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### Research Article

## Complications from Laparoscopic Adjustable Gastric Banding: 364 Cases Experience

### Abstract

**Background:** Laparoscopic adjustable gastric banding LAGB procedures are part of bariatric surgery, it has been reported with favorable risk-benefit profile like part of the management of obesity. These procedures are effective at inducing weight loss and improving comorbid conditions, but like all surgical procedures have several complications.

**Objective:** To report 364 LAGB cases with complications observed in the last five years.

**Material and Methods:** LAGB complications were classified as intraoperative, early postoperative, and late postoperative.

**Results:** 250 women and 114 men with mean age at 36 years were treated; time elapsed for LAGB ranged from 7 days to 60 months. Observed complications were: Esophagogastric obstruction (3.2%), Intra-gastric erosion (54.5%), LAGB chronic slippage (24.6%), Gastric reservoir dilatation (6.23%), Esophageal dilation (3%), Device malfunction (5.1%) and Slippage into the mediastinum (0.5%).

**Conclusions:** the evidence remarks that late complications of gastric banding are common.

### Introduction

Surgical management of morbid obesity includes several options like: adjustable gastric banding, vertical band gastroplasty, sleeve gastrectomy, Roux-en-Y gastric bypass and biliopancreatic diversion with duodenal switch or only duodenal switch. From this options, Laparoscopic adjustable gastric banding (LAGB) [1], is one of the most commonly performed bariatric procedures, and it is the most common form of bariatric surgery in the United States and probably worldwide. Inserting a LAGB is simple and effective for controlling obesity in its early stages, however, through time, many of these patients present complications [2]. The current failure rate goes from 30 to 70% in studies with follow-up of 13 and 15 years [2,3]. This bariatric procedure has a 3% morbidity rate in the early postoperative stage [3,4] and a 12% morbidity rate in the late postoperative period (gastric prolapse, band erosion, obstruction of the band and problems with the port) [5]. Despite its mediocre long-term results, LAGB is a technique used by specialized groups around the world [4,5], it is considered to be a safe and effective method of weight loss and reduction of comorbidities associated with obesity, but in LAGB the revision surgery may be required in 20-60 %. In

studies with follow-up of 13 and 15 years [2,3], of failure cases or complications, were intraoperative, as early or late post-surgery. In LAGB study performed by experts across the USA [6], reported 4.3% rate of major complications in 4,776 patients as a primary procedure. On the last ten years, our service has been specialized in the support of the resolution of surgical problems of patients previously operated on the digestive tract, so the service usually does not perform surgical procedures of first intention, and is dedicated to solve postoperative complications. 369 LAGB cases with complications observed in the last five years are reported in this paper.

### Material and Methods

All patients treated with LAGB surgeries, who presented complications between 2010- 2015 attended in our institution, were analyzed. Clinical records were reviewed recoded in a database including the year of patient care, age, sex, BMI before LAGB, the percentage of excess weight loss with LAGB, number of adjustments of device, post-surgical complications, and surgical procedures performed for resolution. Complications of LAGB were classified as early postoperative complications occurred within the first 30 days as perforation, esophagogastric obstruction and infection at the adjustment

port. Late postoperative complications occurred after a month as gastric erosion, slipped band, pouch enlargement, chronic band obstruction, device malfunctions, and poor quality life.

## Results

From 2010 to 2015, 364 patients with LAGB complications were treated (Table 1), 243 women and 117 men, with a mean age of 36 years and range of 19–65 years. The patients BMI at the time of LAGB placement was an average of 35 with a range of 34– >36. The weight loss percentage with the LAGB was 30–41% range with an average of 39%. The elapsed time since the LAGB was placed to retirement time was 3 days to 60 months. Computed axial tomography was performed in 57% of patients, esophagus-gastro-duodenal series in 49% of cases, ultrasound of liver and biliary tract in 45%, and endoscopy on 364 patients. Early complications were observed in 12 cases with esophagogastric obstruction (3.2%), their surgical management was LAGB removal (n = 10) and LAGB reposition (n = 2). Late postoperative complications were present in 352 patients corresponding to 201 patients with intragastric erosion (54.5%), their surgical resolution was LAGB removal, gastric defect closure and patch with omentum. LAGB chronic slippage in 91 cases (24.6%), resolved through removal LAGB (n = 59), gastric bypass (n = 10) and gastric sleeve (n = 22). Gastric reservoir dilatation was present in 23 patients (6.23%), resolved by LAGB removal (n = 10) and gastric sleeve

(n = 13). Esophageal dilation in 11 cases (3%), management with LAGB removal in all of them (n = 11). Device malfunction was observed in 19 patients (5.1%), their surgical resolution was LAGB removal (n = 8) and device repositioning (n = 11). Slippage of the LAGB into the mediastinum in 2 patients (0.5%) required additional work for LAGB removal. Five patients were attended to remove the LAGB for poor quality life. All patients required surgical resolution. The procedures performed were: LAGB removal in 99,4% of patients (n = 362), gastric defect closure in 55,2% of cases (n = 201), gastric sleeve in 15,6% (n = 57), LAGB reposition in 3.5% (n = 13) and gastric bypass in 2,7% (n = 10).

## Discussion

Surgical management of obesity [7], includes several options: restrictives, restrictive/respective, restrictive/malabsorptive and purely malabsorptive methods; the first are adjustable gastric banding and vertical band gastroplasty; the second is sleeve gastrectomy; the third are Roux-en-Y gastric bypass and biliopancreatic diversion with duodenal switch, and the fourth is only duodenal switch. Adjustable gastric banding probably represents the most frequent performed bariatric surgery. LAGB is considered to be an effective method of weight loss [8–10], however, all surgical procedures have specific complications related to the LAGB, requiring a process for assessment and medical management, a change in lifestyle, diet, and LAGB revision surgery in 20–60 % of cases for failures and/or complications [11,12], which have been listed as gastric band malposition, gastric band erosion, chronic gastric band erosion, gastric band slippage, pouch dilatation, gastric stomal stenosis, catheter malfunction, port-catheter disconnection, catheter-band disconnection, proximal esophageal dilatation without stomal stenosis, esophageal dysmotility, reflux and esophageal gastrification; being the pouch enlargement, band slip, band erosion, port-site infections and port breakage the most commonly associated with LAGB [13]. There are some specific problems related to the device with percentage reported in literature, like: band erosion (2.1% – 9.5%); band intolerance; band leak (1.1% – 4.9%) and band slippage (2% – 18%). Regardless the type of problem, the clinical symptoms can vary depending on the specific complication, but most of them include abdominal pain, retching and vomiting [14].

In this study, gastric band erosion (GBE) was the main complication found, even in literature is uncommon, the pathogenesis is: the band gradually erodes through the stomach wall and into the gastric lumen, the incidence reported is less than 1% [15], with prevalence varying from 0% to 11% [15,16]. If 201 cases were treated in this paper, it means that at least 20,000 bands were performed during the last five years in our environment, with an incidence of 1% which is in agreement with the published literature. GBE etiology may be the result of gastric-wall injury during band placement or tight anterior fixation, especially around the band buckle, and according to the Egberts et al. [17] report. A multiple regression analysis shows that erosion rate is significantly predicted by number of patients and number of years of surgeon experience. As stated by Cherian et al. [18], 55% of the erosions occur within the first year, and only 10% after the second year of LAGB placement,

**Table 1:** Demographic data and surgical procedures performed in 364 patients with LAGB complications.

Patients Characteristics	Data		
Age	X = 36 years, range:19-65)		
Sex	Women 250 (66.7%); Men 114 (31.3%)		
BMI at the time of inserting the LAGB	Mean 35; Rank 34-36.		
Percentage of weight loss	Mean 39%; Rank 30-41		
LAGB type	Swedish Adjustable Gastric Band (89%); Lap-Band (9%)% ; other 2%		
LAGB adjustments number	Mean 6; Rank 4–11		
Time LAGB lasted	7 days to 60 months		
Complications	N	%	Surgical procedures
<b>Early complications</b>			
Esophagogastric obstruction	12	3,2	LAGB removal (n = 10) LAGB reposition (n = 2)
<b>Late complications</b>			
Intragastric erosion	201	54,5	LAGB removal + gastric defect closure + omental coverture
LAGB chronic slippage	91	24.6	Removal LAGB (n =59,) Gastric Bypass (n =10), Gastric Sleeve (n =22)
Gastric reservoir dilatation	23	6,23	LAGB removal (n =10) Gastric Sleeve (n =13)
Device malfunctions	19	5,1	LAGB removal (n = 8), Device repositioning (n = 11)
Esophageal dilation	11	3.0	LAGB removal (n =11)
Poor quality of life	5	1,3	LAGB removal
Band slippage into the mediastinum	2	0.5	LAGB removal

the gastric band erosion can be as high as 17% in reports involving less than 100 patients. It has been generally accepted that early GBE is related to micro-injury during surgery, while late GBE is linked to foreign body responses caused by chronic ischemic tissue damage, however, the etiology of GBE is still not understood at all. Gastric band erosion is a significant source of morbidity, it can manifested with several symptoms, although some patients remain asymptomatic [19]. The most common presentation is abdominal pain (83%) followed by weight regain and port-site sepsis or port infection associated in 50% of cases, the abdominal pain is constant and is not related to eating, it usually appears in epigastrium and may radiate to the upper back, left subcostal area. When inflammation is originated from a gastric perforation, the patient complains of intermittent and severe pain in the lower abdomen, requiring gastric band removal [11,20]. 201 patients with gastric band erosion were treated by laparoscopy, the band was removed and the fistulous orifice was closed with a few stitches on the damaged gastric wall and reinforced with an omentum patch. A perioperative methylene blue test was performed to confirm no leaks. A closed suction drain was placed. Any naso-gastric tube for decompression was considered. All patients were evaluated with contrast medium study and none presented postoperative fistula, starting oral diet. In the literature some authors have described techniques to remove the LAGB with an oral endoscope. We have no experience in that procedure.

LAGB chronic slippage was the second more frequent in this study, being a significant and common late complication, with an incidence of approximately 5% within the first 5 years after LAGB, requiring operative procedures [21]. Slippage or pouch dilatation can occur if the Lap-Band moves down the stomach, or if the pouch above the band stretches up. Patients with these problems may notice heartburn or regurgitation of food at night when they lay down, it can cause acute symptoms of abdominal pain and/or failure to lose weight. The acute symptoms are pain, bloating, vomiting or difficulty in swallowing liquids and solids; in our series it concurred in 24.6 % of 364 complications of LAGB, meaning about 0.4% of 20,000 LAGB calculated in the last five years in our environment, which indicates a lower incidence than reported in the literature. The 91 patients (24.6%) with LAGB chronic slippage were proposed in a single time to remove the band and to perform another bariatric procedure; 22 patients gave their consent to band removal and a gastric sleeve was performed, and 10 patients received a gastric bypass. 59 patients decided the gastric band removal only. In patients who are offered a conversion to another bariatric procedure, all adhesions should be released and the tunnel left by the band should be dismantled. It is also recommended to use higher staples at this point.

Another complication observed in this series was esophageal dilation, it has been described as a late complication following LAGB with incidence of 0.5–50% [22]. GERD symptoms and emesis are the most frequent in patients with dilated esophagus. Esophagus diameter of 35 mm or greater on barium swallow radiographic must be considered dilated esophagus [23].

Device-related complication habitually are present during the first year after LAGB, considered a minor complication, this

group is formed by infection in about 5%, crack tubing port connection and port rotation, are among the most common and annoying ones, and can render the device susceptible to failure, a careful surgical technique and routine use of radiologic guidance for band adjustments are the keys to avoid these complications [24,25].

Poor quality life was seen only in five patients, all of them presented repeated vomiting, epigastric abdominal pain, repetitive adjustments, and insufficient weight loss even though the LAGB was functional and well placed.

The most severe complication observed in this study was the migration to the mediastinum LAGB in two patients, they had dysphagia in swallowing liquids and chest pain. Endoscopy showed stenosis a few centimeters over the gastro esophageal junction avoiding the endoscopy passing. During the surgery, migration to the mediastina was observed, so it was necessary to dissect the meso-esophagus to reach the LAGB. In both cases, the presence of an endoscopist was requested in order to observe the esophageal mucosa and ensure its integrity when removing the LAGB, this complication is rare.

The main defect of this paper is that the authors did not receive all the patients' complications developed in the environment, but in this study, although small, is demonstrative of the complications observed with the use of LAGB [26]. The importance implies that the patient requesting the LAGB placement should receive all the information regarding both the benefits and possible complications that may occur, and the surgical team, must implement a constant patient-medical communication, to detect early any alteration in the functioning of the device to prevent major complications.

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