The effect of linear stapled gastrojejunostomy size in Roux-en-Y gastric bypass

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BACKGROUND

Obesity is increasing in North America and is estimated that 26.8% of adults in Canada have obesity.[1] Obesity increases the risk of other chronic disease such as diabetes, cardiovascular disease, obstructive sleep apnea, hypertension, and certain cancers.[2]

Bariatric surgery has been shown to be superior to medical management of obesity and laparoscopic Roux-en-Y gastric bypass (LRYGB) remains the gold standard in the surgical approach of obesity.[3]

The creation of a gastrojejunostomy (GJ) is a crucial step in LRYGB as its' associated complications carry significant morbidity and mortality.[4] There are many described techniques to create the GJ including linear stapler, circular stapler, or hand sewn, but the linear stapled GJ is now the most commonly performed in Canada and worldwide.[5] However, there is high variability among bariatric surgeons with respect to the size of the linear anastomosis, with most surgeons using a 30mm or 45mm stapler. Currently there is a paucity of published data informing outcomes of various anastomotic sizes of a linear stapled GJ.

OBJECTIVE

The purpose of this study was to determine whether outcomes or complications differ with 30mm vs 45mm size of the linear stapled gastrojejunostomy in laparoscopic Roux-en-Y gastric bypass.

METHODS

Study design
- Retrospective cohort study of patients who underwent linear stapled gastrojejunostomy anastomosis of 30 vs 45mm in LRYGB

Inclusion Criteria
- Patients who had bariatric surgery within the Ottawa Hospital Bariatric Centre of Excellence (Oct 1, 2015 – May 7, 2020); St. Joseph's Health Hamilton Bariatric Centre of Excellence (Jan 1, 2011 – May 7, 2020); Toronto Western Hospital, Humber River Hospital (Jul 1, 2010 – May 7, 2020); Kingston General Hospital (Jan 1, 2020 – May 7, 2020)

Exclusion Criteria
- Previous bariatric surgery (gastric band included)
- Laparotomy at time of surgery
- Less than 1 year follow up

Primary Outcome
- Post operative weight loss at 1 year

Secondary Outcomes
- Post operative weight loss at 6 months, 2, 3, and 5 years
- Post operative stenosis at 6 months, 1-5 years
- Post operative erosions/ulcerations

Study Database
- Patient data obtained from Ontario Bariatric Network Registry

Data Analysis
- Statistical Analysis System, Version 9.4 (SAS Inc, Cary, NC)
- Groups compared using t-tests, ANOVA analysis
- Formal sample size calculation not performed as database was estimated to yield approximately 2000 patients in each arm.

RESULTS

Figure 1. Flow diagram of patients screened and included in study

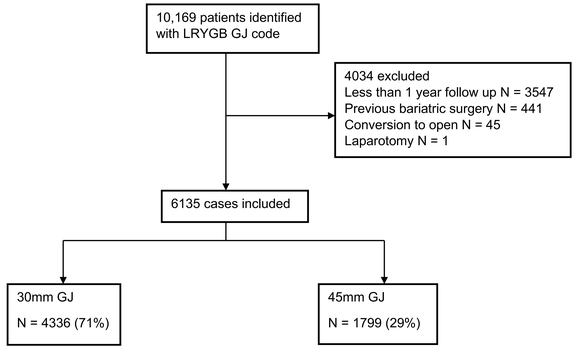


Table 1. Baseline patient and surgical characteristics

	30mm GJ n=4336	45mm GJ n=1799	P-value
Age, mean (SD)	44.25 (10.34)	45.35 (10.15)	0.0001
Female, n(%)	3646 (84.09)	1528 (84.94)	0.4047
Waist circumference at baseline, mean (SD)	133.54 (15.25) n=4012	131.06 (12.56) n=846	<.0001
Initial BMI at time of surgery, mean (SD)	46.81 (7.05) n=4213	45.99 (5.79) n=1676	<.0001
Weight at pre-op assessment (kg) for surgery, mean (SD)	128.91 (22.99) n=4217	127.20 (20.21) n=1677	0.0049
Diabetes – HbA1c (%), mean (SD)	6.16 (1.20) n=3970	6.22 (1.25) n=1689	0.0814
Edmonton Obesity Staging Score (EOSS) at baseline, n (%)	n=1054	n=558	
0	14 (1.33)	13 (2.33)	
1	167 (15.84)	122 (21.86)	
2	672 (63.76)	338 (60.57)	
3	182 (17.27)	80 (14.34)	
4	19 (1.80)	5 (0.90)	0.007
Intra-op complications, n (%)			
Respiratory	1 (0.02)	0	
Major bleeding	3 (0.07)	1 (0.06)	
Organ injury	32 (0.74)	5 (0.28)	0.034
Cardiac	2 (0.05)	3 (0.17)	0.1317
Death	0	0	

Table 2. Percentage total weight loss at 1 year

	30mm GJ n=4217	45mm GJ n=1677	Mean difference (95% CI)	P-value
Mean (SD)	31.02 (8.51)	32.18 (8.42)	1.16 (0.68, 1.64)	<.0001

Table 3. Percentage total weight loss at 1 year adjusted for baseline BMI, waist circumference, age, gender, and total limb length

	30mm GJ	45mm GJ	Least square mean difference (95% CI)	P-value
Least square mean (95% CI)	30.21 (29.84, 30.58)	31.27 (30.50, 32.05)	1.06 (0.23, 1.89)	0.0119

Table 4. Secondary outcomes

	30mm GJ		45mm GJ	
Percentage total weight loss	**N**	**Mean (SD)**	**N**	**Mean (SD)**
6 months	3846	24.64 (7.12)	1408	25.6 (7)
2 years	1966	31.7 (10.16)	679	32.2 (10)
3 years	1163	29.51 (12.35)	416	30.16 (11)
5 years	323	25.45 (14.49)	141	29.12 (9.8)
Stenosis	**N**	**Events (%)**	**N**	**Events (%)**
6 months	222	4 (1.8)	97	12 (12)
1 year	355	4 (1.13)	115	5 (4.4)
2 years	227	2 (0.88)	46	1 (2.2)
3 years	123	3 (2.44)	28	2 (7.1)
4 years	61	0	7	0
5 years	32	0	6	0
Erosion/ulceration	**N**	**Events (%)**	**N**	**Events (%)**
1 year	355	117 (32.96)	117	37 (32)
2 years	229	83 (36.24)	46	10 (22)
3 years	124	44 (35.48)	28	10 (36)
4 years	61	20 (32.79)	7	3 (43)
5 years	32	16 (50)	6	3 (50)

CONCLUSIONS

Main Findings
- Due to the very large sample size, a statistically significant difference in total weight loss was detected favouring the 45mm GJ group, but without clinical significance. This was also true when adjusted for baseline BMI, waist circumference, age, gender, and total limb length. Both the 30mm and 45mm linear stapled GJ provide excellent sustained weight loss.
- Stenosis rates at 1 year for 30mm and 45mm GJ group were 1.13% and 4.35% respectively.

Limitations
- Retrospective review of prospectively entered data without review of individual charts
- Possible confounding bias for weight loss if patients are on medications that result in weight gain or loss or have other intervening lifestyle changes that affect weight.
- Information bias by which outcome measures may be missing such as if patients have been lost to follow up.

FUTURE DIRECTIONS

- Longer term (3-5 year) trends from this study favour weight loss in the 45mm group, which could be tested in prospective randomized controlled trials
- The Ontario Bariatric Network is moving towards synoptic reporting, which would allow for prospective comparisons between linear GJ groups.

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