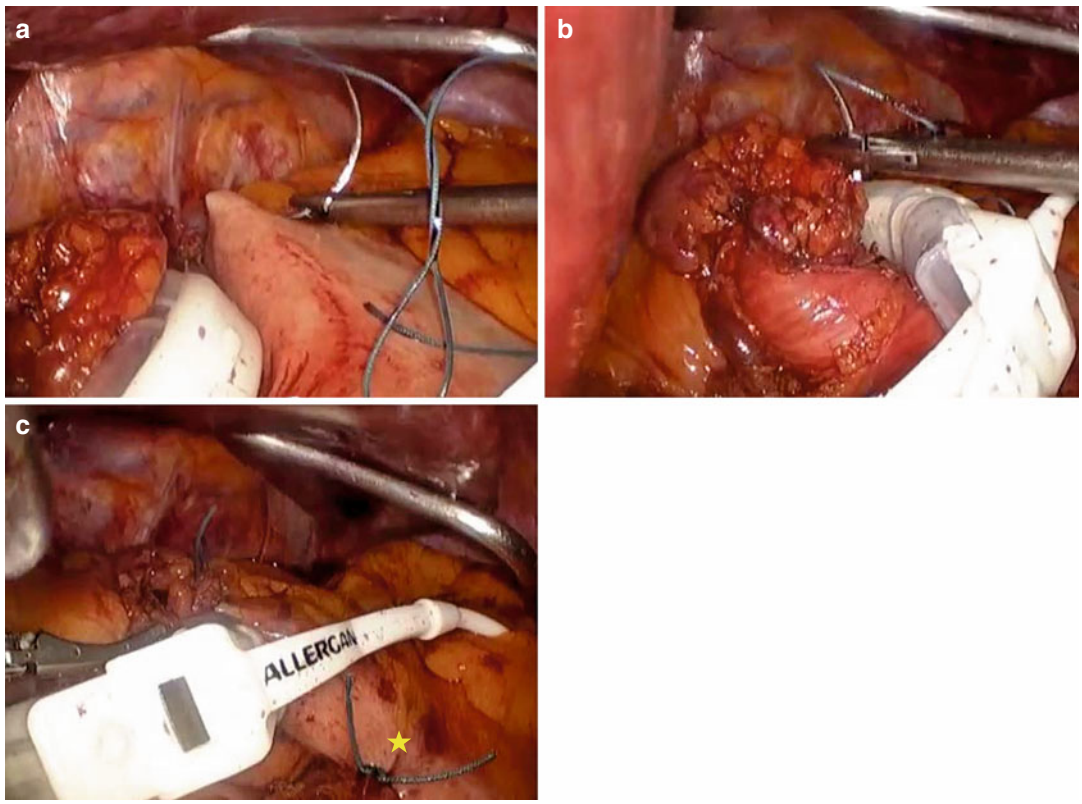

Fig. 8.4 Technical pearls for preventing fundal herniation. (**a**) The first stitch should be located as far posterolateral on fundus as possible. (**b**) Scoring of the thick fat pad on the cardia greatly facilitates the accurate seromuscular bites. (**c**) Anterolateral plication: optional (*star*)

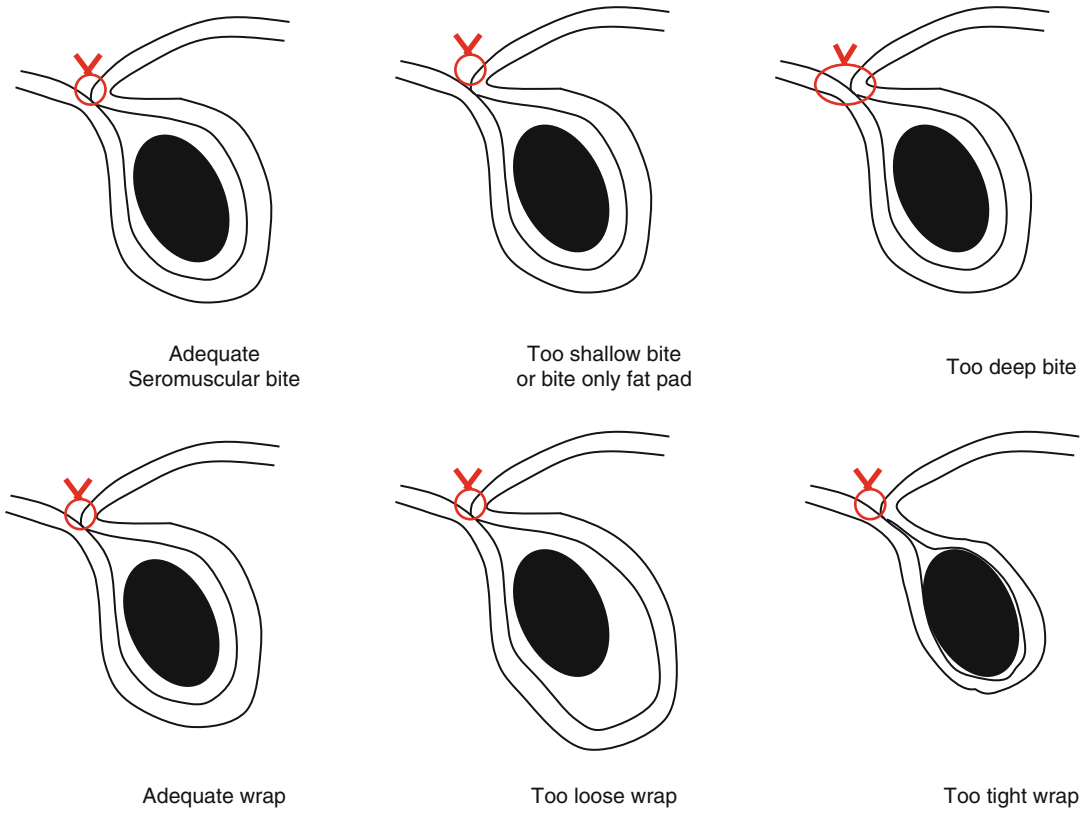

Fig. 8.5 Several types of seromuscular bite and wrap

seromuscular bite and wrap stabilize the gastric band and minimize the complications such as fundal prolapse (slippage) or band erosion (Fig. 8.5). After the intra-abdominal procedure is completed, the tubing is retrieved through one of the trocar sites (usually left upper quadrant). With the laparoscopic grasper inserted through the 15-mm trocar incision site, a subcutaneous tunnel is made, through which the end of the tubing is grasped. The tubing is retrieved through the subcutaneous tunnel, excess tubing is trimmed, and then the port is connected to the tubing. The port is secured onto the anterior rectus fascia by four stitches made with Prolene sutures (Ethicon).

After operation, and returning to ward, we usually keep the patients NPO for 4 h, then encourage mineral water and clear liquid diet sequentially. Adequate pain control is essential. Narcotic requirements are decreased with a laparoscopic approach. A patient-controlled analgesia (PCA) pump is appropriate and helpful. When the patients are deemed to be able to drink total 2 l of water per day, tolerate post-op pain with oral analgesics, and are mobile, they are discharged on the same day or post-op day 1. We do not routinely obtain a radiographic study of the gastrointestinal tract after AGB unless there are clinical signs of a gastric perforation (which include a temperature higher than 100 °C or a heart rate higher than 100 beats/min) or stoma obstruction (sustained vomiting).

8.5 Outpatient Care, Education, and Band Adjustment

Although the schedule of postoperative visits varies, all patients must undergo a long-term follow-up. We usually stitch out tenth post-op day. Diet schedules include 2 weeks of liquid diet, then 2 weeks of soft diet. We encourage patients

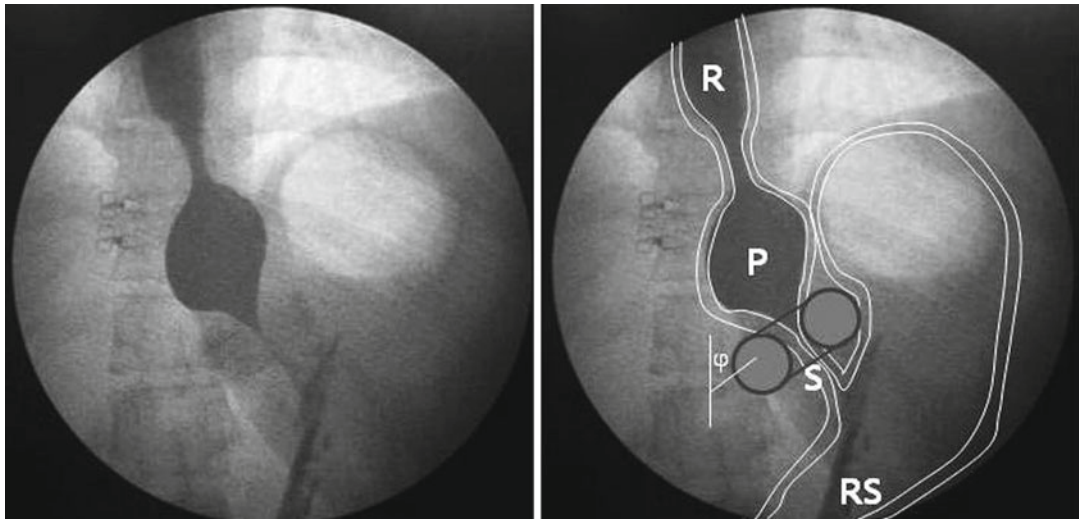

Fig. 8.6 Patterns of normal barium passage in fluoroscopy-guided band adjustment. Following addition of saline in the band, swallowed barium is suspended, resulting in temporary formation of a small pouch (*P*) above the band. Within several seconds, barium passes through the narrow stoma (*S*), which should be grossly equal to the width of the tubing (approximately 4 mm). Temporary mild reflux (*R*) of barium is noted. All swallowed barium passes through the band by the secondary esophageal contraction within 10–15 s. *RS* remnant stomach

to try regular diet after post-op 1 month. We emphasize very intensively the need for eating slowly with small bites and chewing well for minimizing food trouble in the patients fitted with gastric band. Improved weight loss occurs in patients who see their surgeon for adjustments to the band. A goal of 0.5–1 kg/week of weight loss is adjusted for initial body weight. We do not perform intraoperative band filling. The band system is left empty with the cuff deflated following surgery. We do the first band adjustment on the 6th post-op week. We have adopted fluoroscopy-guided band adjustment. However, it can be performed in the office or clinic without fluoroscopic guidance depending on preference of the clinician. In our adjustment protocol, elective band adjustment is usually performed three times at 1 month interval. After each adjustment, we check the barium swallow passage. We consider several points of fluoroscopic appearance of barium passage as "adequate" adjustment (e.g., stoma diameter of 3–4 mm, transient barium reflux, and complete barium passage through the stoma with several secondary esophageal contractions) (Fig. 8.6). After three elective band adjustments, we do minor band adjustment (±0.3 cc) without barium swallow depending on the patient's request regarding regular weight loss, hunger, and meal size. Blood tests after LAGB are seldom performed periodically throughout the patient's follow-up unless there are metabolic indications, patient's underlying medical illnesses, and other indications.

8.6 Outpatient Complications After LAGB

8.6.1 Stoma Obstruction

Not infrequently, patients visit outpatient clinic with symptoms of stoma obstruction during aftercare. Probably, food stuck with poor eating habit (eating too rapidly or not chewing well, too bigger bite) or excessive band adjustment (too tight band) are two common causes of stoma obstruction. Patients should be educated to keep NPO for significant period of time, then sips of warm and clear water whenever there are stuck symptoms. In case of sustained vomiting, band adjustment (remove saline) should be performed immediately, whereas those who show sustained

vomiting immediately after LAGB implies misplacement of band or band malfunction; therefore, in these circumstances, the cause of the symptom should be sought actively (with fluoroscopy or endoscopy). Sustained vomiting can cause esophagitis, Mallory-Weiss tear, and gastric prolapse.

8.6.2 Heartburn/Transient Reflux

More commonly, these symptoms are caused by too tight band or poor eating habit of the patients. Small removal of saline from the band is usually effective for alleviating these symptoms. Short course of PPI antacid plus prokinetics use after band deflation are also helpful. Those who complain new-onset reflux symptoms may have slipped gastric band. Therefore, these patients should be checked for band system configuration with fluoroscopy.

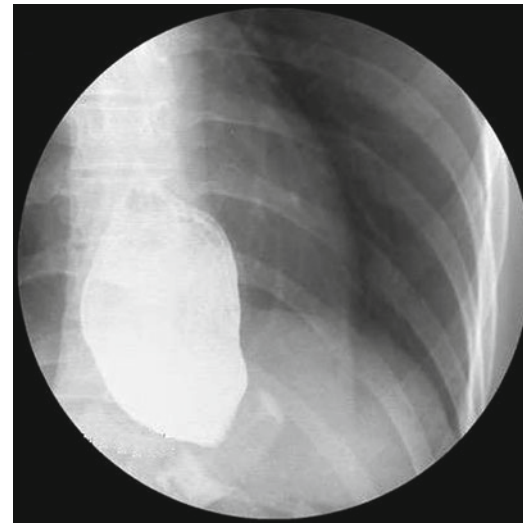

Fig. 8.7 Concentric pouch dilatation (CP). Normal band position and normal band angle are noted. The pouch is dilated concentrically. The pouch appears to have migrated to the intrathoracic level, suggesting the presence of a coexisting hiatal hernia

8.6.3 Pouch Dilatation/Gastric Prolapse with Band Slippage

For particular symptoms, such as vomiting, reflux, and abdominal pain, we also perform a barium swallow study during the adjustment. Band slippage may result in failed weight loss and/or acute obstruction of the stoma. The frequency depends on patient compliance, surgical technique, and postoperative care, and also may be decreased with patient training to encourage appropriate eating behaviors. Overeating with overfilling of the gastric pouch, overinflation of the gastric band at the time of adjustments, and excessive vomiting are risk factors for band slippage [5]. Pouch dilatation is classified as concentric and eccentric. Eccentric pouch dilatation is always accompanied by band slippage, which is classified as anterior and postoperative slippage. Therefore, complications of pouch dilatation with/without band slippage are codified as follows: CP, concentric pouch dilatation (normal band angle) (Fig. 8.7); EPA1, eccentric pouch with early anterior slippage (normal band angle with a ringlike configuration); EPA2, eccentric pouch with chronic anterior slippage (a more horizontal band angle); EPA3, eccentric pouch with acute anterior slippage (an overwhelming pouch covers the band or clockwise rotation of the band with downward migration); and EPP, eccentric pouch with posterior slippage (the band was noted as having counterclockwise rotation with a huge air-fluid pocket inferior and posterior of the band) (Fig. 8.8). Conservative treatment includes total or near-total removal of saline in the band and gradual readjustment with great care for recurrence of abnormal clinico-radiologic signs and symptoms. Strict dietary education is also administered during the "rest" period. Readjustment is usually started around 3–4 weeks after total removal of saline. For patients who do not respond to the conservative management, surgical treatment (repositioning or replacing the band) should be considered.

8.6.4 Band Erosion

Intragastric erosion, penetration, or migration of the band is a major long-term complication following LAGB. Band erosion (BE) requires

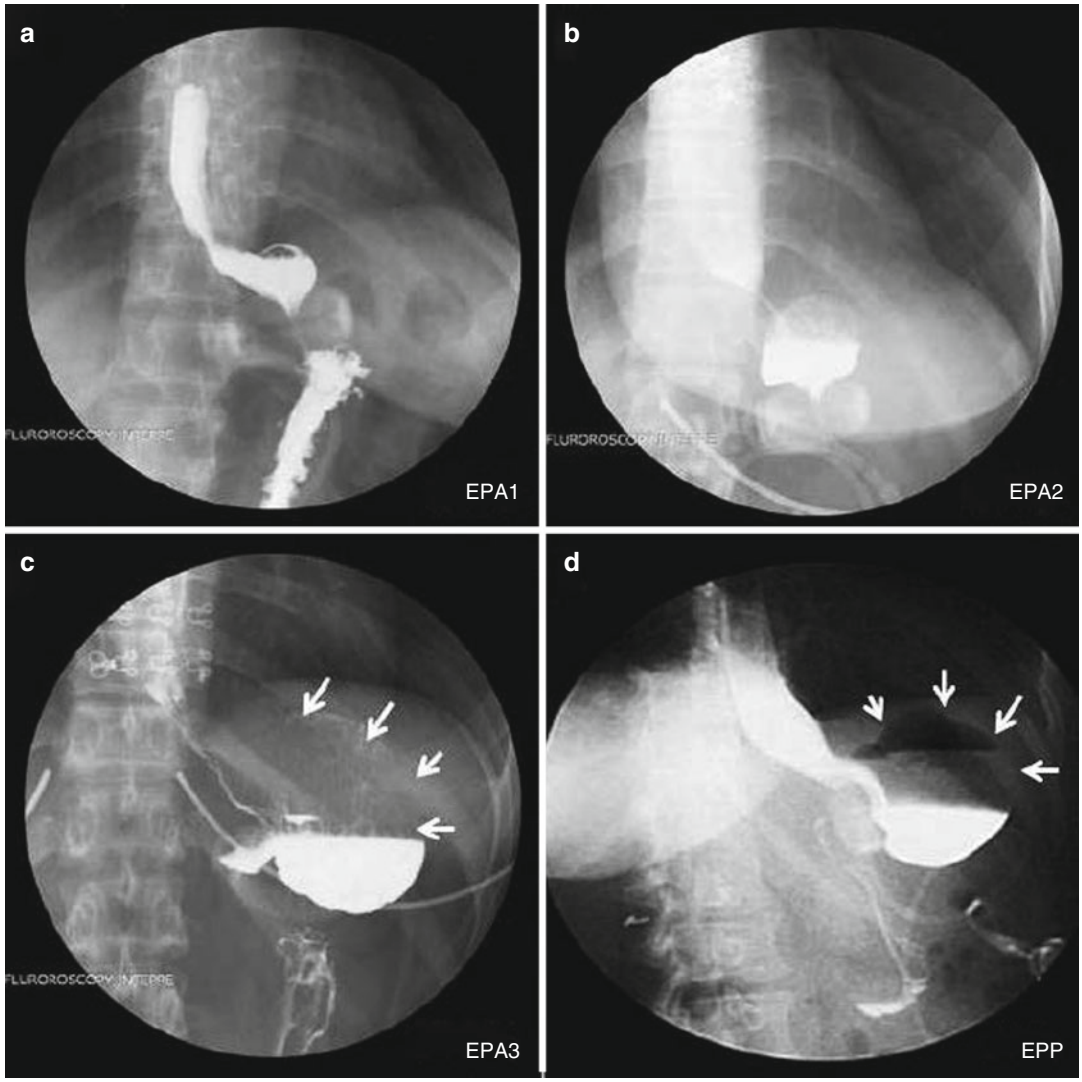

Fig. 8.8 Upper GI study of eccentric pouch dilatation. (**a**) EPA1, eccentric pouch with a normal band angle with a ring-like band configuration. Radiologically, this type is early anterior slippage. (**b**) EPA2, eccentric pouch with a more horizontal band angle. This type of dilatation usually results in a progressive chronic symptom of acid reflux. (**c**) EPA3, eccentric pouch with excessive clockwise rotation of the band. This type of dilatation usually manifests as acute, total food intolerance with severe reflux and epigastric pain. (**d**) EPP, eccentric pouch with posterior band slippage. This type of dilatation is associated with use of poor surgical techniques (e.g., entering the lesser sac with a redundant posterior gastric wall). *Arrows* indicates outlines for prolapsed gastric pouch above the band

removal of the gastric band system. With this complication, the gastric band gradually erodes or migrates into the gastric wall. According to the literature, BE after LAGB in high-volume center occurs in about 0.23–8.94 % of cases [6, 7]. There is neither clear-cut symptom nor exact etiopathology of the BE [7]. We speculate "microtrauma" of the pouch as the culprit of BE (e.g., intraoperative damage, NSAID, excessive vomiting, overinflation of the band, band infection). Asymptomatic individuals can often increase their food intake and gain weight. However, in our series of patients, nonspecific abdominal pain was the predominant symptom,

which is in line with findings from other studies. 83 % complained of upper abdominal pain, and port infection was present in 50 %. On rare occasion, patients presented with acute peritonitis or nonemergent GI bleeding. Based on the clinical signs and symptoms suggestive of BE, upper gastrointestinal (UGI) and abdominal CT scan are helpful. The barium swallow test typically shows barium passing from the upper to the lower gastric pouch outside the band. Abdominal CT scan can detect small free air or localized abscess formation around the band, tube, and reservoir port. EGD is the definitive study instrument of choice. On EGD, the band typically protrudes into the gastric lumen. Occasionally, pus (infected purulent fluid) descending down from the pouch near the GE junction may be the only sign of BE on retroversion at endoscopy (Fig. 8.9). There is no consensus on the technique of removal of the eroded gastric band. In our series of patients, all eroded bands were removed via direct dissection outside the stomach because we decided that the band was easily identified along the connecting tube following dissection. However, the fibrous capsule around the band is actually "unhealthy" phlegmonous tissue. Therefore, after removal of

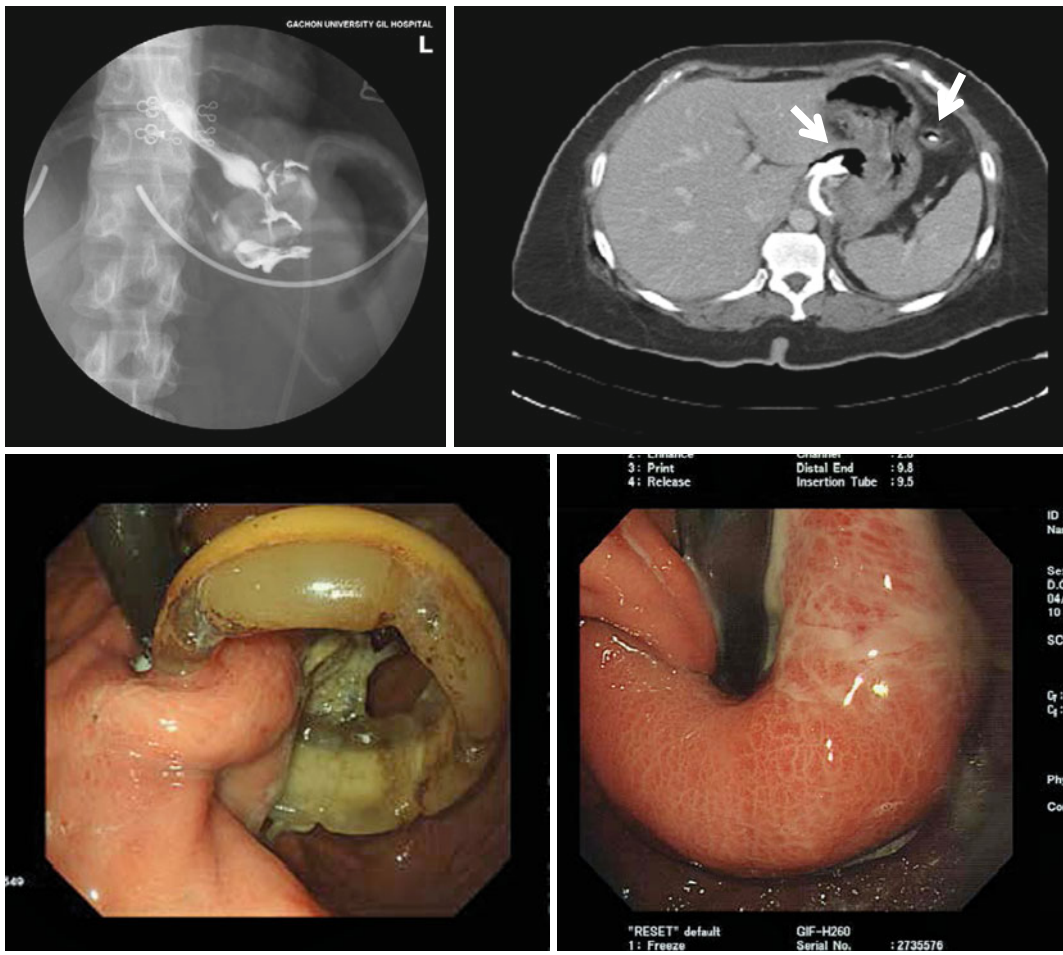

Fig. 8.9 Band erosion. The barium swallow test shows barium passing from the upper to the lower gastric pouch outside the band. Abdominal CT scan detects small free air and localized abscess formation around the band. On EGD, the band protrudes into the gastric lumen. Pus (infected purulent fluid) descending down from the pouch near the GE junction is shown

the band, closure of the remaining gastric perforation is very difficult, and repaired gastrostomies are more prone to leakage and breakdown. Recent reports also suggest that endoscopic removal of the eroded band is a feasible procedure [8, 9]. Endoscopic removal of an eroded band may require multiple sessions, and patient symptoms might prevent postponement of the procedure while waiting for the erosion to progress. However, we prefer endoscopic removal of eroded gastric band because it is a nonoperative option and therefore avoids surgery and general anesthesia. Minimal scar tissue after endoscopic removal facilitates future secondary bariatric procedure [8].

8.6.5 Port-Related Problems

Unlike the well-known complications such as slippage, erosion, and infection, port complications are still underestimated because they have been considered minor problems, and relatively few require surgical treatment. The port, however, is the Achilles' heel of gastric band surgery, and access-port complications are actually the most frequent complication. According to the literatures, as many as 4–20 % of patients have port complications [10, 11], which include infection, inversion/migration that makes accessing port impossible, associated skin erosion, abdominal wall hernia, and leakage of saline. Port-related problems may be unavoidable because both the port and the tubing are subject to wear and tear. However, most of the port problem can be corrected under local anesthesia (port removal and/or exchange). Port infection remote from surgery should be regarded as a sign of band erosion and needs endoscopic examination because presumably the infection from eroded band tracks down via the tubing to the port.

8.7 Revisional Surgery

Revisional surgery or secondary gastric banding (rebanding) are often necessary for LAGB complications. We summarize the technical aspects of LAGB revision in two common situations: slippage and erosion. Except urgent band removal in case of an acute stoma obstruction with excessively large or partially necrotic gastric pouch, the ideal revisional surgery for slipped gastric band is removal and repositioning because recurrent slippage is prone to occur after the simple reduction of prolapse and resuturing [12]. Removal and repositioning procedure consists of repositioning of the gastric band through the newly formed retrogastric tunnel above the previous band position and meticulous fixation sutures of redundant gastric pouch around the band. If hiatal hernia is grossly evident, it requires concurrent repair (Fig. 8.10). Rebanding after band erosion is often requested by the patient because of significant regain of body weight after band removal. However, if the patient is not pleased with the first band, a different bariatric operation should be considered. The outcome of the rebanding after band erosion has been disappointing because of unacceptably high incidence of re-erosion [8]. However, for those whose band had been removed during early stage of erosion or removed by endoscopy, rebanding can be performed without difficulty. It can be performed at least 3 months after band removal. Retrogastric tunneling slightly above the previous band position should be performed because dissection of scar near the previous band position is very difficult or not possible at all. Careful dissection and advancement under the crus muscle fascia (subfascial approach) minimizes the chance of gastric perforation during the rebanding procedure (Fig. 8.11). Endoscopic examination is recommended after the procedure before awaking the patient if there is a concern for gastric perforation.

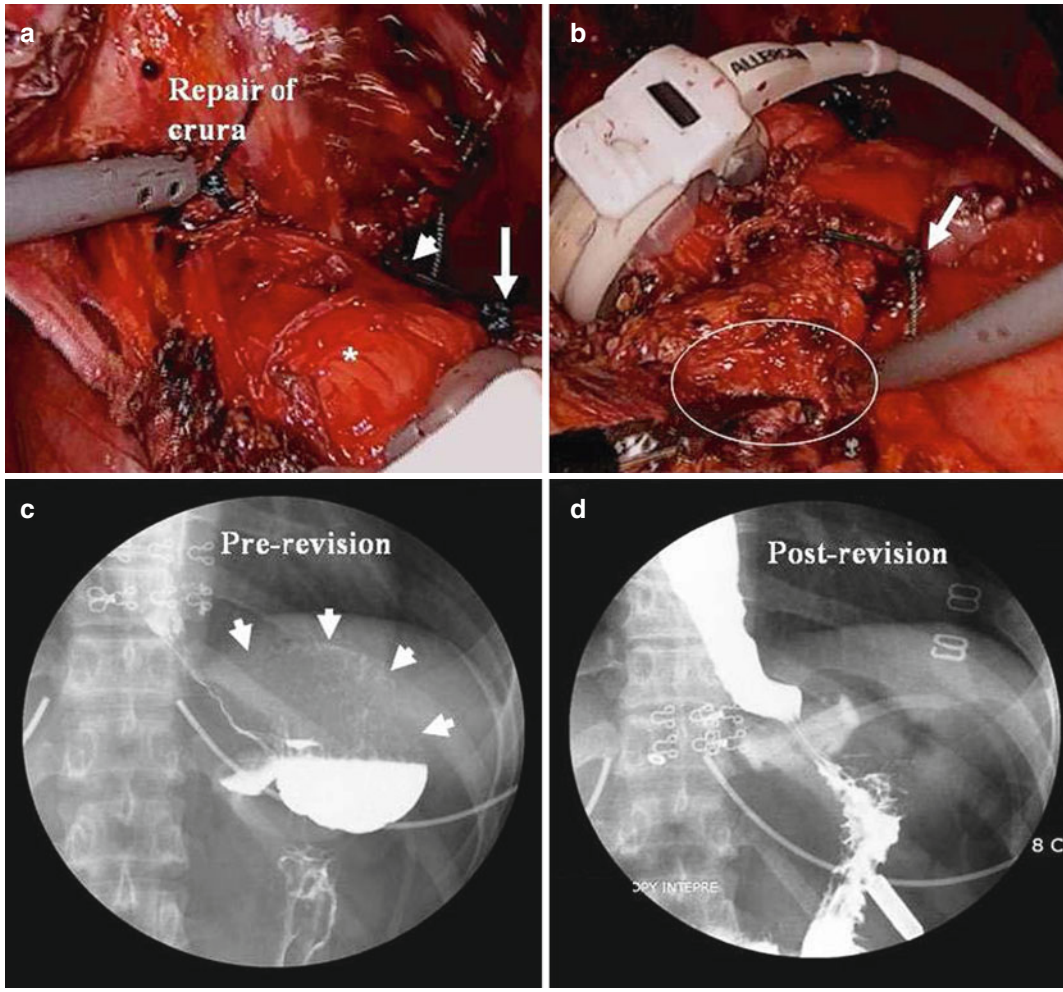

Fig. 8.10 Laparoscopic nondestructive removal of the band and its repositioning at a proper level in an EPA3 patient. (**a**) In patients with pouch enlargement with severe reflux, a variable degree of hiatal hernia was usually observed, and we performed concomitant repair using figure of eight sutures of the anterior crura muscle. Plicated neofundus was anchored to the crural muscle fascia (*short arrow*), and gastrogastric suture was also performed (*long arrow*). *Asterisk*: newly formed pouch. (**b**) Repositioning of the gastric band through the newly formed retrogastric tunnel above the previous band position (*circular area*). Anterior plication of the gastric wall below the band was performed (*arrow*). Pre-op (**c**) and post-op (**d**) Gastrografin swallow study showed that the band angle and pouch shape (*arrow*) were normalized

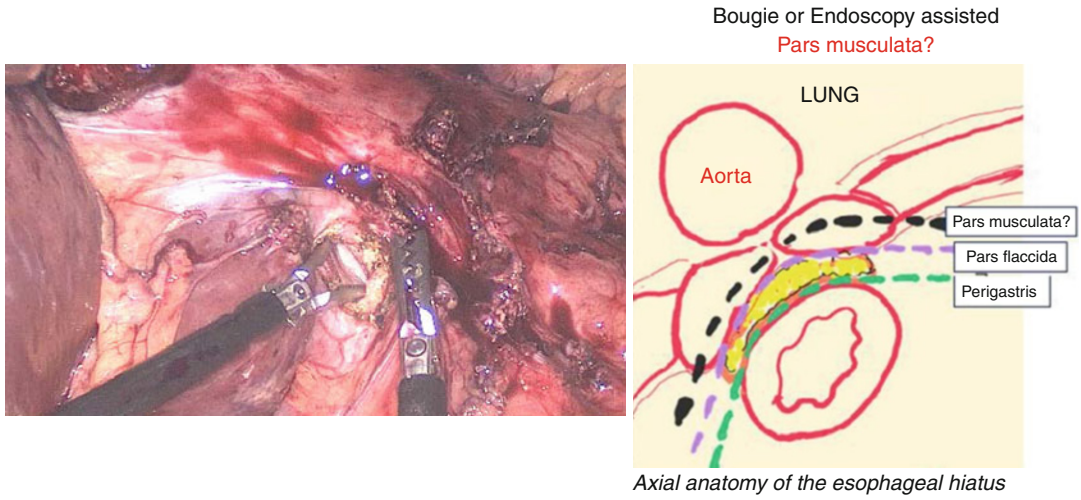

Fig. 8.11 Repositioning of the gastric band through the newly formed retrogastric tunnel above the previous band position (subfascial approach)

Further Videos

Electronic supplementary material is available in the online version of this chapter at (doi:10.1007/978-3-642-35591-2_8) and accessible for authorised users. Videos can also be accessed at http://www.springerimages.com/videos/978-3-642-35590-5

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