

Background

- Laparoscopic sleeve gastrectomy (LSG) is a safe procedure
- Specific technical factors such as smaller bougie size may lead to greater weight loss
- However, there is a risk of sleeve stenosis after LSG
- Early stenosis may occur due to edema, ischemia or technical factors

Objectives

- The objective of this study was to determine the rates and technical factors associated with 30-day stenosis after LSG

Methods

- The Metabolic and Bariatric Surgery Accreditation and Quality Improvement Program (MBSAQIP) database collects data from 854 bariatric surgery centers in the United States and Canada
- Data was extracted from all available years of the database (2015-2018)
- Primary LSG was included and patients undergoing revisional bariatric surgery were excluded
- Multivariable logistic regression analysis was performed to determine technical factors associated with sleeve stenosis
- Included bougie size, stapling distance from the pylorus, oversewing of the staple line and staple line reinforcement

Results

Table 1. Patient characteristics				
		No Stenosis n = 389,449	Stenosis n = 345	p-value
Age, years				
mean ± sd		44.3 ± 12.0	44.2 ± 12.0	0.217
% female		79.4	86.6	0.003
Race				
White		202,512 (72.2)	126 (48.1)	< 0.001
Black or African American		53,112 (18.9)	112 (42.8)	
Other		24,959 (8.9)	24 (9.2)	
BMI				
mean ± sd		45.1 ± 7.8	44.8 ± 8.2	0.671
Functional Status				
Independent		385,655 (99.0)	339 (98.26)	0.297
Partially dependent		2,297 (0.6)	3 (0.87)	
Fully dependent		1,542 (0.4)	3 (0.87)	
ASA class				
1-2		95,494 (24.7)	92 (26.7)	0.688
3		279,101 (72.1)	242 (70.1)	
4-5		12,649 (3.3)	11 (3.2)	
Smoking		33,322 (8.6)	22 (6.4)	0.148
Diabetes				
None or diet controlled		299,618 (76.9)	272 (78.8)	0.408
Non-insulin dependent		64,250 (16.5)	48 (13.9)	
Insulin dependent		25,626 (6.6)	25 (7.3)	
Hypertension		180,338 (46.3)	159 (46.1)	0.937
GERD		107,538 (27.6)	116 (33.6)	0.013
COPD		6,107 (1.6)	11 (3.2)	0.015
Hyperlipidemia		85,444 (21.9)	70 (20.3)	0.460
Chronic steroid		6,824 (1.8)	7 (2.0)	0.695
Renal insufficiency		2,443 (0.6)	2 (0.6)	0.911
Dialysis dependent		1,364 (0.4)	4 (1.2)	0.011
History of VTE		8,530 (2.2)	12 (3.5)	0.102
Preoperative therapeutic anticoagulant use		10,183 (2.6)	11 (3.2)	0.504
Venous stasis		3,671 (0.9)	3 (0.9)	0.889
Oxygen-dependent		2,407 (0.6)	5 (1.5)	0.049
Sleep apnea		141,435 (36.3)	110 (31.9)	0.087
History of MI		4,571 (1.2)	5 (1.5)	0.635
Previous major cardiac surgery		4,183 (1.1)	4 (1.2)	0.878
Previous PCI		7,136 (1.8)	6 (1.7)	0.898
ASA, American Society of Anesthesiologists; BMI, body mass index; COPD, chronic obstructive pulmonary disease; VTE, venous thromboembolism; GERD, gastroesophageal reflux disease; MI, myocardial infarction; PCI, percutaneous coronary intervention.				

Table 2. Technical factors				
		No Stenosis	Stenosis	p-value
Operative time, minutes				
mean ± sd		72.2 ± 35.9	82.1 ± 39.7	< 0.001
Bougie size				
< 36		94,559 (99.9)	107 (0.1)	0.132
36 - 40		165,694 (99.9)	132(0.1)	
40 - 50		127,553 (99.9)	104 (0.1)	
> 50		1,688 (99.9)	2 (0.1)	
Distance to pylorus				0.003
< 3 cm		10,781 (99.80)	22 (0.20)	0.003
3 – 4 cm		32,980 (99.88)	40 (0.12)	
4 – 5 cm		93,740 (99.91)	89 (0.09)	
5 – 6 cm		144,609 (99.93)	100 (0.07)	
> 6 cm		107,384 (99.91)	94 (0.09)	
Over sewed staple line		83,784 (99.90)	81 (0.10)	0.993
Staple line reinforcement		258,222 (99.91)	224 (0.09)	0.649

Table 3. Significant technical risk factors for sleeve stenosis on multivariable logistic regression			
Risk Factor	Adjusted Odds Ratio*	95% confidence interval	p-value
Bougie size	0.97	0.93-1.01	0.132
Pylorus distance	0.86	0.78-0.95	0.003
Oversewing the staple line	0.99	0.77-1.29	0.99
Staple line reinforcement	0.95	0.76-1.19	0.65
Longer operative time (> 60 min)	1.32	1.17-1.48	<0.001
*Adjusted for sex, race, body mass index, preoperative functional status, American Society of Anesthesiologists Physical Status classification, chronic obstructive pulmonary disease, history of venous thromboembolism, preoperative therapeutic anticoagulation use, venous stasis, sleep apnea, previous major cardiac surgery, and previous percutaneous coronary intervention.			

Conclusions

- 345 (0.09%) patients developed early, 30-day sleeve stenosis
- Longer operative time was associated with early stenosis (p < 0.001)
- Shorter pylorus distance was also associated with early stenosis (p=0.003)
- For every 1 cm increase in pylorus distance, the odds of stenosis decreased by 13.6%
- The unadjusted rates of stenosis with a pylorus distance < 3 cm were significantly higher than ≥ 3 cm (0.20% vs 0.09%, p<0.001).
- Bougie size, oversewing and staple line reinforcement did not increase the rate of sleeve stenosis