



Laparoscopic vertical banded gastroplasty

A multicenter prospective study of 200 procedures

D. Nocca,¹ R. Aggarwal,² P. Blanc,¹ B. Gallix,⁴ G. L. Di Mauro,⁵ B. Millat,⁵ C. De Seguin des Hons,³ E. Deneve,¹ J. G. Rodier,⁵ G. Tincani,¹ M. A. Pierredon,⁴ J. M. Fabre¹

¹ Department of Digestive Surgery Pr Fabre, Hopital Saint Eloi, University Hospital of Montpellier, Avenue Bertin SANS, 34000 Montpellier, France

² Department of Biosurgery & Surgical Technology, Imperial College London, London, United Kingdom

³ Clinique Saint Louis, PL Joseph Boudouresques, 34190 Ganges, France

⁴ Department of Radiology Pr Bruel, Hopital Saint Eloi, University Hospital of Montpellier, Avenue Bertin SANS, 34000 Montpellier, France

⁵ Department of Digestive Surgery Pr Millat, Hopital Saint Eloi, University Hospital of Montpellier, Avenue Bertin SANS, 34000 Montpellier, France

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Abstract

Background: The commonest surgical procedure for management of morbid obesity in Europe is laparoscopic adjustable gastric banding (LAGB), even though laparoscopic vertical banded gastroplasty (LVBG) is still considered to be a gold standard restrictive option in bariatric surgery. A multicenter prospective study was designed to assess the efficacy of LVBG in terms of weight loss and complication rates for obese patients who have indications for a restrictive procedure.

Patients and methods: Two-hundred morbidly obese patients (84.5% female) with a mean age of 41 years and mean body mass index (BMI) of 43.2 kg/m² underwent LVBG as described by MacLean. Five trocars were placed in standard positions as per laparoscopic upper gastrointestinal surgery. A vertical gastric pouch (30 ml) was created with circular (21 or 25mm) and endoliner stapling techniques, enabling definitive separation of the two parts of the stomach. The gastric outlet was calibrated with either a polypropylene mesh (5.5 cm in length and 1cm in width) or a nonadjustable silicone band. The median follow-up period was 30 months (range, 1–72 months).

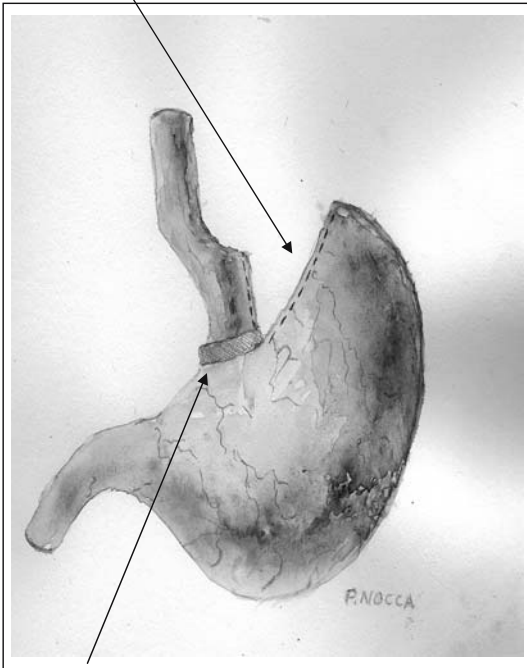
Results: One case had to be converted to open surgery (gastric perforation) and there was one death secondary to peritonitis of unknown etiology. The morbidity rate was 24%, comprising the following complications: gastric outlet stenosis (8%); staple line leak (2.5%); food trapping (1.5%); peritonitis (1%); thrombophlebitis (1.5%); pulmonary embolism (0.5%); and gastroesophageal reflux (9%). The excess weight loss achieved was 56.7% (1 year), 68.3% (2 years), and 65.1% (3 years).

Conclusions: Laparoscopic vertical banded gastroplasty is an effective procedure for the surgical management of morbid obesity, especially for patients who present hyperphagia but are unable to manage the constraints of adjustable gastric banding. Laparoscopic vertical banded gastroplasty is safe, as demonstrated by an acceptable complication rate, of which gastric outlet stenosis, staple line leakage, and gastroesophageal reflux predominate.

Key words: Obesity surgery — Gastroplasty — Weight loss — Complications

The commonest surgical procedure for the management of morbid obesity in Europe is laparoscopic adjustable gastric banding (LAGB). This is notwithstanding the fact that laparoscopic vertical banded gastroplasty (LVBG) is considered to be the gold standard restrictive option in bariatric surgery [6]. The concept of vertical banded gastroplasty was described first by Mason in the 1960s [10]. This procedure led to long-term weight control in the majority of cases, although unacceptable failure rates were also described. Many of these patients experienced weight regain, or had to resort to a second surgical procedure. This led MacLean to modify the approach in an effort to decrease complication rates [13] (Fig. 1). The combination of the MacLean approach together with advances in laparoscopic technology had the potential to lead to even greater reductions in complication rates. Greater numbers of patients may be availed of the opportunity to undergo a single operation for definitive treatment of their morbid obesity. However, few surgical teams have reported long-term follow

Transection of the stomach



Calibration of the gastric pouch (non adjustable ring)

Fig. 1. Vertical banded gastroplasty as described by MacLean et al. [13].

up data of patients who have undergone LVBG. This study aims to describe the effectiveness of this operation from analyses of prospective databases of three French laparoscopic bariatric centers.

Methods

Data were prospectively collected using a standardized database from three bariatric surgical centers. A total of 200 LVBGs were performed during the study period, which spans from January 1999 to September 2004. Patient selection was performed under the guidelines of the 1991 NIH Consensus Conference (BMI >40 kg/m², BMI between 35 and 40 kg/m² with related co-morbidities, age between 18 and 65 years, failure of medical treatment, and absence of hormonal dysfunction). Binge eating and sweet eating disorders were considered as contraindications for this type of procedure, as for all the restrictive procedures. The choice between LVBG and LAGB have been made by the patient or by the surgeons in case of LAGB contraindication (noncompliant patient for specific follow-up of LAGB, psychological problems, significant hiatal hernia, slippage of LAGB).

All patients were discussed at a multidisciplinary meeting comprising an endocrinologist, nutritionist, psychologist, and anesthesiologist [18]. The mean age of the patients was 41 years and the mean BMI was 43.2 kg/m². Twenty-five patients (12.5%) were classed as super-obese, i.e., BMI >50 with hyperphagia. Follow-up was performed at subsequent clinic visits, and subjects who did not attend were contacted by telephone.

Surgical technique

Five surgeons who are experts in laparoscopic procedures performed LVBG in a standardized manner. Eighty percent of those surgeons are used to proposing alternative laparoscopic bariatric procedures (LGBP

and LAGB) in case LVBG is contraindicated. Following the administration of general anesthesia, the patient was placed in an anti-Trendelenburg position (45°) on a specific bariatric operative table. Pneumoperitoneum was achieved with either the Hasson technique, or with a long Veress needle, with intraperitoneal pressure limited to 15 mmHg. Ports were positioned in accordance with established laparoscopic upper gastrointestinal technique, and only after the patient had been placed in the 45° position. It is important to emphasize this, because in the beginning of our laparoscopic upper gastrointestinal procedure experience, placement of ports prior to tilting the patient compromised the surgeon's view. After liver retraction, dissection commences at the lesser curvature, approximately 6 cm inferior to the gastroesophageal junction, until the lesser sac is breached. This step may be performed using monopolar or bipolar cautery or an ultrasonic scalpel. Subsequently, a 36 French gastric tube is placed transorally by the anesthesiologist into the stomach, for calibration of the size of the gastric pouch. A gastrogastric window is created with a circular stapler of size 21mm or 25 mm. This step may be performed from either the right side of the patient (circular stapler introduced in the right upper quadrant of the abdomen) or by way of positioning the anvil into the lesser sac and transecting the stomach from a posterior approach (circular stapler introduced at the epigastric level). The stomach is transected vertically toward the angle of His by means of an endoliner stapler (45 mm, green cartridge). This results in a vertical gastric pouch around 30 cc in size (Fig. 1).

Routinely, the staple line is reinforced by a 3/0 Vicryl running suture, the aim being to prevent leakage at this site, and the absence of leakage was systematically confirmed by the methylene blue test. In five cases, we used bio-absorbable buttressing material, such as Bio-seamguard (W. L. Gore Co.) to decrease the risk of bleeding along the stapler liner and to increase its strength [2]. Finally, a polypropylene mesh of 5.5 cm length and 1 cm width (70.5%), or a nonadjustable silicone band (LM Proring Band, IOC) (29.5%) was positioned circumferentially around the gastric outlet in order to calibrate it. The application of a drain beside the gastric pouch was performed in some cases. To prevent infection and thromboembolic complications, all patients received antibiotics and low molecular weight heparin, and they wore thromboembolic stockings.

Results

Between January 1999 and September 2004, 200 patients underwent LVBG. This type of bariatric procedure was proposed for morbidly obese patients who presented with hyperphagia. Thirty-two patients (16%) had previously undergone another bariatric procedure (LAGB) with good results in the short term, but had re-presented with slippage of the band. No associated procedure was performed for these patients.

Median follow-up time was 30 months (range, 1–72 months). Conversion to open surgery was performed in one case (0.5%), secondary to a gastric perforation that could not be managed via the laparoscopic approach. The mean operative time was 132 min (range, 48–280 min). We experienced one death secondary to generalized peritonitis; re-laparotomy on postoperative day 2 revealed intact staple lines. No cause was found during this procedure.

The morbidity rate was 24% of which 12.5% were classified as early postoperative morbidities. The reoperation rate was 11.5%, and the predominant complication was gastric outlet stenosis (8%). Of these, eight had a polypropylene band (5.67% of patient who underwent a calibration by polypropylene mesh) and eight had the silicone band (13.55% of patients who underwent a calibration by silicone band). Removal of the silicone band led to resolution of the stenosis,



Fig. 2. Gastric stenosis (x-ray control).

Leakage on the stapler line diagnosed on a Xray control.

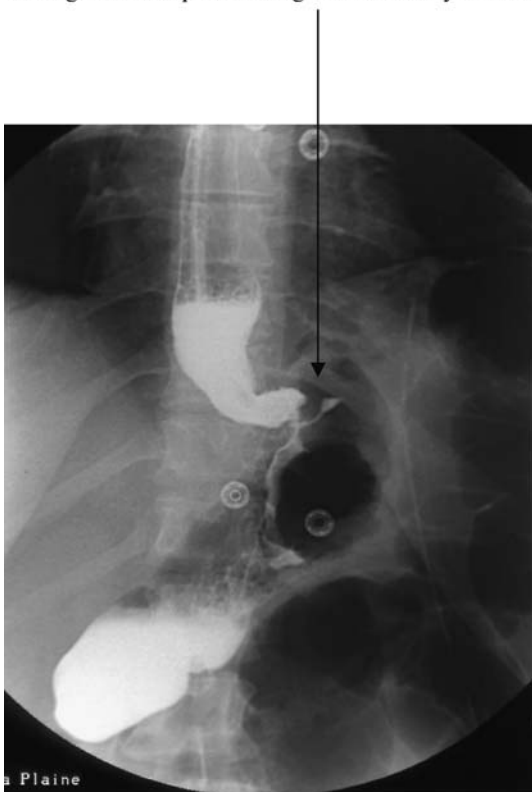


Fig. 3. Leakage along the stapler line, diagnosed on x-ray control.

though for patients with the polypropylene band two underwent endoscopic dilatation, and the remaining six required reoperation for recalibration (3 cases) or stricturoplasty (3 cases). Staple line leakage occurred in five patients (2.5%), which necessitated radiological confirmation in three cases. Definitive management was by reoperation and drainage of the leak, either via an open (4 cases) or a laparoscopic (1 case) approach. Less common morbidities were represented by food trapping (1.5%) treated by endoscopic dilatation, peritonitis of unknown etiology (1%), thrombophlebitis (1.5%), pulmonary embolism (0.5%), and gastroesophageal reflux (9%). Mean length of hospital stay was 4.8 days.

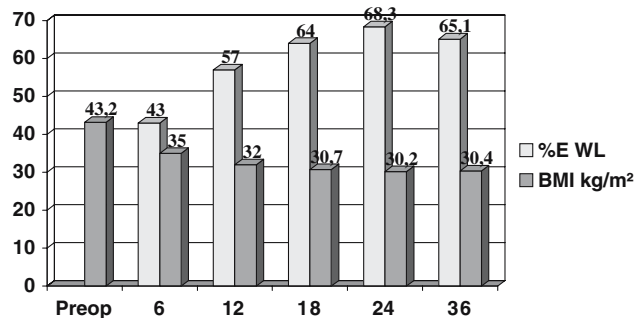


Fig. 4. Weight loss after laparoscopic vertical banded gastroplasty.

Excess weight loss achieved was 56.7% at 1 year, 68.3% at 2 years, and 65.1% at 3 years. The evolution of BMI at one year was 32 kg/m², 30.2 kg/m² at 2 years, and 30.4 kg/m² at 3 years (Fig. 4). With regard to the super-obese patient population, excess weight loss was 52.6% at 1 year, 66.1% at 2 years, and 66.2% at 3 years. This group had a nil mortality, and there were no differences in rates of morbidity when compared with the rest of the patient population.

Discussion

Laparoscopic vertical banded gastroplasty and laparoscopic adjustable gastric banding are the reference restrictive bariatric procedures performed today. Although they may be less efficacious than other malabsorptive procedures, they nonetheless provide a simpler solution to achieve weight loss and treat co-morbidities [6, 7, 20]. The vertical banded gastroplasty (VBG) has evolved away from the disappointing results of Mason's procedure toward the MacLean modification to achieve superior results [10]. Coupled with advances in laparoscopic surgery are the benefits of decreased analgesic requirements, improved respiratory function, faster postoperative recovery, fewer wound infections, and better cosmetic results [3].

The use of endoliner stapling devices to create a definitive transection allows surgeons to solve the problem of staple line disruption that often occurred with the Mason technique [12]. However, the risk of gastric fistulae and peritonitis is greater after the MacLean procedure than with the Mason procedure (2.5% in our study). It is thought possible to augment the staple line with a running suture or more recently, an absorbable polymer membrane (Seamguard), which also prevents gastric bleeding after transection of the stomach [2]. These early results on humans have shown that Seamguard can reduce staple-line hemorrhage.

Calibration of the gastric pouch remains a further problem for the surgeon. Stenosis or migration of the band occurs frequently and leads in the majority of cases to reoperation [5]. Different materials have been used to calibrate the gastric pouch, with current interest being placed on polypropylene mesh because of its cost-effectiveness. However, it does seem to cause higher rates of erosion of the gastric wall [12]. The use of

Goretex or Silastic rings has been described, but the results have been poor [12]. Recent use of the nonadjustable silicone band has led to high rates of stenosis necessitating reoperation. This has led the manufacturer to increase the size of the band to a diameter of 6 cm. Though Mason has shown the ideal length of the band to be 5 cm, it is important to emphasize that this measurement was obtained during the open approach, where the gastrogastic window could be created with greater accuracy. Because of technical difficulties, the laparoscopic approach may increase the distance between the lesser curvature and the gastric window. A band that is too small can thus lead to acute stenosis, necessitating removal of the band. However, with the use of adjustable polypropylene mesh, the surgeon has the option to recalibrate the gastric outlet. Nonetheless, chronic stenosis of the gastric outlet may appear over time, requiring management by endoscopic dilatation or surgery. At surgery, the options are to perform a stricturoplasty of the stenosis or to convert to a gastric bypass. A further complication leading of banding procedures may be erosion of the gastric wall or total migration of the band into the stomach, leading to chronic stenoses [12, 19, 22]. A solution to this problem may be to use nonabsorbable biomaterial which may be less rigid than the silicone [20]. The appearance of gastroesophageal reflux disease is certainly possible after the MacLean procedure, at a rate of 9% in our study. Some authors propose an antireflux valve procedure around the gastric pouch to prevent this complication. Proton pump inhibitors may be helpful to decrease the symptoms, and severe reflux disease can be treated with conversion to a gastric bypass [1].

Another commonly cited complication of LVBG is weight regain over time. This raises the question of whether restrictive procedures are effective as a long-term solution to morbid obesity. Laparoscopic vertical banded gastroplasty has been proven to be effective for the majority of patients, achieving 60%–70% of excess weight loss at 3 years of follow-up [14, 16, 17]. However, long-term studies to confirm the ongoing efficacy of the procedure do not exist. The only long-term studies that have been published concern Mason's procedure, which does not involve total transection of the gastric stapler line. The consequence of this approach is the appearance of fistulae on the gastric stapler line, commonly occurring after 5 years of follow-up.

Recently, Morino has compared in a randomized study the effectiveness of LAGB versus LVBG in patients with a BMI between 40 and 50 kg/m² [15]. The study concluded that LAGB can be performed with shorter operative times and a shorter hospital stay, but that LVBG is more effective in terms of late complications, reoperations, and weight loss. The results of LVBG, however, are inferior to those of recent reports of laparoscopic gastric bypass studies [8, 21], so the question must be asked whether LVBG is now a redundant procedure?

In answer to this, the mortality and fistula rate of restrictive procedures is lower than that of the gastric bypass, leading to many surgeons and patients to select the purely restrictive approach. This preference occurs

even though the results may be inferior in terms of weight loss when compared to the gastric bypass procedure. In our study, we had one death from peritonitis of unknown etiology. This emphasizes that close follow-up is necessary in the postoperative period to identify the warning signs of such complications (tachycardia, fever, abdominal pain, confusion, respiratory distress).

Conclusions

Laparoscopic vertical banded gastroplasty is an effective and safe procedure, even though laparoscopic gastric bypass results in greater weight loss. Laparoscopic VBG is a good alternative for patients who have hyperphagia and who are not able to manage or support the constraint of adjustable gastric banding. Stenosis of the gastric outlet and stapler line leakage are the main complications to be prevented through close follow-up protocols.

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