

Laparoscopic adjustable gastric banding: Technique and results

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ABSTRACT

Prevalence of obesity is increasing worldwide and bariatric surgery is the most effective surgical therapy for obesity. Laparoscopic adjustable gastric banding (LABG) is one of the most common bariatric procedures in the world. Popularity is high among surgeons due to shorter learning curve and lower early complication rate. There are 2 insertion techniques for LABG: the perigastric technique and pars flaccida technique. Pars flaccida approach evolved due to high complication rate of perigastric technique. Most common complications of LABG are pouch dilation, band slippage, band migration, and port complications. Although LABG is an effective weight loss procedure, weight loss is slower compared with other bariatric procedures, such as gastric sleeve or bypass. It results in significant improvement in co-morbidities, including diabetes, hypertension, hyperlipidemia, and sleep apnea, and significant improvement in quality of life is seen. Despite the high safety profile of LABG in short term, it has a high complication rate in long term. Patients who are candidates for LABG must understand that intensive follow-up, compliance, and motivation are necessary for good results and outcomes.

Keywords: Bariatric surgery; laparoscopic adjustable gastric banding; obesity.

Introduction

Obesity is increasing worldwide. In addition to causing many co-morbidities like hypertension, diabetes and sleep apnea, it also causes an increased burden to the healthcare system. Nonsurgical treatment methods of obesity like diet and exercise may achieve only a 5–10% weight loss.^[1,2]

Laparoscopic adjustable gastric banding (LABG) represents one of the most frequently performed bariatric operations in morbidly obese patients. Popularity of LABG is high among surgeons due to shorter learning curve and

lower early complication rate. Despite its improved early safety compared with other bariatric procedures, it may cause unique complications and require a specific procedure for assessment and management.

Gastric band is losing its popularity in Europe and gaining popularity in the United States.^[3] Food and Drug Administration in the United States approved LAP-BAND for a body mass index greater than 30 in 2001. Until that time, the use of LABG was increasing in the United States.



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History

Vertical banded gastroplasty is a pioneer of the gastric band, being the first restrictive bariatric operation.^[4] Surgical restriction of intake by means of a nonadjustable gastric band was started in the 1980s.^[5] First step was nonadjustable gastric band and replaced gastroplasty. Gastric band tried to eliminate the disadvantages of vertical banded gastroplasty by placing silicon band around the stomach.

First adjustable gastric band was introduced by Kuzmak.^[6] Belachew was the first to perform laparoscopic adjustable gastric band (LABG) operation in 1993.^[7,8] The technique of Belachew was the perigastric technique.^[5] After laparoscopic operations, LABG gained popularity around the world as a first-choice surgical therapy for morbid obesity.

Surgical Technique

Main parts of the gastric band are silicone band, access port and connecting tube. Principle of this technique is to create an adjustable opening and a small gastric pouch to limit food consumption and induce early satiety. There are two different techniques in adjustable gastric band placement including perigastric technique and pars flaccida technique.

Perigastric Technique

Belachew's original technique for band placement was called perigastric technique, which involves creating a window at the lesser curvature of the stomach 3 cm below

the gastro-esophageal junction.^[5] The window is created medial to the neurovascular bundle and a tunnel is created below the gastric wall and extended to the angle of His with blunt dissection (Figure 1). Band is introduced into the abdomen through a trocar with mounting straight on a grasper. The band is pulled through this tunnel with a grasper to create 15–30 mL gastric pouch above the band. Then, a calibration bougie is inserted orally into the stomach and inflated with 25 cc saline. The bougie is withdrawn to the esophago gastric junction. Band is closed to create gastric pouch below the balloon of the bougie. In order to avoid band slippage, gastric plication is created by putting, generally, three to five anterior sutures between the greater curvature and gastric pouch. Connecting tube is pulled outside the abdomen through a trocar and is connected and linked to the port after trocar removal. The port is fixed to the abdominal fascia with non-absorbable sutures.

Pars Flaccida Technique

The perigastric technique has evolved into the pars flaccida technique due to the complications of perigastric technique.^[9,10] Since this technique has low complexity in dissection maneuvers, it is the most commonly utilized and generally recommended technique. The dissection begins near the angle of His. The thin area of gastrohepatic ligament (pars flaccida) over the caudate lobe is divided. After the identification of right crus, peritoneum at the border of the crus is incised. The grasper is passed behind the gastro-esophageal junction to the angle of His (Figure 2). The band is introduced into the abdomen through the

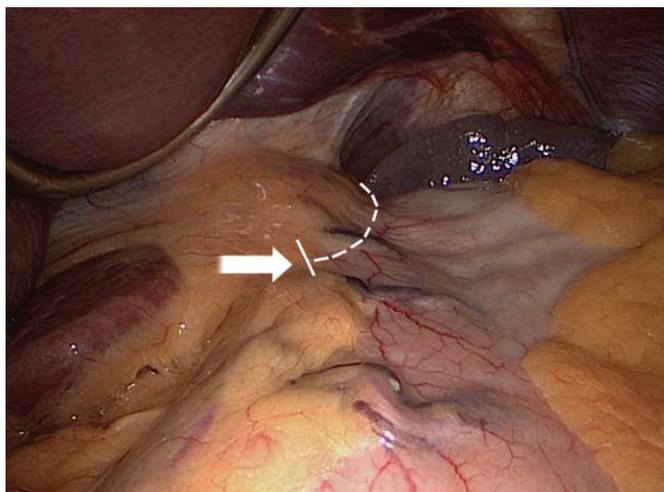


Figure 1. Perigastric technique. Dissection is performed near the gastric wall 3 cm below the gastroesophageal junction. White arrow: entry point, dotted blue line: route of retrogastric tunnel.

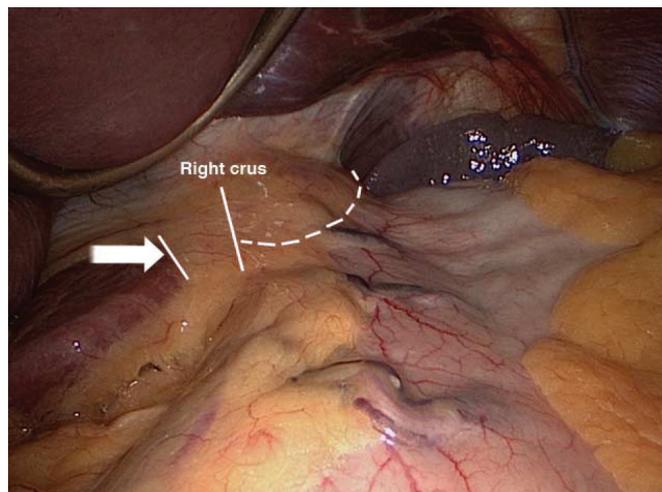


Figure 2. Pars flaccida technique. After dividing gastrohepatic ligament, the dissection continues anterior to the right crus. Opening pars. White arrow: entry point, dotted line: route of retrogastric tunnel.

port. The end of the band is grasped with the grasper and passed through the created tunnel. A calibration bougie is passed to the stomach through oral route. The balloon at the end of the bougie is filled with 15 cc saline.

The bougie is withdrawn to the esophagogastric junction. Band is closed to create gastric pouch below the balloon of the bougie. In order to avoid band slippage, gastric plication is created by putting, generally, three to five anterior sutures between the anterior gastric wall and gastric pouch. Connecting tube is pulled outside the abdomen through a trocar and is connected and linked to the port after trocar removal. The port is fixed to the abdominal fascia with non-absorbable sutures.

Adjustment: At the time of the operation, no fluid is injected into the band, and it is left empty. First filling is performed after 4–6 weeks based on the patient's rate of weight loss and food-fluid tolerance. If the patient has insufficient weight loss (less than 0.5 kg per week) and insufficient restriction of solid food, fluid is injected to the port. If the patient has obstructive symptoms (vomiting, heart burn), the fluid must be removed from the port. Generally, the port can be accessed by palpation. If it cannot be accessed by palpation, fluoroscopy should be used. After the adjustment, the patient should be able to drink water comfortably. The patient must be followed up every 4-8 weeks during the first postoperative year.

Results

Complications

Safety is the major perioperative advantage of LABG. Despite the initial success and safety of LABG, more recent studies show rising long-term complications.^[11] It has been suggested that each year the band is increasing the complication rate 3 to 4%.^[12] Pouch dilation, band slippage, band migration, and port problems represent the complications most commonly associated with LABG.^[13]

Pouch dilation is a different entity from slippage. There is a concentric dilation and the band is seen in its normal axis in radiography. Tight band or overeating may cause this complication. Endoscopy reveals concentric dilation and there is a narrow segment on barium radiography. Band fluid removal is usually curative.^[11] Over a period of time, resolution of the dilation occurs in most patients.

Band slippage or gastric prolapse occur when a portion of the gastric wall herniates under the band and there is a

rotation of the band. O'Brien has reported band slippage rate of less than 5%.^[14] Perigastric technique causes more frequent band slippage. Anterior or posterior gastric wall prolapse may be seen. Posterior slippage is seen more frequently in the perigastric technique. However, it is less frequent now since the par flaccida technique is adopted instead of the perigastric technique. Band slippage generally requires immediate operation. Some surgeons prefer repositioning the band. However, recurrence is common with this approach.^[11] Replacement of the band with a newly created tunnel is an alternative method. Conversion to other bariatric procedures as first stage or second stage is an acceptable alternative therapy.

Band migration is the erosion of the gastric wall with the band and migration of the band into the gastric lumen. The incidence ranges from 0 to 5.8%.^[11] The incidence is higher in long standing bands. Most patients with band migration are asymptomatic and weight regain may be the only symptom. The etiology includes gastric wall injury during placement and tight fixation around the band. Endoscopy is the diagnostic tool for suspicious cases. The treatment is laparoscopic removal of the band and repairment of the gastric wall.^[15] Endoscopic removal with specific devices is an alternative therapy.^[15,16]

Port complications are seen more frequently and include disconnection of the tube, skin ulceration, and port-site infection.^[13] Port-site infections are the most frequent complications and can be classified as early and late.^[17] Early infection occurs in the immediate postoperative period. Therapy is oral or intravenous antibiotic. When the infection doesn't heal, the port should be removed and a new port placed as a second stage. Late infections generally occur as an ascending infection due to band migration. Therapy of this later infection is the removal of the band.^[13] Skin ulceration is a rare complication of the port, occurring, generally, as a result of weight loss and loss of subcutaneous fatty tissue.^[17] Using a low profile port and inserting the port deeply may prevent this complication.

Outcomes

Weight loss: LABG is an effective weight-loss procedure with the majority of patients losing between 44 and 55% of their excess body weight.^[18] This technique results in a slower weight loss compared to other bariatric procedures like gastric bypass and sleeve gastrectomy.^[19]

LABG results in less weight loss in the first 6 months and starts to reach approximately 50 to 65% in 2–3 years.^[20–23]

There are gradual weight losses and many factors affecting weight loss after LABG. Close follow-up visits with band adjustment are necessary for a successful weight loss.

Co-morbidities: One of the most important outcome measures of bariatric surgery is the resolution of comorbid conditions. Unlike the metabolic effects of other bariatric procedures, the remission or improvement of comorbidities after LABG is believed to be due to the direct effects of weight loss. Weight loss can improve type 2 diabetes, hypertension, gastro esophageal reflux, hyperlipidemia, sleep apnea, polycystic ovarian syndromes, arthritis, and overall quality of life. O'Brien and Frigg have shown that after LABG, patients experience 94% resolution of sleep apnea, 55–75% resolution of diabetes, 55–58% resolution of hypertension, and 74% resolution of hyperlipidemia.^[24,25] In a meta-analysis, Buchwald has shown 76.8% resolution of diabetes, 71.1% improvement in hyperlipidemia, and 71.5% resolution or improvement in hypertension.^[26]

Quality of life: There are some methods to measure quality of life (QoL) after bariatric surgery. Most commonly used one is the Short Form-36 Health Survey (SF-36). There is increase in QoL after LAP in short term.^[27-29] Weiner has also shown stable improvement in the long-term in QoL in patients undergoing LABG.^[22]

Discussion

Surgical technique in LABG has undergone some evolution to become an effective option for patients. The most important modification in the technique has been the introduction of an alternative pathway. Since the perigastric technique has resulted in frequent complications, pars flaccida technique has been developed. The most common problem with the perigastric technique was gastric prolapse.^[10] O'Brien demonstrated significant decrease in complication of gastric prolapse when the surgical technique was modified to pars flaccida.^[9,30] The change to pars flaccida technique led to lower incidence of band removal.

There are some advantages of LABG over other bariatric procedures. The operation time is short, it is reversible, and stoma size is adjustable. It has low mortality rate and excellent safety profile for intraoperative and early post-operative complications.^[11] Patients may undergo other bariatric procedures if necessary. LABG may be an option for patients who want less invasive bariatric procedure.

However, it comes with risk of possible reoperation rate for band slippage, erosion, port problems, and band migration.^[30] There is a steep decrease in LABG with a concomitant steep increase in sleeve gastrectomy as a decrease in weight loss efficacy and an increase in long-term complications can be seen in LABG.^[3] Patients, who are candidates for LABG, must understand that intensive follow up, compliance and motivation are necessary for good results and outcomes.

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