A comparison of laparoscopic adjustable gastric band and laparoscopic sleeve gastrectomy: a single surgeon’s experience

Richard Flint

Abstract

Aim Laparoscopic adjustable gastric band (LAGB) has been a popular form of surgical weight loss in New Zealand but is now being neglected in preference of the laparoscopic sleeve gastrectomy (LSG). Arguments for each operation have focused on differences in weight loss and complication rates. The aim of this study is to compare the results of these two techniques from a single surgeon’s practise.

Method A non-randomised, observational study comparing patients undergoing either LAGB or LSG by a single surgeon.

Results There were 228 patients who had either a LAGB (94 patients, mean age 45.1±11.9 years, mean BMI 42.2±7.1 kg/m^2) or a LSG (134 patients, mean age 44.8±9.11 years, mean BMI 50.2±9.0 kg/m^2) between October 2009 and April 2014. The 2-year mean percent excess body weight loss for the LAGB group was 46.1±27.8% compared to 72.1%±20.9% for the LSG group (P<0.0001). There were 19 patients (20%) that required 29 reoperations following LAGB, most commonly for gastric prolapse (mean 22.8±13.8 months postop). In contrast, there were 4 patients (3%) that required reoperation following LSG (2 haemorrhage, 1 staple-line leak and 1 check laparoscopy) and 2 patients (1%) that required gastroscopy for sleeve spasm. Reoperation rate was significantly greater for LAGB than LSG (p<0.0001).

Conclusion In this current series there was a significantly reduced level of weight loss but higher complication rate following LAGB when compared to LSG. Despite the limitations of this study, the results may explain why LSG has gained preference over LAGB in recent years.
Methods

All patients undergoing either LSG or LAGB weight loss surgery by the author between October 2009 and April 2014 were sourced from a prospective database. Patient demographics (age, gender, weight, and body mass index (BMI)) were sourced from the database, with missing data being recovered from a retrospective chart review. Patient follow-up was also accessed from the database and when required, patients were either called back to clinic or contacted by telephone.

All patients had a comprehensive preoperative workup that involved consultations with the author as operating surgeon, a psychologist, a dietician and an exercise specialist. A preoperative very low calorie diet (up to 800 kcal/day, OptiFast, Nestle New Zealand) was commenced at least 2 weeks before surgery. Laparoscopic adjustable gastric bands (LapBand AP system, Allergan, Irvine CA) were placed by the pars flaccida approach. Postoperative band adjustments were scheduled to start 6 weeks after surgery and monthly thereafter until the optimal volume was reached.

Laparoscopic sleeve gastrectomy was performed using a 36F bougie starting 3 cm from the antrum. The staple line was not oversewn nor were tissue-reinforced staples used, but fibrin sealant (Tisseel, Baxter International Inc.) was used routinely until 2014, after which it was used selectively. Dietician and exercise specialist follow-up was continued for at least a year after all operations, and postoperative psychologist consultations were scheduled on an as-needed basis.

All descriptive data is expressed as mean ± standard deviation. Weight loss is expressed as percentage of excess body weight lost, with the ideal body weight being calculated by the Deitel & Greenstein formula, indirectly based on Metropolitan Life tables. All statistical analysis was performed by InStat version 6.0 software (GraphPad Software Inc., San Diego, USA). Student’s two-tailed t-test (non-paired) was used to analyse all nonparametric data and Fisher’s exact test for all parametric data.

This study was conducted in accordance with the directions of the New Zealand Health and Disability Commissioner Ethics Committee. Formal review was not required.

Results

There were 228 patients who had either a LAGB (94 patients, mean age 45.1±11.9 years) or a LSG (134 patients, mean age 44.8±9.11 years) during the study period (Table 1). Patients having LAGB were significantly smaller than LSG (mean BMI 42.2±7.1 kg/m² versus mean BMI 50.2±9.0 kg/m²; p=0.02). All patients were accounted for during the study period but weight loss data was incomplete for 9 (10%) LAGB and 21 (16%) LSG patients. The average duration of follow-up was greater after LAGB (Table 1).

The 2-year mean percent excess body weight loss for the LAGB group was 46.1±27.8% compared to 72.1%±20.9% for the LSG group (P<0.0001) (Figure 1). There were two deaths during the study period. One patient had a non-survivable cerebrovascular accident in the second week following LSG. The second death occurred 9 months after LAGB from an unrecognised acute gastric prolapse whilst out of town.

During the study period a total of 19 patients with a LAGB required a total of 29 reoperations. The author performed all but two of these reoperations. Two of these were for re-siting of the LAGB subcutaneous reservoir due to malposition that had rendered it inaccessible. The remaining 17 patients required a repeat laparoscopy.

The commonest indication for repeat laparoscopy was for gastric prolapse (nine patients). This occurred at an average 22.8±13.8 months from the initial operation. Two of these nine patients insisted their LAGB was removed after the prolapse and had no further surgery. The remaining seven had laparoscopic repositioning of their AGB, of whom two had further prolapse and subsequent removal of their AGB. The next most common indication for further surgery was band erosion (two patients) that required removal of the AGB at 17 and 30 months from initial surgery.

Gastric perforations at time of initial operation occurred in two patients and were both successfully managed with laparoscopic removal of the AGB. Band intolerance occurred in two patients and
required replacement with a larger band (one patient) or removal the AGB (one patient). The other indications for reoperation following LAGB was an infected AGB (one patient) and spontaneous unbuckling of the AGB (one patient).

Of the 94 patients who had LAGB, 10 required removal of the AGB. Four of these had a conversion to another weight loss surgery (two gastric bypasses and two sleeve gastrectomies) whilst the remaining six patients had no further surgery.

Table 1. A comparison of laparoscopic adjustable gastric band (LAGB) and laparoscopic sleeve gastrectomy (LSG) describing patient demographics, weight loss, reinterventions and complications

<table>
<thead>
<tr>
<th>Variables</th>
<th>LAGB</th>
<th>LSG</th>
<th>p</th>
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</thead>
<tbody>
<tr>
<td>Number</td>
<td>94</td>
<td>134</td>
<td></td>
</tr>
<tr>
<td>Age (years)</td>
<td>45.1±11.9</td>
<td>44.8±9.11</td>
<td>NS</td>
</tr>
<tr>
<td>BMI (kg/m²)</td>
<td>42.2±7.1</td>
<td>50.2±9.0</td>
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<tr>
<td>%EBWL at 2 years</td>
<td>46.1±27.8%</td>
<td>72.1±20.9%</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Average follow-up (months)</td>
<td>33.7±12.6</td>
<td>24.0±14.7</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Reoperation</td>
<td>19</td>
<td>4</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Endoscopy</td>
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<td>2</td>
<td>NS</td>
</tr>
<tr>
<td>Prolapse</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Erosion</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Haemorrhage</td>
<td>0</td>
<td>2</td>
<td>NS</td>
</tr>
<tr>
<td>Staple line leak</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Stricture</td>
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<td></td>
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</tbody>
</table>

%EBWL = percent excess body weight loss.

Figure 1. Graph comparing percent excess body weight lost at 2 years after laparoscopic adjustable gastric band (LAGB) and laparoscopic sleeve gastrectomy (LSG)
Following LSG, two patients had a postoperative bleed and required an urgent laparoscopy to control hemorrhage. One patient had a staple-line leak on postoperative day 5 and was successfully treated with laparoscopic placement of drains and endoscopic stenting. The remaining patient had a diagnostic laparoscopy on postoperative day 1 after an anomaly on routine postoperative gastrografin swallow suggested a leak. No leak had occurred in this case and the patient continued to recover without incident. There were no gastric strictures in this series but two patients required gastroscopy in the first month due to sleeve spasm. One patient developed a spontaneous portal vein thrombosis that resolved with anticoagulation alone.

Discussion

This report describes a single surgeon’s experience of LAGB and LSG that shows a significantly greater weight loss following LSG with a reduced reoperation rate during the study period.

The sleeve gastrectomy is a recent weight-loss procedure that was developed as the first stage of a two-stage procedure for high-risk patients. The aim was to reduce weight in the extremely obese so that a bypass could be safely performed at a later date. Since then the popularity of LSG as a standalone operation has surged as people have become attracted to its perceived technical simplicity, feasibility, and good outcomes.

Local surgeons have recognised that patients’ demand for LSG have come at the expense of the LAGB, a procedure that used to be extremely popular amongst those seeking weight-loss surgery. This phenomenon has been mimicked internationally with demand for the LSG in North America rising dramatically over the last decade. However there has been little comparison between the two procedures with only one low-powered randomised controlled trial describing a greater weight loss following LSG, with less reoperations but more severe complications.

This current study’s findings of a 20% reoperation rate following LAGB may seem at odds with other units’ claims of a 1% perioperative complication rate. Indeed it is these reported low rates that had led many to prefer the LAGB over other surgeries such as the gastric bypass that have a five-fold greater perioperative risk.

This current study differs from these earlier reports by including events beyond the 30-day perioperative window. The results presented in this paper suggest that problems with the LAGB can occur beyond the initial postoperative period and should be considered when comparing different types of weight-loss operations.

Indeed, this implication is now being supported by recent long-term follow-up studies that describe a similar reoperation rate to that presented here. Gero et al describe a 50% reoperation rate in their 10-year follow-up of a randomised controlled trial of two different types of LAGB. O’Brien et al describe a similar reoperation rate of 56% during the 15-year follow-up of a series of 3227 bands. In addition, Himpens el al had to reoperate on 22% of their LAGB during their 3-year follow-up of a randomised trial of LAGB versus sleeve gastrectomy whilst Steffen et al report a 23% long-term complication rate in their 5-year follow-up of 824 LAGB.

As in this current study the most common indication for reoperation was gastric prolapse; a condition where the stomach herniates up through the band and becomes impacted. The rate of documented prolapse varies up to 20% and its true cause is still conjectural. It is the author’s opinion that much of the variation in the incidence can be attributed to the duration of follow-up as many of the cases in this series occurred long after the band had been adequately adjusted.

The suspicion that gastric prolapse is an ongoing risk that accumulates over time, is supported in larger studies of longer duration that describe prolapse occurring approximately 2 years after its placement. A similar argument can be made for gastric erosion which also occurs several months after placement of the band. Therefore it seems reasonable to assume the number of patients that
have extremely satisfactory weight loss with no adverse effects following their LAGB will get progressively smaller as problems with the LAGB accumulate overtime. Furthermore it is impossible to predict preoperatively who will remain in this successful group.\(^{10}\)

Although greater weight loss with a lower chance of reoperation makes a convincing argument against the LAGB in preference of the LSG; it must be noted that all of the LAGB complications in this study could be salvaged laparoscopically, usually in a non-urgent basis, and none of the patients suffered long-term sequelae. Complications after the LSG may be less common, but the consequences are much more serious. For example the most feared complication of a leak in the staple line is very uncommon (reported to be 2-6%\(^{16}\) and in this series 0.7%). However, when it does occur it takes an average of 40 days to heal, will require a total gastrectomy in 10% and is the leading cause of death accounting for 30% of mortalities after LSG.\(^{16,17}\) Therefore the true advantage of the LAGB over LSG may be in its reversibility if problems were to occur.

Although this study describes significant differences between the LAGB and LSG the results need to be interpreted in view of some limitations. This was a non-randomised, non-blinded study so direct comparisons between the groups may be susceptible to bias and confounding. Indeed the group who had LSG had a greater initial BMI and it is accepted that those with a greater excess weight will have a larger excess weight loss following their operation. Furthermore the follow-up is still relatively short and it is possible that long-term problems with the LSG are yet to become apparent, which will alter the comparisons. Another limitation is based on the use of one LAGB amongst a variety of different types of adjustable gastric bands on the market.

In conclusion, this report of a single surgeon’s experience of LAGB and LSG in the New Zealand environment describes a greater weight loss and lower complication rate following LSG. Experiences like this may explain the growing popularity of the LSG over LAGB.

**Competing interests:** Nil.

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**References**


