

Reoperative Options After Gastric Banding

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Introduction

- ▶ 30% inadequate weight loss ($\leq 25\%$ excess weight loss)
- ▶ device-related complications (band erosion, port/tubing leak, etc.)
- ▶ patient-related factors(dietary compliance)

Preoperative Workup

- history and physical exam focusing on weight and dietary history, existing comorbidities, and number as well as volume of band adjustments
- soft/liquid foods with high-caloric content
- Persistent esophageal dilation
- Esophagram
- Endoscopy
- Esophageal manometry
- The original operative report

Surgical Options

- Conversion to RYGB
- Conversion of AGB to LSG
- BPD/DS
- One Anastomosis Gastric Bypass (OAGB)
- Stomach Intestinal Sparing Surgery (SIPS)

Conversion to RYGB

- most common revisional option
- one-stage or two-stage
- hiatal hernia should be repaired
- Intraoperative endoscopy
- band capsul
- thick or extra-thick stapler

Outcomes of Conversion of AGB to RYGB vs. Primary RYGB

- higher risk of complications , increased hospital stay and prolonged operating time
- 63,000 primary RYGB patients and 301 revisional RYGB:
 - intraoperative complications were higher in the revision RYGB group (5.6% vs. 2.4%).
 - Postoperative complications were also higher in the revision group (30.2% vs. 4.9%), including wound complications, postoperative infections, and gastrointestinal complications
 - The rate of reinterventions was higher in patients undergoing revision RYGB as well (3.7% vs. 0.6%)
 - Finally, weight loss at 24 months was significantly lower in revision RYGB vs. primary RYGB patients

Outcomes of One-Stage Conversion vs. Two-Stage Conversion of AGB to RYGB

- 738 single-stage conversions to RYGB to 147 two-stage revisions to RYGB
- Indications presence of a grossly dilated pouch and iatrogenic lesions or perforations of the gastric wall after band removal
 - No significant difference in 30-day complications one- and two-stage (4.9% vs. 6.1%)
 - There was a significantly shorter hospital stay for single- stage ($3.7 \pm 0.8d$) versus two-stage procedures ($4.1 \pm 1.1d$)
 - There was no leak or mortality in either group
- single-stage approach preferred given its benefits with limiting the hospital stay and number of operations
- Insurance coverage
- safety and complication rates are not significantly different
- Case by case

Conversion of AGB to LSG

- Extra thick staplers are strongly especially upper half of the stomach
- these staple line disruptions are difficult to close
- not too narrow at the incisura result in stenosis
- truncal vagotomy
- Additional emptying studies

Outcomes of Conversions of AGB to LSG vs. Primary LSG

- ▶ retrospective study compared 76 conversions of LSG patients to 279 primary LSG patients
- ▶ All in two stages, 5 months
- ▶ most for inadequate weight loss
 - ▶ operative time was higher for the conversion to LSG (78 vs. 65 minutes)
 - ▶ no difference in complication rate (17.1% vs. 10.7%)
 - ▶ hospital stay was longer in the conversion to LSG group (4 days vs. 3)
 - ▶ %EWL was lower in the conversion group at 6 months (46.5% vs. 49.8%) at 12 months (66.4% vs. 78.2%), but not at 24 months (78.5% vs. 78%)

One-Stage Conversion vs. Two-Stage Conversion of AGB to LSG

- ▶ meta-analysis reviewed 1300 patients who had conversions of AGB to LSG after band removal in one or two stages:
 - ▶ Abscess rates for one- and two-stage procedures were 4.2 and 1.4%, respectively
 - ▶ Post-op bleeding rates were 2.8% and 4.3%, respectively
 - ▶ Leak and fistula rates were 5.8% and 2.8%
 - ▶ Total morbidity rates were 10.9% and 11.2% for one and two-stage procedures, respectively
 - ▶ Mean BMI change was -9.8 and -10.0 kg/m² for single- and two-stage procedures
- ▶ patients will gain weight in the period of time between the band removal and the conversion 29.4 to 36.7 kg/m², another study showed from 43.5 to 44.8 kg/m²

Comparative Outcomes of AGB to LSG vs. AGB to RYGB

- 15 studies for the RYGB showing %EWL between 23% and 74% in 7–44 months
- eight studies for LSG revisions that showed %EWL to be between 31% and 60% period of 6–36 months
 - RYGB were found to have higher 30-day reoperation rate (2.7% vs. 1.6%) morbidity (6.5% vs. 2.9%) however, leak rate was equivalent (0.9% RYGB vs. 0.7%)
- Another analysis 2700 band revision patients
 - higher rates in RYGB patients versus LSG patients for bleeding (2.66% vs. 0.44%)
 - 30-day readmission (7.46% vs. 3.69%)
 - 30-day reoperation (3.25% vs. 1.26%)
 - operative time (151 vs. 113 minutes)
 - Unplanned ICU admission (1.48% vs. 0.37%)
 - Pulmonary embolisms (1.33% vs. 0.15%, $p < 0.001$) were more frequent in RYGB
 - Patient comorbidities as well as the patient's BMI. Patients with higher
- BMIs and for patients with GERD tended to have more RYGB conversion


Other Less Common Surgical Options for Conversion

- BPD/DS
- One Anastomosis Gastric Bypass (OAGB)
- Stomach Intestinal Sparing Surgery (SIPS)

Conclusions

- converting the AGB to another bariatric operation will have increased risks of complications compared to their primary counterparts
- Overall level 1 data or large series comparing the different alternative treatment modalities are lacking. There is a lack of randomized studies
- patients selected for the RYGB tend to have higher preoperative BMI and more comorbidities, such as GERD
- Knowing the various techniques, benefits, and pitfalls of each operation can help when deciding which revision is appropriate for a given patient.

Long-Term (over 10 Years) Retrospective Follow-up of Laparoscopic Adjustable Gastric Banding

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Abstract

Background Laparoscopic adjustable gastric banding (LAGB) placements have progressively decreased in recent years. This is related to poor long-term weight loss outcomes and necessity for revision or removal of these bands. Long-term outcome results following LAGB are limited. The aim of our study was to determine the long-term outcome after LAGB at our institution.

Objectives The aim of our study was to determine the long-term outcome after LAGB at our institution.

Setting The setting of this is Academic Center, Israel.

Methods Patients who underwent LAGB between 1999 and 2004 were reviewed. Patient comorbidities and weight loss parameters were collected preoperatively and at defined post-operative periods. Improvement in weight loss was defined as percent excess weight lost, and improvement in comorbidities was defined based on standardized reporting definitions.

Results In total, 74 (80%) patients who underwent LAGB met inclusion criteria. The mean age at LAGB placement was 50.5 ± 9.6 years, and the mean body mass index (BMI) was 45.5 ± 4.8 kg/m². Preoperative comorbidities were diabetes mellitus (13.5%), hypertension (32%), hyperlipidemia (12.1%), obstructive sleep apnea (5.4%), joints disease (10.8%), mood disorders (5.4%), and gastro-esophageal

reflux disease (GERD) symptoms (8.1%). The mean follow-up was 162.96 ± 13.9 months; 44 patients (59.4%) had their band removed, and 22 (30%) had another bariatric surgery. The follow-up BMI was 35.7 ± 6.9 ($p < 0.001$), and the % total weight loss was 21.0 ± 0.13 . There was no improvement in any of the comorbidities. GERD symptoms worsened at long-term follow-up ($p < 0.001$). Undergoing another bariatric procedure was associated with a higher weight loss (OR 12.8; CI 95% 1.62–23.9; $p = 0.02$).

Conclusion LAGB required removal in the majority of our patients and showed poor resolution of comorbidities with worsening of GERD-related symptoms. Patients who go on to have another bariatric procedure have more durable weight loss outcomes.

Keywords Laparoscopic adjustable gastric banding (LAGB) · Long-term results · LAGB revision

Introduction

Bariatric surgery continues to be the most effective treatment for obesity and its associated comorbidities [1, 2]. Since 2015, sleeve gastrectomy (SG) is the most common bariatric proce-

Introduction

- Since 2015, SG in the USA (53.8%), RYGB (23.1%) and LAGB (5.7%)
- LAGB represented 35.4% in the USA in 2011
- sharp decline in LAGB placement
- slippage, erosions, and penetrations

Methods

- From 1999 through 2004
- Cardiometabolic, band complications, and reoperations
- remained with the band in place and those who had their band removed with or without a revision or subsequent bariatric procedure were included
- follow-up 10 years\
- Excluded: lost to follow-up and unavailable for, or chose not to participate in, the follow-up phone questionnaire.

- indications for band extraction:
 - Technical failure was defined as tube or port displacement or infection
 - Band intolerance was defined as severe dysphagia or pain while the band was deflated and in normal position
 - Band erosion or penetration was diagnosed as visualization of the band through the stomach wall on upperendoscopy or Ctscan
 - Slippage of the band was demonstrated on X-ray, upper GI, or CT scan as a dilated stomach cardia with a more horizontal or vertical angle of the band

Results

- 92 underwent LAGB of which 74 (80%) met the inclusion criteria
- Female 54 (72.9%)
- mean age at the time LAGB placement 50.5 ± 9.6 years

Results

Table 1 Baseline demographic characteristics

Number	74
Sex (F)	54 (72.9%)
Age (years)	50.5 ± 9.6
Initial weight (kg)	126.6 ± 16.8
Height (m)	1.66 ± 0.08
Initial BMI (kg/m ²)	45.5 ± 4.8
DM	10 (13.5%)
HTN	24 (32%)
HPL	9 (12.1%)
OSA	4 (5.4%)
Joint disease	8 (10.8%)
Mood disorders	4 (5.4%)
GERD symptoms	6 (8.1%)

BMI body mass index, *DM* diabetes mellitus, *HTN* hypertension, *HPL* hyperlipidemia, *OSA* obstructive Sleep Apnea

Table 2 Long-term results of weight loss and comorbidities

Follow-up (months)	162.96 ± 13.9
Weight (kg)	99.4 ± 20.7*
%TWL at 1 year	28.0 ± 0.16
%TWL at the long-term follow-up	21.0 ± 0.13
%EWL	31.7 ± 21.0
BMI (kg/m ²)	35.7 ± 6.9*
BMI loss (kg/m ²)	9.7 ± 6.7
DM	13 (17.5%)
HTN	24 (32.4%)
HPL	12 (16.2%)
OSA	2 (2.7%)
Joint disease	14 (18.9%)
Mood disorders	7 (9.4%)
GERD symptoms	29 (39.1%)*
Band extraction	44 (59.4%)
Revisional surgery	22 (29.7%)

%TWL percentage of total weight loss, EWL% percentage of excess weight loss, BMI body mass index, DM diabetes mellitus, HTN hypertension, HPL hyperlipidemia, OSA obstructive sleep apnea

**p* < 0.001

Results

- time to band extraction was 63.3 ± 43.5 months in 44 (59.4%)
- 22 (50.0%) patients underwent revision to another bariatric surgery
- six (27.2%) revision was performed at the time of gastric band removal
- All simultaneous bariatric procedure underwent SG

Results

Table 3 Indication for band removal

Indication for band extraction	% from extracted bands (44) (%)	% from entire cohort (74) (%)
Technical failure	40.9	24.3
Intolerance	29.5	17.5
Erosion/penetration	22.7	13.5
Slippage	6.8	4.0

Table 4 Distributions of revisions after LAGB

Type of procedure	Number of band extractions
SG	18
RYGB	2
Band replacement	1
Scopinaro	1

SG sleeve gastrectomy, RYGB Roux-en-Y gastric bypass

Table 5 Multivariate analysis evaluation of different parameters affection weight loss outcome in the long term

	Odds ratio	CI	<i>p</i> value
Initial BMI	0.52	−0.48 1.54	0.30
Revisional surgery	12.8	1.62 23.9	0.02
DM	11.6	−4.50 27.8	0.15
HTN	−5.09	−16.6 6.47	0.38
HPL	−8.49	−24.6 7.65	0.29
OSA	9.84	−13.4 33.0	0.40
Joint disease	−0.32	−17.0 16.4	0.96
Fertility disorders	−21.3	−48.0 5.37	0.11
Mood disorders	−6.72	−29.2 15.8	0.55
Band extraction	1.14	−10.1 12.4	0.84

Discussion

- 1993
- weight loss and comorbidity resolution is not durable over the long term following LAGB placement
- relatively poor weight loss outcome with an average %EWL of 31.7%
- Other long-term follow-up studies also reports unfavorable results in regard to resolution of comorbidities and weight loss
- Resolution of comorbidities following LAGB is often seen in the first 2 years after surgery. This improvement however is not maintained over the long term
- In our study, we observed a significant worsening in GERD symptoms. This is explained by the fact that LAGB by its nature worsen reflux and even forms de novo in patients who previously were asymptomatic
- GERD can also induce dietary noncompliance and decrease weight loss after LAGB

Discussion

- Band extraction was indicated in 59.4%
- We had quite a higher rate of technical problems (40.9%) in this group, which included tube and port displacement or infection to other studies less than 10%
- Most common in literature band migration or slippage causing pouch dilatation and symptoms of GERD and dysphasia.
- associated with the perigastric technique

Discussion

- Suter et al showed a rate of band removal of only 21.7% at about 8 years of follow-up, but they also stated that each further year of follow-up added 3– 4% of major complications leading to band removal
- O'Brien et al. published long-term results up to 16 years in a cohort of 3227 46% of patients at 10-year and 76% of patients at 15-year follow-up underwent surgical revision with replacement of the band

Discussion

- ▶ patients who had their band removed along with another bariatric procedure were almost 13 times more likely to achieve a greater weight loss compare to the other two groups mentioned
- ▶ Himpens et al. who also report a favorable results of RYGB after failed LAGB that reached %EWL of 64% in a long-term follow-up compared with the 48% observed when the band was still in place
- ▶ Furthermore, Suter et al. and Aarts et al. showed that only one from five patients will benefit from LAGB in the long-term

Limitations

- First, this is a retrospective study with a small sample size of patients
- Furthermore, this study is not based on intent-to-treat but rather on long-term follow-up. This creates the potential for selection bias
- Furthermore, we did not compare our group of patients to a control group of patients who had primary SG and RYGB
- Rather, we performed a regression analysis to help identify factors that could contribute to the outcome measures, which we hope has sufficiently controlled for any confounding factors
- Finally, while we were able to make comparisons between our three groups of patients, we recognize that there may be some surgeon influence into the patients that go on to undergo revision from LAGB to SG or RYGB.

Conclusion

- Our long-term retrospective analysis of LAGB shows a high rate of band complications that progressed to band extraction in the majority of patients. Our data also demonstrates poor resolution of comorbidities and aggravation of GERD symptoms over the years
- For patients currently with a band in place, band extraction and performance of another bariatric procedure may improve weigh loss outcome in this patient population.

