ELSEVIER

Surgery for Obesity and Related Diseases 5 (2009) 72–76

SURGERY FOR OBESITY AND RELATED DISEASES

Original article

Feasibility and technique of laparoscopic conversion of adjustable gastric banding to sleeve gastrectomy

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Received April 8, 2008; revised November 17, 2008; accepted November 18, 2008

Abstract

Background: To evaluate the feasibility, safety, and short-term efficacy of the conversion of laparoscopic adjustable gastric banding (LAGB) to laparoscopic sleeve gastrectomy (LSG) because of inadequate weight loss.

Methods: The inclusion criteria were an inadequate percentage of excess weight loss (%EWL), defined as <30% at ≥1 year after LAGB. From August 2002 to October 2007, 27 patients (17 women and 10 men) had undergone removal of their LAGB and conversion to LSG. The average age at LSG was 43.6 ± 11.4 years (range 25–66). Before LAGB, the mean weight and body mass index was 129.8 ± 21.9 kg (range 95–178) and 45 ± 8.1 kg/m^2 (range 35–64), respectively. The average interval between LAGB and LSG was 51.2 ± 30.1 months (range 22–132). Before conversion, the mean weight, body mass index, and %EWL was 117.9 ± 27.3 kg (range 63–170), 39 ± 9.6 kg/m^2 (range 24–61), and 18.1% ± 18.3%, respectively. Of the 27 patients, 12 had 19 obesity-related co-morbidities, including arterial hypertension in 7, type 2 diabetes mellitus in 2, degenerative joint disease in 7, and sleep apnea in 3.

Results: The mean operative time was 120.6 ± 32.4 minutes (range 65–195). No conversion to open surgery was required, and no patient died. The postoperative complications included a subphrenic hematoma that required laparoscopic drainage; no postoperative leaks developed. The mean hospital stay was 3.2 ± 1.4 days (range 2–8). After a mean follow-up of 18.6 ± 14.8 months (range 1–59) for 23 patients (4 patients were lost to follow-up), the mean weight, body mass index, and weight loss was 100.7 ± 23.5 kg (range 61–152), 34.6 ± 8.7 kg/m^2 (range 21–50.4), and 23 ± 12.4 kg (range 2–55), respectively. The patients had had an additional 16.7% EWL after LSG for a total average %EWL of 34.8% ± 21.8% (P <.05). Of the 12 patients with obesity-related co-morbidities, 5 had had resolution, including arterial hypertension in 1, type 2 diabetes mellitus in 1, degenerative joint disease in 2, and sleep apnea in 2.

Conclusion: The results of this study support the safety of LSG in the case of an inadequate %EWL after LAGB. However, the degree of weight loss and co-morbidity resolution is of concern. (Surg Obes Relat Dis 2009;5:72–76.)

Keywords: Gastric banding; Sleeve gastrectomy; Failure; Weight loss; Conversion

Since we performed the first laparoscopic adjustable gastric banding (LAGB) procedure [1], it has become one of the most popular in the treatment of morbid obesity in Europe [2] and Australia [3]. This is because of the encouraging results, low morbidity, and minimal operative mortality [4,5]. Laparoscopic sleeve gastrectomy (LSG) was first described as a component of the duodenal switch procedure [6,7], but, more recently, it has been reported as a

Presented as an oral presentation at the 25th Annual Meeting of the American Society for Metabolic and Bariatric Surgery, Washington, DC, June 15–20, 2008

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1550-7289/09/$ – see front matter
doi:10.1016/j.soard.2008.11.008

stand alone bariatric operation [8]. LSG is gaining popularity in some European countries [9–16] and in South America [17], but long-term results are lacking [18].

Inadequate weight loss after LAGB, using Reinhold's criteria [19], affects 10.5% of patients at 5 years and increases to 14% after 7 years [20]. The success rate (percentage of excess weight loss [%EWL] >50%) reaches a peak at 2 years (53.8%) but declines progressively to 42.9% after 7 years [20]. The reasons can be related to dilation of the gastric pouch [21] but also to poor compliance by both patient and surgeon regarding the need for frequent band adjustments. Changes in alimentary behavior are often mentioned as another reason for failure [22]. In the case of LAGB failure, conversion to another bariatric procedure can be considered. The possibility of conversion to laparoscopic Roux-en-Y gastric bypass (LRYGBP) has been previously reported after both band removal [23–27] and keeping the band in place [28]. Other options include conversion to laparoscopic biliopancreatic diversion (LBPD) with removal of the band [29] and laparoscopic duodenal switch (LDS) with [27,29] or without [30,31] removal of the band. A final option could be to perform repeat LAGB [24,32–34].

Only a few case reports and small cohort studies have reported on the possibility of removing the band and converting the procedure to LSG [9–12,35,36]. The aim of this study was to evaluate the feasibility, safety, and efficacy at 18 months of conversion of LAGB to LSG because of an inadequate %EWL.

Methods

The inclusion criteria were an inadequate %EWL, defined as <30% at ≥1 year after LAGB. From August 2002 to October 2007, 27 patients (17 women and 10 men) had undergone removal of the LAGB and conversion to LSG. The average age was 43.6 ± 11.4 years (range 25–66). Before LAGB, the mean weight and body mass index (BMI) was 129.8 ± 21.9 kg (range 95–178) and 45 ± 8.1 kg/m^2 (range 35–64), respectively. The average interval between LAGB and LSG was 51.2 ± 30.1 months (range 22–132). Before the conversion to LSG, the mean weight, BMI, and %EWL was 117.9 ± 27.3 kg (range 63–170), 39 ± 9.6 kg/m^2 (range 24–61), and 18.1% ± 18.3%, respectively. Of the 27 patients, 12 had had 19 obesity-related co-morbidities, including arterial hypertension in 7, type 2 diabetes mellitus in 2, degenerative joint disease in 7, and sleep apnea in 3.

Surgical technique

The patient was positioned supine with the legs apart and with both arms in abduction (French position). The surgeon stood between the patient's legs. The camera person was to the patient's right and the assistant to the patient's left. Five trocars were placed in the abdomen as follows: a 10-mm trocar (for the 30° optical system) 20 cm distal to the xiphoid process, a 5-mm trocar on the left anterior axillary line and 5 cm distal to the costal margin, a 12-mm trocar on the left mid-clavicular line between the first and second trocars, a 12-mm trocar on the right mid-clavicular line on the same horizontal line, and a 5-mm trocar just distal and to the left of the xiphoid process. Adhesiolysis between the left liver lobe and the band was performed with the coagulating hook; the tubing system of the band helped to identify its position. The right and left crus of the hiatus were completely freed. Finally, the band was completely exposed for its entire circumference by sectioning the gastrogastric tunnel covering the band. The distal limit of resection at the antrum was scored on the stomach surface. It extended vertically from the crow's foot toward the greater curvature, thus sparing 6–8 cm of antrum proximal to the pylorus. The greater curvature of the stomach, at the left side of the scoring marks, was freed from the greater omentum using the LigaSure device (Covidien, New Haven, CT) or the coagulating hook, going cephalad until the left crus was reached. The band was not retrieved at the conclusion of devascularization of the greater curve; instead, it was kept as a landmark for stapling (Fig. 1). The stomach was transected with sequential firings of a linear stapler, using green loads (Covidien), under a guidance of 34F orogastric tube, which was kept on the lesser curvature side. The band was finally opened and retrieved just after the last stapler was fired. The fibrotic perigastric capsule created by the band was opened vertically with scissors. Two seroserosal running sutures, starting respectively at the angle of His and at the gastric antrum, were used to buttress the staple line and were tied together halfway down the staple line. The band and the specimen were extracted from the abdomen by enlarging the left 12-mm trocar opening. A leak test, using compressed air inflated through the orogastric tube, confirmed the absence of leak along the staple line. A drain was left in place along

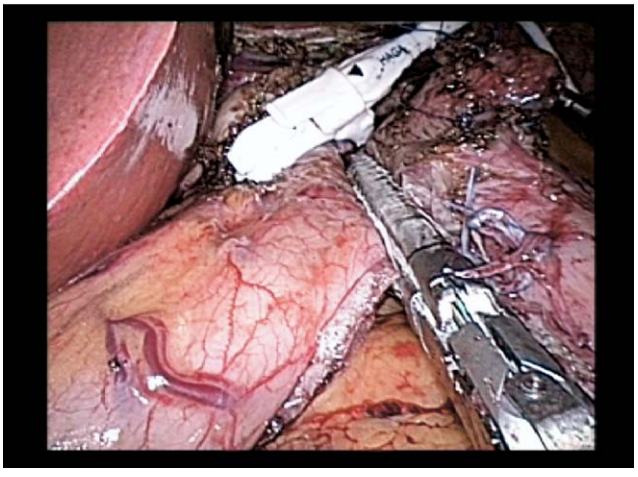

Fig. 1. Firing of linear stapler (green load) inside gastric band and along orogastric bougie.

the resected line, with its end at the angle of His. The enlarged left 12-mm port site was closed in layers, and the band port and orogastric tube were removed. A methylene blue test was performed on the first postoperative day and, if negative, a liquid diet was started on the second postoperative day. Usually, the patient was discharged from the hospital on the third postoperative day.

Results

The mean operative time was 120.6 ± 32.4 minutes (range 65–195). No patient required conversion to open surgery, and no mortality occurred. The postoperative complications included a patient with a subphrenic hematoma that required laparoscopic drainage on the second postoperative day; no postoperative leaks developed. The mean hospital stay was 3.2 ± 1.4 days (range 2–8). After a mean follow-up of 18.6 ± 14.8 months (range 1–59), with 4 patients lost to follow-up, the mean weight, BMI, and weight loss for the remaining 23 patients was 100.7 ± 23.5 kg (range 61–152), 34.6 ± 8.7 kg/m^2 (range 21–50.4), and 23 ± 12.4 kg (range 20–55), respectively. The patients had had an 18.1% EWL after LAGB and before conversion and had an additional 16.7% EWL after LSG, for a total average %EWL of 34.8% ± 21.8 % ($P < .05$). Of the 12 patients with obesity-related co-morbidities, 5 had resolution, including arterial hypertension in 1, type 2 diabetes mellitus in 1, degenerative joint disease in 2, and sleep apnea in 2.

Discussion

The choice of conversion of LAGB to another bariatric procedure has not been well defined in the published data [37]. The final choice depends on the surgeon's personal experience and philosophy. It sometimes depends on the anticipated difficulty of the surgery resulting from the previous obesity procedure. Usually, in our department, the policy after a "failing" restrictive procedure is to change the type of operation. Hence, LAGB patients will usually benefit from band removal and conversion to LRYGBP or LDS. However, a small group of patients are still considered candidates for conversion to LSG. These patients were those who clearly had been volume eaters before the band procedure, and in whom the weight loss failure could be attributed to poor food choices and poor compliance to the strenuous follow-up needed for a successful LAGB operation [38]. Poor compliance can result because band adjustments cost a substantial amount of money for the patient, especially if fluoroscopy is used.

Only 1 study of LAGB removal and immediate conversion to isolated LSG has been reported and included 8 patients [35]. Isolated case reports from LSG series have also been reported [9–12,36]. The operative times were longer than for primary LSG [39]. This results from the time needed for adhesiolysis and isolation of the band from both crura and to dismantle the gastrogastric tunnel. The latter maneuver is essential to avoid double tissue stapling and to avoid missing a dilated pouch proximal to the band and/or a subclinical hiatal hernia, very often only apparent at the end of the dissection when a large lipoma becomes visible. We believe it is very helpful to keep the band in situ until the last stapler firing. This can avoid the risk of constructing an asymmetric tube, because the exact limit of the lesser curvature is often obscured by fibrosis. Asymmetry of the sleeve can result in gastroesophageal reflux, reduced weight loss, and dysphagia.

No conversion or mortality occurred in the present study, in agreement with other reports [35] and confirming the possibility of bariatric revision by laparoscopy [40,41]. Postoperatively, we had 1 major complication (3.7%): a subphrenic hematoma that required laparoscopic drainage. The probable cause of the hematoma was bleeding of an artery along the left crus. The most feared complication of LSG is a leak, usually located at the angle of His. To address the thickness of the gastric wall, we usually performed LSG using green staple loads and buttressed the staple line with a seroserosal running suture. This included the area of the previous LAGB, which usually appeared fibrotic. We are aware of good arguments against the need for oversewing the staple line; however, we were guided by the vast experience of Hess and Hess [7], who reportedly eliminated leaks by oversewing the staple line.

The 23 patients in the present study achieved a mean %EWL of 34.8% at 18.6 months. The 16.7% increase in the %EWL after conversion from LAGB to LSG can probably be explained by the resection of the gastric fundus, which constitutes the main capacity area of the stomach. Moreover, the fundus is the predominant area of ghrelin production. Ghrelin levels remain decreased at 6 months after LSG but increase after LAGB [42–44]. The %EWL in the present study was less than the 57% EWL reported by another study after conversion from LAGB to LSG [35], but that study included a smaller sample (5 of 8 patients). The BMI decrease in the present study was similar to that obtained with removal of the LAGB and conversion to LRYGBP. With the latter approach, the BMI reportedly decreases from 42.0–45.8 kg/m^2 to 31.8–37.7 kg/m^2 after 12–18 months [24–26]. The removal of the LAGB and synchronous conversion to LBPD or LDS is another option [27,29]. Dolan and Fielding [29] reported a mean %EWL at 12 months after LBPD and LDS of 37% and 28%, respectively. Topart et al. [27] recently compared the removal of the LAGB and simultaneous conversion to LRYGBP and LDS and found a similar BMI after these 2 procedures, 33.4 kg/m^2 and 31.4 kg/m^2, respectively, at 12 and 18 months. These data are similar to those in the present study. Another revision procedure reported consists of adding a malabsorptive element to the restrictive one [45–47]. However, only few isolated cases have been reported [30,31]. We are concerned that this procedure might eventually fail, and the

band would still need to be removed [37]. A final option for patients with a LAGB and an inadequate %EWL is a repeat banding procedure [32,33]. The data regarding repeat banding have not been encouraging, because BMI appears unchanged after 1 year [24].

We have not achieved the results reported in published studies for obesity-related co-morbidity remission or improvement [48], with remission in only 5 of 12 patients. This might have been related to the less than optimal weight loss obtained with LSG. A clear correlation appears to exist between weight loss and the resolution of co-morbidities, especially diabetes [49].

Finally LSG after LAGB for weight loss failure in a small and select group of patients and in our hands had a success rate (%EWL >30%) of only 40%. Hence, our concept of replacing a restrictive procedure with another restrictive procedure remains open to question.

Conclusion

The results of the present study support the safety of LSG after unsuccessful LAGB (%EWL <30%) in select patients; however, the low %EWL and co-morbidity resolution is of concern.

Disclosures

The authors claim no commercial associations that might be a conflict of interest in relation to this article.

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