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ORIGINAL ARTICLES

Laparoscopic adjustable gastric banding via pars flaccida versus perigastric positioning: technique, complications, and results in 2,549 patients

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Abstract
Aim Retrospective multicenter analysis of the results of two different approaches for band positioning: perigastric and pars flaccida.
Methods Data were collected from the database of the Italian Group for LapBand® (GILB). Patients operated from January 2001 to December 2004 were selected according to criteria of case–control studies to compare two different band positioning techniques: perigastric (PG group) and pars flaccida (PF group). Demographics, laparotomic conversion, postoperative complications, and weight loss parameters were considered. Data are expressed as mean ± standard deviation.
Results 2,549 patients underwent the LapBand System® procedure [age: 40 ± 11.7 years; sex: 2,130 female, 419 male; body mass index (BMI): 46.4 ± 6.9 kg/m^2; excess weight (EW): 60.1 ± 23.6 kg; %EW: 90.1 ± 32.4]. During this period 1,343/2,549 (52.7%) were operated via the pars flaccida (PF group) and 1,206/2,549 (47.3%) via the perigastric approach (PG group). Demographics for both groups were similar. Thirty-day mortality was absent in both groups. Operative time was significantly longer in the PG group (80 ± 20 min versus 60 ± 40 min; $p < 0.05$). Hospital stay was similar in the two groups (2 ± 2 days). Laparotomic conversion was significantly higher in the PG group (6 versus 2 patients; $p < 0.001$). Overall postoperative complication rate was 172/2,549 (6.7%) and was linked to gastric pouch dilation/slippage (67/172), intragastric migration/erosion (17/172), and tube/port failure (88/172). Gastric pouch dilation and intragastric migration were significantly more frequent in the PG group: 47 versus 20 ($p < 0.001$) and 12 versus 5 ($p < 0.001$), respectively. Patients eligible for minimum 3-year follow-up were 1,118/1,206 (PG group) and 1,079/1,343 (PF group). Mean BMI was 33.8 ± 12.1 kg/m^2 (PG group) and 32.4 ± 11.7 kg/m^2 (PF group) (p = ns), and mean percentage excess weight loss (%EWL) was 47.2 ± 25.4 and 48.9 ± 13.2 in PG and PF groups, respectively (p = ns).
Conclusions Significant improvement in LapBand System® results with regard to laparotomic conversion and postoperative complication rate, with similar weight loss results, was observed in the pars flaccida group.

Keywords Lap-Band® System · Obesity · Pars flaccida · Perigastric · Intragastric migration · Gastric pouch dilation

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Laparoscopic adjustable gastric banding has been available from more than 10 years. The original technique has been described by Belachew and by Favretti [1, 2]. Over the years this technique has undergone substantial modifications and changes: the band is placed at the gastric apex without significant gastric pouch; the gastrostenometer to calibrate the pressure at the band level is no longer used; and the access port is positioned with nonabsorbable stitches on the anterior

rectus sheath. However, the most important variation in technique has been the introduction of an alternative pathway to perigastric placement to ease the surgical procedure and to reduce some disturbing complications. Aim of this study is a retrospective multicenter analysis of the results of two different approaches for band positioning: perigastric and pars flaccida.

Patients and methods

Patient selection

Lap-Band® patients operated with band positioning via pars flaccida (PF group) were compared with patients who, during the same period, underwent band positioning via the perigastric pathway (PG group). Data were collected from the database of the Italian Group for Lap-Band® System (GILB) from January 2001 to December 2004.

It must be stressed that the experience of the Italian Group for Lap Band (GILB) dates from 1996. Until December 2000, 2,559 patients had been operated by GILB surgeons by the perigastric technique, as the pars flaccida approach started in that period. These data demonstrate that the learning curve for GB, and specifically for the perigastric technique, has no influence on results.

These two groups were matched according to sex, age, and BMI in conformity with the criteria of case–control studies, then patients were selected. Age range considered was 18–45 years. BMI considered was 30–45 kg/m^2. Patients out of these ranges were excluded from this study.

Perigastric approach

The first step is the exposure of the subcardial area. The left liver lobe is elevated with a retractor to expose the gastroesophageal junction, the anterior wall of the stomach, and the lesser omentum. The gastric fundus is pulled up with a grasper. Then a calibration tube is inserted orally into the stomach, inflated with 25 cc air or saline, and withdrawn slowly to block the gastroesophageal junction. The stomach is pulled downwards gently with the grasper, while another grasper brings into tension the hepatogastric ligament. A reference point, corresponding to the equator of the calibration tube inflated balloon, is made with a cautery hook. This point will be approximately 1.5–2 cm below the gastroesophageal junction. The dissection begins by opening the hepatogastric ligament while the stomach is put in tension by the graspers. The balloon is then deflated and the calibration tube is withdrawn into the esophagus. The dissection proceeds as close as possible to the stomach with careful attention to avoid any kind of gastric, vagal or vessels lesions. The full thickness of the hepatogastric ligament is dissected from the gastric wall; the dissection should be the same size as the band or smaller to prevent stomach slippage. The dissection through the lesser curvature should be straight in the direction of the angle of His. Once the left crus is localized, the greater curvature can be dissected. Before starting this dissection the stomach fundus must be pulled down with a grasper. Sometimes steep anti-Trendelenburg position is necessary to expose this area and obtain better vision, displacing viscera and fatty omentum. For the same reason, the camera can occasionally moved to the subxiphoid trocar. A small opening is created with the cautery hook into the avascular phrenogastric ligament just above the belly of the left diaphragmatic crus. The next surgical step is the creation of a retrogastric tunnel with blunt dissection. Usually an articulating dissector or a dedicated instrument is passed from the lesser curvature behind the stomach toward the left diaphragmatic crus through the phrenogastric ligament, reaching the space opened in the angle of His. This blunt creation of the retrogastric tunnel is a blind maneuver and the risk of a gastric perforation is possible. At this time the band is introduced into the abdomen and mounted straight on a grasper in order to avoid damage to its inflatable part. Some loss of pneumoperitoneum should occur during this introduction. Once intra-abdominal pressure is reestablished, the band is grasped or linked to the device used and pulled through the retrogastric tunnel. At this time the band is closed with a dedicated tool. To avoid stomach slippage or band dislocation the stomach must be sutured over the band. Three to five nonabsorbable anterior stitches are placed. Once the band is properly fixed, the fill tube is pulled into the abdomen and its distal extremity linked to the port after trocar removal. The port can be fixed to the fascia on the rectus abdominis with nonabsorbable stitches or with the more recently developed automatic appliers.

Pars flaccida approach

This approach has recently become the consensus choice for better handling of instruments and band, low complexity in dissection maneuvers, and low complication rate. Dissection starts near the angle of His above the greater curvature of the stomach. Then the lesser omentum is opened through the pars flaccida component, and the fat on the posterior wall of the lesser sac is retracted to provide exposure of the right crus of the diaphragm. A point along the anterior border of this muscle, at its lowermost aspect, is selected, and the peritoneum is opened. This is the point of confluence of the left and right pillars of the right crus for 1–2 cm to initiate the pathway. The band placer is then passed along this path to appear on the greater curvature aspect of the stomach at the site of prior dissection at the angle of His. The band is drawn along this pathway and

partly closed. The band is then closed and fixed with stitches to the gastric wall. The port is placed in the rectus abdominis.

Study outline

Mortality, intra- and postoperative complications, laparotomic conversion, and weight loss (BMI, %EWL, and %EBL) with a minimum 3 years of follow-up were compared. Data are expressed as mean ± standard deviation. Statistical analysis was done with Fisher's exact test or Student's t test; $p < 0.05$ was considered significant.

Results

From January 2001 to December 2004, 2,549 patients who corresponded with the inclusion criteria underwent the LapBand® System procedure (age: 40 ± 11.7 years, sex: 2,130 female, 419 male; BMI: 46.4 ± 6.9 kg/m^2, EW: 60.1 ± 23.6 kg; %EW: 90.1 ± 32.4). During this period 1,343/2,549 (52.7%) were operated via pars flaccida (PF group) and 1,206/2,549 (47.3%) via perigastric approach (PG group). Both groups were similar with regard to demographics (Table 1). Thirty-day mortality was absent in both groups. Operative time was significantly longer in the PG group (80 ± 20 min versus 60 ± 40 min; $p < 0.05$). Hospital stay was similar in both groups (2 ± 2 days). Laparotomic conversion was significantly higher in the PG group (6 versus 2 patients; $p < 0.001$), due to difficult surgical anatomy ($n = 4$) or complications ($n = 2$), while in the PF group both cases of conversion were due to complication (Figs. 1, 2). Overall postoperative complication rate was 172/2,549 (6.7%) and linked to gastric pouch dilation/slippage (67/172), intragastric migration/erosion (17/172), and tube/port failure (88/172). Gastric pouch dilation and intragastric migration were significantly more frequent in the PG group: 47 versus 20 ($p < 0.001$), and 12 versus 5 ($p < 0.001$), respectively. Tube/port failure rate was similar in both groups (46 versus 42; $p =$ ns). Patients eligible for minimum 3 years follow-up were 1,118/1,206 (PG group) and 1,079/1,343 (PF group). Mean BMI was 33.8 ± 12.1 kg/m^2 (PG group) and 32.4 ± 11.7 kg/m^2 (PF group) ($p =$ ns), and mean %EWL was 47.2 ± 25.4 and 48.9 ± 13.2 in PG and PF groups, respectively ($p =$ ns).

Discussion

Laparoscopic gastric banding has been shown to be safe and effective in the surgical treatment of morbid obesity [3, 4]. Several experiences with different lengths of follow-up have confirmed that band positioning has lower mortality and complication rate as compared with other more invasive procedures [1–4]. Over the years, different technical variations have been proposed, all having different impacts on the technical improvement of band positioning and its results. In this field the most important variation has been the introduction of the band placement by the pars flaccida pathway.

O'Brien et al. [5] reported, in a prospective randomized study of 202 patients followed for 24 months, that the pars flaccida pathway makes a significant difference in gastric prolapse reduction. Similar improvement in SF36 scores for quality of life and weight loss were also recorded. They conclude that gastric band positioning by pars flaccida method is among the significant refinements and improvements of the procedure associated with progressive improvements in outcomes with the device.

In the present study in a very large patients population, performed outside of the learning curve for both techniques, weight loss at 3 years was without significant differences between groups. Less incidence of intragastric migration and a lower rate of gastric pouch dilations were observed in patients who underwent banding via the pars flaccida pathway. In 20 patients who had gastric pouch dilation after pars flaccida positioning, band repositioning

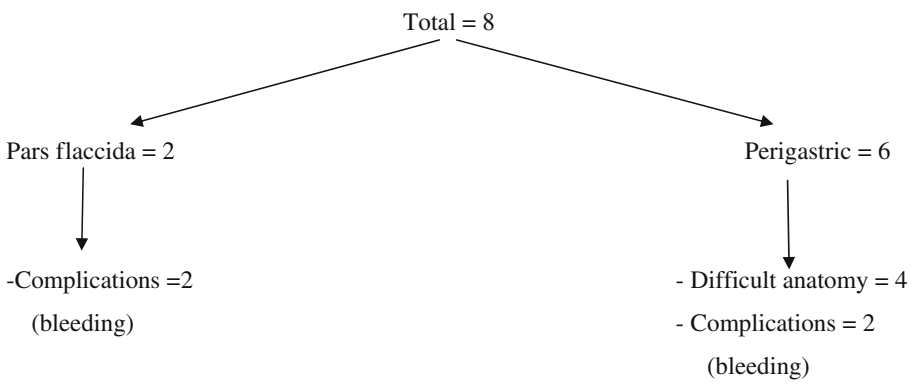

Fig. 1 Laparotomic conversion

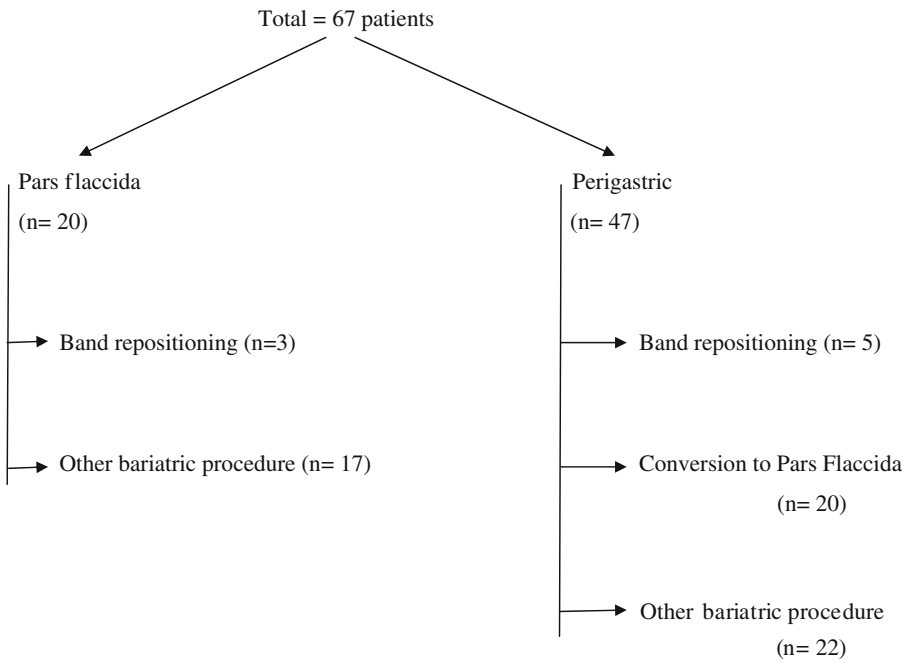

Fig. 2 Gastric pouch dilation treatment

Table 1 Demographics and weight parameters according to gastric band positioning

	Patients	Age (years)	Sex	BMI (kg/m^2)	EW (kg)	%EW
Pars flaccida	1,343	42.3 ± 9.9	1,131F/212 M	45.9 ± 7.3	57.7 ± 28.1	97.3 ± 34.6
Perigastric	1,206	39.6 ± 13.8	999F/207 M	47.2 ± 5.9	61.9 ± 21.2	92.2 ± 29.8
Total	2,549	40.0 ± 11.7	2,130F/419 M	46.4 ± 6.9	60.1 ± 23.6	90.1 ± 32.4

was performed in 3 patients, while in 17 a more invasive bariatric procedure was performed. In 47 patients with band positioned via the perigastric pathway 5 underwent band repositioning, 20 a conversion to pars flaccida positioning, and 22 to another bariatric procedure. These results suggest that the best band positioning pathway is via pars flaccida. Moreover, in the experience of the Italian Group for Lap-band®, some surgeons consider the pars flaccida approach to be the best way to position the band after complications of the perigastric technique, and consider the pars flaccida pathway their first choice to resolve the problem without converting to a more invasive procedure, especially in those patients who have had a good response to band placement, but have unfortunately suffered complications.

Laparoscopic adjustable gastric banding is now shown to be a very safe and effective surgical option for the treatment of severe obesity. Recent developments in the device and technique refinements have enhanced the safety of this option with fewer complications and the same results in terms of weight loss.

Although the presented data suggest, as a general recommendation, that surgeons should prefer the pars flaccida approach, we must keep in mind that perigastric technique has good results as well, with low complications rate, in expert hands. Therefore, we can say that, at this time, the choice between the pars flaccida and perigastric pathway is linked to surgeon experience and strategy in treatment of complications

Disclosures Nicola Di Lorenzo, Francesco Furbetta, Franco Favretti, Giovanni Segato, Maurizio De Luca, Giancarlo Micheletto, Marco Zappa, Paolo De Meis, Ezio Lattuada, Michele Paganelli, Marcello Lucchese, Nicola Basso, Francesco D. Capizzi, Leonardo Di Cosmo, Vincenzo Mancuso, Simona Civitelli, Angelo Gardinazzi, Cristiano Giardiello, Augusto Veneziani, Marcello Boni, Vincenzo Borrelli, Angelo Schettino, Pietro Forestieri, Vincenzo Pilone, Ida Camperchioli, and Michele Lorenzo have no conflicts of interest or financial ties to disclose.

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