Secondary Bariatric surgery – Does the type of index procedure affect outcomes after conversion?

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Abstract

Introduction:
- Revision bariatric surgery accounts for nearly 14% of the total cases performed at bariatric centers of excellence in the US.
- We designed a study aimed at investigating the effect that primary procedure type has on the total weight loss and perioperative complications that patients experience after conversion to Roux-en-Y gastric bypass.

Methods:
- Retrospective review of patients at our institution who underwent conversion from sleeve gastrectomy (SG) or adjustable gastric band (AGB) to Roux-en-Y gastric bypass (RYGB) between 2009 and 2019.
- Preop: In addition to demographic information, we obtained information on timing and indication for conversion and the presence of major obesity related co-morbidities
- Post-operatively, we measured short- and long-term complications, and percent changes in total body weight at 6 months, 12 months and 24 months post-op.
- Statistical analyses performed using univariate models, Fisher's test and Wilcoxon Rank sum tests.

Results:
- 42 patients underwent SG to RYGB conversion, 116 patients underwent single stage AGB to RYGB conversion.
- The most common reason for SG conversion was GERD (57.1%), vs weight regain (77.6%) for AGB conversion.
- Mean time to conversion was 52.9 vs. 94.7 months for SG vs. AGB.
- Mean pre-conversion BMI was 36.7kg/m^2 vs 43.8 kg/m^2 for SG vs AGB
- 30-day complication rate was 9.5% vs 6% in SG vs AGB (p=0.48).
- Long term complication rate was 31% vs 14.5% in the SG vs AGB (p=0.02).

Pre-operative and Demographic Characteristics

Subgroup	SG to RYGB (n=42)	AGB to RYGB (n=118)	*p* value
Age, years	48 (IQR:27-74)	51.8 (IQR: 23-74.8)	0.10
Sex, female	34 (81%)	94 (81%)	0.99
Race			0.15
Black	4 (10%)	10 (8.8%)	
Hispanic	4 (10%)	3 (2.6%)	
White	32 (80%)	101 (88.6%)	
Unspecified	1	1	
Peak BMI pre AGB/SG (+/- SD), kg/m^2	45.5 kg/m^2 (+/- SD: 7.8)	46.3 kg/m^2 (+/- SD: 7.3)	0.65
Nadir BMI post AGB/SG (+/-SD), kg/m^2	33.7 kg/m^2 (+/- SD: 7.5)	35.4kg/m^2 (+/- SD: 7.9)	0.21
Peak BMI pre conversion from AGB/SG (+/-SD), kg/m^2	36.7 kg/m^2 (+/- SD: 8.4)	43.8kg/m^2 (+/- SD: 7.6)	<0.0001
Time to conversion, months	52.9 (IQR: 30-69)	94.7 (IQR: 60-120)	<0.0001
Presence of hiatal hernia	17 (40.5%)	15 (12.9%)	<0.0001
Comorbidities			
GERD	31 (73.8%)	69 (59.5%)	0.10
Diabetes	9 (21.4%)	32 (27.6%)	0.44
Hypertension	14 (33.3%)	65 (32%)	0.01
Obstructive sleep apnea	14 (33.3%)	57 (49.1%)	0.08

Table 1: Preoperative and demographic characteristic of study patients

Weight Loss Outcomes

Subgroup	SG to RYGB (n=42)	AGB to RYGB (n=118)	p value
Peak BMI pre conversion from AGB/SG (+/-SD), kg/m^2	36.7 kg/m^2 (+/- SD: 8.4)	43.8kg/m^2 (+/- SD: 7.6)	<0.0001
Mean ΔBMI at 6 months, kg/m^2	5.2 kg/m^2 (+/- SD: 4.0)	9.5kg/m^2 (+/- SD: 3.4)	<0.0001
Mean ΔBMI at 12 months, kg/m^2	5.8kg/m^2 (+/- SD: 5.0)	11.9kg/m^2 (+/- SD: 4.4)	<0.0001
Mean ΔBMI at 24 months, kg/m^2	5.5kg/m^2 (+/- SD: 5.5)	11.1kg/m^2 (+/- SD: 4.7)	<0.0001
%TWL at 6 months	13.5%	21.3%	<0.0001
%TWL at 12 months	15.9%	27.3%	<0.0001
%TWL at 24 months	13.2%	24.7%	<0.0001

Table 2: Weight loss characteristics and outcomes per conversion subgroup

GERD/Dysphagia Outcomes

Subgroup	SG to RYGB (n=42)	AGB to RYGB (n=118)	*p* value
Peak BMI pre conversion from AGB/SG (+/-SD), kg/m^2	36.7 kg/m^2 (+/- SD: 8.4)	43.8kg/m^2 (+/- SD: 7.6)	<0.0001
Mean ΔBMI at 6 months, kg/m^2	5.2 kg/m^2 (+/- SD: 4.0)	9.5kg/m^2 (+/- SD: 3.4)	<0.0001
Mean ΔBMI at 12 months, kg/m^2	5.8kg/m^2 (+/- SD: 5.0)	11.9kg/m^2 (+/- SD: 4.4)	<0.0001
Mean ΔBMI at 24 months, kg/m^2	5.5kg/m^2 (+/- SD: 5.5)	11.1kg/m^2 (+/- SD: 4.7)	<0.0001
%TWL at 6 months	13.5%	21.3%	<0.0001
%TWL at 12 months	15.9%	27.3%	<0.0001
%TWL at 24 months	13.2%	24.7%	<0.0001

Table 3: GERD/Dysphagia outcomes per conversion subgroup

Weight Loss

Fig 1a

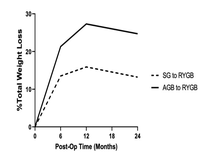


Fig 1b

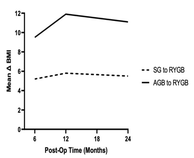


Fig 1c

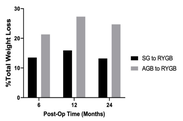
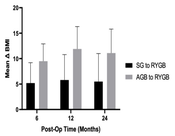


Fig 1d



Figures 1a-d: Weight loss outcomes subgroup analysis, reported in %TWL and mean change in BMI.

GERD/Dysphagia

Fig 2a

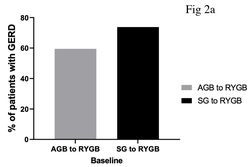
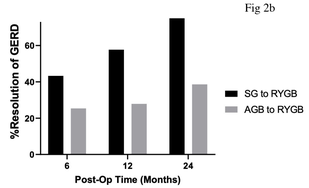


Fig 2b



Figures 2a and 2b: GERD/Dysphagia incidence and resolution per subgroup

Complications

Complication	SG to RYGB	AGB to RYGB	Clavien-Dindo complication grade	Early vs Late
Stroke/cerebrovascular accident	1 (2.4%)	0 (0.0%)	II	Early
Surgical site infection	1 (2.4%)	0 (0.0%)	II	Early
Anastomotic leak	1 (2.4%)	0 (0.0%)	III	Early
Pneumonia	1 (2.4%)	0 (0.0%)	II	Early
Gallstone Pancreatitis	1 (2.4%)	0 (0.0%)	III	Early
Hematoma	0 (0.0%)	1 (0.9%)	II	Early
Retained foreign body	0 (0.0%)	1 (0.9%)	III	Early
Symptomatic Cholelithiasis	1 (2.4%)	0 (0.0%)	III	Early
Small Bowel Obstruction (jejunojejunostomy)	1 (2.4%)	4 (3.4%)	III	Early
Incisional Hernias	2 (4.8%)	0 (0.0%)	III	Early
Hiatal Hernia recurrence	1 (2.4%)	0 (0.0%)	II	Early
Failure to thrive requiring enteral access	2 (4.8%)	0 (0.0%)	III	Late
Acute cholecystitis	1 (2.4%)	1 (0.9%)	III	Late
Gastrointestinal bleed	0 (0.0%)	1 (0.9%)	III	Late
Diabetic Ketoacidosis	1 (2.4%)	1 (0.9%)	III	Late
Internal hernia	0	2 (1.7%)	III	Late
Choledocholithiasis	0	1 (0.9%)	III	Late
Marginal Ulcers	5 (11.9%)	3 (2.6%)	III	Early/Late
Anastomotic Stricture (gastrojejunostomy)	1 (2.4%)	3 (2.6%)	III	Early/Late

Table 4: Early and Late Complications

Conclusion

Conclusions: Our study demonstrates that patients undergoing AGB conversion to RYGB experience significantly greater initial and long-term weight loss as well as less short- and long-term complications than those undergoing for conversion from SG, even after accounting for indications for conversion.

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