Surgery 163 (2018) 571–577

Contents lists available at ScienceDirect

Surgery

journal homepage: www.elsevier.com/locate/ymsy

What matters after sleeve gastrectomy: patient characteristics or surgical technique?

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ARTICLE INFO

Article history:
Accepted 12 September 2017

ABSTRACT

Background. The impact of operative technique on outcomes in laparoscopic sleeve gastrectomy has been explored previously; however, the relative importance of patient characteristics remains unknown. Our aim was to characterize national variability in operative technique for laparoscopic sleeve gastrectomy and determine whether patient-specific factors are more critical to predicting outcomes.

Methods. We queried the database of the Metabolic and Bariatric Surgery Accreditation and Quality Improvement Program for laparoscopic sleeve gastrostomies performed in 2015 ($n = 88{,}845$). Logistic regression models were used to determine predictors of postoperative outcomes.

Results. In 2015, >460 variations of laparoscopic sleeve gastrectomy were performed based on combinations of bougie size, distance from the pylorus, use of staple line reinforcement, and oversewing of the staple line. Despite such substantial variability, technique variants were not predictive of outcomes, including perioperative morbidity, leak, or bleeding (all $P \geq .05$). Instead, preoperative patient characteristics were found to be more predictive of these outcomes after laparoscopic sleeve gastrectomy. Only history of gastroesophageal disease (odds ratio 1.44, 95% confidence interval 1.08–1.91, $P < .01$) was associated with leak.

Conclusion. Considerable variability exists in technique among surgeons nationally, but patient characteristics are more predictive of adverse outcomes after laparoscopic sleeve gastrectomy. Bundled payments and reimbursement policies should account for patient-specific factors in addition to current accreditation and volume thresholds when deciding risk-adjustment strategies.

The prevalence of obesity has increased markedly during the past two decades, affecting an estimated 37% of adults in the United States.[1] Concurrently, laparoscopic sleeve gastrectomy (LSG) has evolved to become the most commonly performed bariatric procedure, accounting for 54% of weight-loss operations in 2015.[2] While numerous studies have demonstrated the safety and efficacy of LSG, controversy still remains regarding the optimal operative technique.[3-5] Differences in bougie size, distance from pylorus while stapling, utilization of staple line reinforcement, and oversewing of the staple line have all been proposed as factors contributing to differences in outcomes.[6-8] Variability in any of these components of operative technique may also contribute to the variability reported regarding anatomy, size, and compliance of the sleeve pouch in patients undergoing LSG.[9,10]

Additionally, while previous studies have emphasized the correlation between operative technique and postoperative complications, little is known regarding the relative importance of patient characteristics on outcomes after LSG. Due to the relatively low rates of overall morbidity, leak, and bleeding, reports evaluating the impact of these patient factors are scarce.[11,12] With growing emphasis on value-based payments and bundled reimbursement plans, establishing appropriate patient-specific, risk-adjustment strategies is of importance for surgeons, centers, and policymakers alike.[13] Thus, the goal of the present study was to characterize variability in operative technique at the national level and to determine whether patient characteristics or components of operative technique are more critical to predicting outcomes and complications after LSG.

Methods

Data source

A retrospective, cohort study was performed utilizing the 2015 Metabolic and Bariatric Surgery Accreditation and Quality

All funding was received internally from the University of Cincinnati College of Medicine. No outside organizations or companies contributed additional funding.

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https://doi.org/10.1016/j.surg.2017.09.052
0039-6060/

Improvement Program (MBSAQIP) data registry participant user file (PUF). The MBSAQIP is a joint program between the American College of Surgeons and American Society for Metabolic and Bariatric Surgery that accredits bariatric surgery centers in the United States and Canada that have undergone independent, rigorous peer evaluation, and meet nationally recognized standards. The MBSAQIP data registry collects prospective clinical data regarding preoperative, intraoperative, and postoperative characteristics specific to bariatric surgery that are obtained by certified metabolic and bariatric surgical clinical reviewers and are audited regularly for accuracy. Data in the MBSAQIP registry is obtained from >790 accredited centers and represents >90% of bariatric procedures performed in the United States annually. All information collected in the dataset was coded such that investigators did not have access to any patient-, surgeon-, or center-identifying information and was therefore exempt from review by the institutional review board. MBSAQIP and centers participating in the data registry did not verify and were not responsible for the statistical validity of the analyses or conclusions derived by the authors.

Study cohort, variables defined, and measures of outcome

All patients who underwent LSG from January 1, 2015 to December 31, 2015 were identified ($n = 98{,}292$). Those <18 years old or without complete data were excluded from analysis ($n = 9{,}447$). The following patient characteristics were collected: age (years), sex, race (white, black, Asian, or other), body mass index (BMI), American Society of Anesthesiologists classification, functional status (independent, dependent, or severely ill), and relevant components of medical history (smoking, diabetes, hypertension, gastroesophageal disease [GERD], chronic obstructive pulmonary disease, hyperlipidemia, chronic steroid use, renal insufficiency, hemodialysis, deep venous thrombosis [DVT] or pulmonary embolism [PE], venous stasis, oxygen dependence, sleep apnea, preoperative serum albumin level, and history of previous obesity or foregut surgery). Additionally, data regarding the following components of operative technique were obtained: bougie size (BS), distance from pylorus, staple line reinforcement (SLR), and oversewing of the staple line (OSL). Only patients with data available for all technique factors were included in the analysis. Finally, data regarding postoperative outcome measures were collected. Overall morbidity, leak, bleed, readmission, reoperation, or need for additional intervention were the primary outcome variables evaluated. Overall morbidity was defined as a composite of any 30-day morbidity (acute renal failure, cardiovascular event, cerebrovascular accident, surgical site infection, prolonged ventilator requirements, pneumonia, pulmonary embolism, sepsis or septic shock, unplanned intubation, urinary tract infection, venous thrombosis, unplanned ICU admission, or perioperative death), 30-day bariatric-related readmission, 30-day bariatric related reoperation, or 30-day bariatric-related additional intervention. Similarly, leak and bleed were defined as any 30-day leak or bleed related readmission, 30-day leak or bleed related reoperation, and 30-day leak or bleed related additional intervention. Bleeding events also included any requirement for transfusions within the first 72 hours of LSG.

Statistical analysis

Descriptive statistics were reported. Continuous variables were described as estimates of central tendency (median) and interquartile ratio (IQR). Categorical variables were described as percentages (%). Categorical variables were analyzed using Pearson χ^2 statistic or Fisher exact test, while continuous variables were compared through Student's t test or Wilcoxon rank-sum test. Multivariate analysis was used to identify predictors of morbidity, leak, bleed, readmission, reoperation, and need for additional intervention through logistic regression techniques. Covariates including components of operative technique as well as patient factors found to be associated with outcomes on univariate comparison were included in this analysis. Statistical analyses were performed via statistical programs SAS 9.4 and JMP Pro 11 (SAS Institute, Cary, NC).

Results

Patient characteristics and perioperative measures

Of the 138,093 patients available in the 2015 MBSAQIP participant user file, 98,292 patients underwent LSG and 88,845 met inclusion criteria. Patient characteristics of the entire study cohort (Table 1). A majority of patients were female (79.0%), between the ages 40 and 49 (29.2%), white (73.5%), functionally independent (99.1%), and with a preoperative BMI between 40 and 49 (50.7%). The overall median operative time was 70 minutes (interquartile ratio [IQR] 52–95 min) and median duration of stay was 2 days (IQR 1–2 days). For all patients undergoing LSG in 2015 with available data, overall composite morbidity was found to be 4.5%, and perioperative mortality rate, including patients who suffered mortality within 30 days of the LSG, was found to be 0.08%. Rates of

Table 1
Characteristics of patients undergoing laparoscopic sleeve gastrectomy in 2015.

Characteristic	*N*/median	(%/IQR)
Total patients	88,845	(100%)
Age (y)		
18–29	9,752	(11.0%)
30–39	22,319	(25.2%)
40–49	25,910	(29.2%)
50–59	20,208	(22.7%)
≥60	10,547	(11.9%)
Sex		
Male	18,660	(21.0%)
Female	70,185	(79.0%)
Race		
White	65,271	(73.5%)
Black	15,917	(17.9%)
Asian	417	(0.5%)
Other	7,240	(8.1%)
BMI		
	3,643	(4.1%)
35–39	20,790	(23.4%)
40–49	45,044	(50.7%)
50–59	14,837	(16.7%)
60–69	3,287	(3.7%)
≥70	1,244	(1.4%)
Functional status		
Independent	88,032	(99.1%)
Partially dependent	539	(0.6%)
Fully dependent	274	(0.3%)
ASA class		
1–2	23,899	(26.9%)
3	61.836	(69.6%)
4–5	3,110	(3.5%)
Medical history		
Smoking	7,820	(8.8%)
Diabetes	20,329	(22.9%)
Hypertension	42,320	(47.6%)
Gastroesophageal reflux disease	25,779	(29.0%)
Chronic obstructive pulmonary disease	1,484	(1.7%)
Hyperlipidemia	20,517	(23.1%)
Chronic steroids	1,456	(1.6%)
Renal insufficiency	568	(0.6%)
Hemodialysis	261	(0.3%)
Deep venous thrombosis	974	(1.1%)
Pulmonary embolism	974	(1.1%)
Venous stasis	815	(0.9%)
Oxygen dependent	547	(0.6%)
Sleep apnea	30,857	(34.7%)
Previous obesity or foregut surgery	5,530	(6.2%)

Table 2
Perioperative complication rates according to variations in operative technique.

	No. of patients	Overall Morbidity	*P* value	Leak	*P* value	Bleed	*P* value
Total cohort	88,845	3,999 (4.5)		257 (0.3)		620 (0.7)	
Staple line variants			.11		.60		.22
Neither	20,228 (22.7)	917 (4.5)		51 (0.3)		178 (0.9)	
OSL	9,228 (10.4)	457 (5.0)		24 (0.3)		69 (0.7)	
SLR	48,149 (54.2)	2,146 (4.5)		147 (0.3)		307 (0.6)	
Both	11,240 (12.7)	479 (4.3)		35 (0.3)		66 (0.6)	
Bougie size			.07		.67		.39
<38	51,391 (57.8)	2,257 (4.4)		152 (0.3)		360 (0.7)	
≥38	37,454 (42.2)	1,742 (4.7)		105 (0.3)		260 (0.7)	
Pylorus distance			.31		.48		.70
<4	11,111 (12.5)	500 (4.5)		32 (0.3)		88 (0.8)	
4–5	21,866 (24.6)	986 (4.5)		58 (0.3)		153 (0.7)	
5–6	32,279 (36.3)	1,406 (4.4)		88 (0.3)		222 (0.7)	
≥6	23,589 (26.6)	1,107 (4.7)		79 (0.3)		157 (0.7)	

OSL, oversewing staple line; *SLR*, staple line reinforcement.

postoperative leak and bleeding after LSG were found to be 0.3% and 0.7%, respectively. Finally, the overall 30-day readmission, reoperation, and additional intervention rates were 3.4%, 0.9%, and 1.1%, respectively.

National variability in operative technique

More than 460 unique variations of LSG were performed in 2015 based on combinations of BS, DP, OSL, and SLR (Fig). The most commonly performed variation in technique, representing 7.8% of all cases ($n = 6{,}892$), involved use of a 40 French size bougie, creation of the staple line 5 cm from the pylorus, not oversewing the staple line, and incorporating staple line reinforcement. While only 9 technical variations were performed >2,000 times, >100 technical variations were performed in at least 100 cases. When comparing outcomes between individual operative techniques, no significant differences were found with regard to rates of overall morbidity, leak, or bleed based on BS, DP, OSL, or SLR (Table 2). Similarly, no differences were noted with regard to 30-day readmission, reoperation, or additional intervention rates (Table 3).

Predictors of postoperative outcomes

After univariate analysis shown in Table 4, multivariate analyses were performed using covariates to identify predictors of overall composite morbidity, leak, bleeding, readmission, reoperation, and need for additional intervention after LSGs performed in 2015. Only preoperative patient characteristics, including history of hypertension, diabetes, GERD, DVT, PE, chronic steroid use, and preoperative albumin level, were found to be predictive of these outcomes (Table 5). History of GERD (odds ratio [OR] 1.44, 95% confidence interval [CI], 1.08–1.91, $P < .01$) remained the only patient factor independently associated with postoperative leak, while history of diabetes (OR 2.34, 95% CI, 1.56–3.51, $P < .01$) and history of PE (OR 5.32, 95% CI, 3.00–9.42, $P < .01$) were found to be associated with bleeding. Differences in components of operative technique, including BS, DP, OSL, and SLR, were not predictive of adverse outcomes. Increasing preoperative serum albumin level was found to be protective for several outcomes. For every 1-unit increase in albumin, the odds of overall composite morbidity decreased by 31% (OR 0.69, 95% CI, 0.53–0.91, $P < .01$), odds of readmission decreased by 15% (OR 0.85, 95% CI, 0.76–0.95, $P < .01$), and odds of requiring an additional intervention decreased by 19% (OR 0.81, 95% CI, 0.67–0.98, $P = .03$).

Discussion

In this large retrospective study, we have demonstrated that considerable variability exists with regard to operative technique for LSG performed across the nation; however, differences in BS, DP, OSL, and SLR were not predictive of outcomes. Instead, preoperative patient factors, including history of hypertension, diabetes, GERD, DVT, PE, and chronic steroid use, were more commonly associated with unfavorable postoperative outcomes on multivariate analyses. These findings are comparable to those reported by Spivak et al, who demonstrated recently that type 2 diabetes was an independent predictive risk factor for bleeding after LSG, while operative technique was not predictive.[11]

Table 3
30-day readmission, reoperation, and additional intervention rates according to variations in operative technique.

	No. of patients	Readmission	*P* value	Reoperation	*P* value	Additional Intervention	*P* value
Total cohort	88,845	3,035 (3.4)		814 (0.9)		1,005 (1.1)	
Staple line variants			.33		.81		.45
Neither	20,228 (22.7)	668 (3.3)		194 (1.0)		209 (1.0)	
OSL	9,228 (10.4)	342 (3.7)		89 (1.0)		102 (1.1)	
SLR	48,149 (54.2)	1,651 (3.4)		430 (0.9)		566 (1.2)	
Both	11,240 (12.7)	374 (3.3)		101 (0.9)		128 (1.1)	
Bougie size			.07		.50		.27
<38	51,391 (57.8)	1,707 (3.3)		461 (0.9)		564 (1.1)	
≥38	37,454 (42.2)	1,328 (3.5)		353 (0.9)		441 (1.2)	
Pylorus distance			.30		.75		.05
<4	11,111 (12.5)	375 (3.4)		100 (0.9)		140 (1.3)	
4–5	21,866 (24.6)	741 (3.4)		200 (0.9)		258 (1.2)	
5–6	32,279 (36.3)	1,069 (3.3)		285 (0.9)		322 (1.0)	
≥6	23,589 (26.6)	850 (3.6)		229 (1.0)		285 (1.2)	

OSL, oversewing staple line; *SLR*, staple line reinforcement.

Table 4
Perioperative complication rates according to patient characteristics.

Characteristic	Morbidity (%)	*P* value	Leak (%)	*P* value	Bleed (%)	*P* value
Sex		.50		.36		.02
Male	4.5		0.3		0.8	
Female	4.6		0.3		0.7	
Age, y		<.01		.48		<.01
18–29	4.1		0.3		0.3	
30–39	4.2		0.3		0.5	
40–49	4.3		0.3		0.7	
50–59	4.5		0.3		0.8	
>60	6.0		0.3		1.3	
Race		<.01		.11		.27
White	4.3		0.3		0.7	
Black	5.9		0.2		0.7	
Asian	5.0		0.2		1.0	
Other	3.5		0.2		0.5	
BMI class		<.01		.12		.07
<35	4.2		0.4		0.8	
35–39	4.3		0.3		0.8	
40–49	4.1		0.3		0.7	
50–59	5.2		0.3		0.8	
60–69	6.2		0.5		0.4	
>70	7.5		0.3		0.6	
Functional status		<.01		.20		.18
Independent	4.5		0.3		0.7	
Partially dependent	8.5		0.6		1.3	
Fully dependent	8.0		0.7		1.1	
ASA class		<.01		.81		<.01
1–2	3.7		0.3		0.5	
3	4.6		0.3		0.7	
4–5	8.4		0.3		1.8	
Smoking status		.01		<.01		.53
No	4.4		0.3		0.7	
Yes	5.2		0.5		0.8	
Diabetes		<.01		.10		<.01
No	4.1		0.3		0.6	
Yes	5.8		0.3		1.0	
Hypertension		<.01		.15		<.01
No	3.8		0.3		0.5	
Yes	5.3		0.3		0.9	
GERD		<.01		.03		<.01
No	4.2		0.3		0.6	
Yes	5.4		0.3		0.9	
COPD		<.01		.73		<.01
No	4.4		0.3		0.7	
Yes	9.4		0.3		1.8	
Hyperlipidemia		<.01		.59		<.01
No	4.2		0.3		0.6	
Yes	5.5		0.3		1.1	
Chronic steroids		<.01		.92		<.01
No	4.5		0.3		0.7	
Yes	7.7		0.3		1.3	
Renal insufficiency		<.01		.78		<.01
No	4.5		0.3		0.7	
Yes	13.2		0.4		2.6	
Dialysis		<.01		.78		.02
No	4.5		0.3		0.7	
Yes	14.6		0.4		1.9	
History of DVT		<.01		.95		<.01
No	4.4		0.3		0.7	
Yes	10.8		0.3		1.5	
History of PE		<.01		.62		<.01
No	4.4		0.3		0.7	
Yes	10.5		0.2		2.1	
Venous stasis		<.01		.37		.33
No	4.5		0.3		0.7	
Yes	6.4		0.1		1.0	
Oxygen dependent		<.01		.64		<.01
No	4.5		0.3		0.7	
Yes	11.3		0.2		2.0	
Sleep apnea		<.01		.86		<.01
No	4.1		0.3		0.6	
Yes	5.2		0.3		0.9	
Previous obesity surgery		<.01		<.01		.06
No	4.4		0.3		0.7	
Yes	5.7		0.6		0.9	

COPD, chronic obstructive pulmonary disease; *DVT*, deep venous thrombosis; *GERD*, gastroesophageal reflux disease; *PE*, pulmonary embolism.

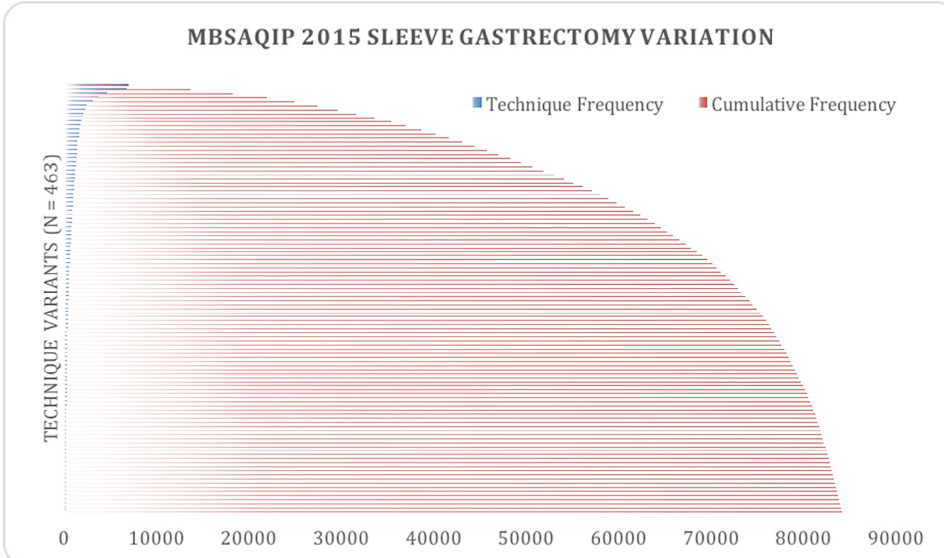

Fig. Variation in technique for laparoscopic sleeve gastrectomy in 2015 based on unique combinations of BS, DP, OSL, and SLR. Nine technique variants were performed in at least 2,000 cases, 106 technique variants were performed in at least 100 cases, and 17 technique variants make up half of the 88,845 cases performed in 2015.

The likely explanation for such findings is that as LSG has grown in popularity, the skill of bariatric surgeons performing this procedure has improved substantially over time despite differences in technique. In their analysis utilizing MBSAQIP data from 2012 to 2014, Berger et al reported an overall leak rate of 0.9% and bleed rate of 0.8% for 189,477 LSG procedures performed nationally.[6] In the present study utilizing MBSAQIP data from 2015, we found leak and bleeding rates to be decreased even further to 0.3% and 0.7%, respectively. In their review of 11,800 LSGs from 2005 to 2013, Stroh et al found a decrease in leak rate from 6.5% to 1.4%.[14] Varban et al similarly demonstrated a decrease in leak rates after LSG at the state-level from 1.18% to 0.36% during a 5-year period, despite substantial variation in operative technique.[4] It is important to note, however, that current measures of variability in operative technique may be inadequate. Factors such as optimizing distance from the gastroesophageal junction, avoiding narrowing at the incisura angularis, preventing kinks or twists in the sleeve pouch, and minimizing retention of fundus are additional aspects of technique that surgeons may have improved on despite using the same combinations of BS, DP, OSL, and SLR. Thus, while technical factors available for analysis in the present study did not correlate with outcomes, our findings do not demonstrate definitively that operative technique overall does not play a role in determining outcomes after LSG. Future studies would benefit from capturing data related to the additional components of technique noted above.

Understanding the factors that drive outcomes after LSG is important to optimizing resource allocation and decreasing wasteful expenditures. Although present efforts to decrease postoperative complications and improve cost containment after LSG emphasize continuous refinement of technique, bariatric surgeons and centers also should be sure to implement strategies of quality improvement that optimize patients medically in the preoperative setting. As reimbursement policies evolve, it is becoming increasingly critical for policymakers implementing bundled payment plans

Table 5
Multivariate analyses evaluating predictors of perioperative complications, reoperation, readmission, and need for additional intervention.*

Variable	Morbidity OR 95% CI	Leak OR 95% CI	Bleeding OR 95% CI	Reoperation OR 95% CI	Readmission OR 95% CI	Additional intervention OR 95% CI
Hypertension	1.34 (1.04–1.72)				1.18 (1.07–1.30)	
Diabetes	1.64 (1.19–2.27)		2.34 (1.56–3.51)	1.68 (1.30–2.17)	1.54 (1.33–1.78)	1.58 (1.24–2.00)
DVT	3.90 (2.58–5.89)			2.60 (1.76–3.83)	1.98 (1.53–2.55)	1.73 (1.13–2.65)
PE			5.32 (3.00–9.42)		1.63 (1.21–2.21)	2.35 (1.50–3.67)
GERD		1.44 (1.08–1.91)		1.23 (1.04–1.45)	1.27 (1.16–1.39)	1.27 (1.09–1.48)
Chronic steroids					1.65 (1.28–2.13)	
Albumin	0.69 (0.53–0.91)				0.85 (0.76–0.95)	0.81 (0.67–0.98)

DVT, deep venous thrombosis; *GERD*, gastroesophageal reflux disease; *PE*, pulmonary embolism.
* Variations in operative technique including bougie size, distance from pylorus, oversewing of staple line, and staple line reinforcement were not significantly associated with morbidity, leak, bleeding, reoperation, readmission, or need for additional intervention after LSG on multivariate logistic regression models. Covariates including age, race, BMI, functional status, ASA class, smoking status, COPD, hyperlipidemia, renal insufficiency, dialysis, venous stasis, oxygen dependence, sleep apnea, and previous obesity surgery also were evaluated, but not found to be significant on multivariate analysis.

to consider adequate patient, risk-adjustment strategies that account for relevant patient or disease factors.[13] Furthermore, with outcomes improving over time despite variability in technique, strategies for refining LSG should focus on minimizing processes that increase operative time, the costs of medical devices, and postoperative recovery duration.[15-17]

The present study has several important limitations. First, it is a retrospective review utilizing a large clinical database that may be subject to associated biases. Data obtained by metabolic and bariatric surgical clinical reviewers are retrieved from operative reports that may differ in some respects from actual surgeon practices. Second, evaluation of operative techniques and associated outcomes were based on patient-level information. Data regarding practice patterns of the surgeons, operative skill, and operative volume were unavailable. As a result, it is unknown whether the variability in operative techniques evaluated were confounded by surgeon-specific factors or selection bias. Different surgeons with different levels of skill or operative volumes may achieve different results despite utilizing the same operative technique. Additionally, more granular details regarding the specific techniques of oversewing and staple line reinforcement were not available. Distance of the staple line from the incisura angularis, distance from the gastroesophageal junction, and redundancy of the fundus are additional technical considerations that may contribute to variation in technique, but were unknown. Third, long-term outcomes in weight loss beyond 1 year were unavailable for evaluation. Finally, correlations as opposed to direct causations were evaluated with regard to predicting overall morbidity, leak, and bleeding complications.

Our work presented here has attempted to understand the variability in operative technique for LSGs performed nationally and the associated impact on outcomes. While previous studies have focused on the effect of process measures, including BS, DP, OSL, and SLR, the impact of preoperative patient factors is often overlooked. Findings from the present study suggest that rates of leak and bleed after LSG have improved over time regardless of variations in technique. Committing resources to optimizing patients' medical comorbidities, such as diabetes and GERD, may instead portend more favorable outcomes.

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Discussion

Dr Peter Hallowell (Charlottesville, Virginia): As many of you know, bariatric surgery is proving to be highly effective in treating those most afflicted with the disease of obesity.

In the early 2000s, bariatric surgery underwent a crisis of quality characterized by anecdotally high procedural complication rates, as well as mortality. The bariatric surgery community mobilized and launched several quality initiatives, including centers of excellence and quality databases that have evolved into the current MBSAQIP [Metabolic and Bariatric Surgery Accreditation and Quality Improvement Program] accreditation and database that this study utilized. As we enter an age of quality reporting and potentially value-based purchasing, bariatric surgeons have been the leaders in improving their operations and care to a point where we are rarely talking about mortality as a quality indicator. Mortality is so rare with rates 1 to 3 in a 1000. This is even more impressive, because we're talking about a patient population that many other surgeons and surgical subspecialties try to avoid because these patients are the highest quintile of risk. I have a few questions for the authors.

You found over 460 unique variations of laparoscopic sleeve gastrectomy that were performed in 2015. Based on the parameters that were recorded in the database, you found that there were no significant differences in regard to how the operation was performed. Were there any trends for which combinations were better or worse?

Number two, Dr Hutter's group recently published data from the same database, although prior years, that showed an increased risk of staple line leak when staple line reinforcement was used. Your data does not seem to show an increased risk. Can you comment on this finding?

Lastly, the overall finding of this paper, that patient factors drive outcome following laparoscopic sleeve gastrectomy, as opposed to operative technical details, is unique. What would your group recommend to optimize your patients prior to sleeve gastrectomy?

Dr Vikrom K. Dhar: With regard to your first question as to whether we saw any trends for better or worse outcomes when we looked at the different variations, we found that the variance in the highest quartile for leak or bleed were not necessarily in that same quartile for readmission rates or reoperation rates. When we looked at our own cases at University of Cincinnati, we found that we were in the top quartile for leak and bleed, but we were in the bottom quartile for readmission and need for additional intervention. So, we didn't really see any correlation or trend that we could identify.

For your second question, you had mentioned Dr Hutter's group and their paper where they had looked at the same database from 2012 to 2014 and had found a leak rate of 0.9% and had found an association, as you mentioned, for staple line reinforcement. I think the reason that we don't see that same difference is the overall incidence of leak in 2015 was threefold lower. It was 0.3%, and because we didn't have that same incidence, we didn't see that difference with regard to staple line reinforcement.

For your final question, in terms of optimizing our patients preoperatively, I think it's just being aware of the factors that we mentioned. For example, if you have a patient who has a history of DVT [deep vein thrombosis] or PE [pulmonary embolism] and they're getting anticoagulated, make sure you're managing their perioperative anticoagulation appropriately. These patients, even though they're obese, can be malnourished. So, if you're checking their albumin or pre–albumin, make sure that they're nutritionally optimized before they undergo surgery.

Dr James Madura (Phoenix, Arizona): I'm somewhat embarrassed to tell you that I'm old enough that this is the third cycle in trying to figure out which bariatric operation we should be doing. The first was vertical banded gastroplasty [VBG] versus gastric bypass from the 1991 consensus conference statement. It is not as drastic to do a VBG, so people did VBGs. Of course, that went away with lap band. It's reversible, adjustable, not as radical. It doesn't involve stapling the intestines. Patients would come in and tell me that's why they wanted a band.

And now I hear the exact same thing from the patients when they come in and say they want a sleeve. They don't want a bypass because it's not as drastic, it's not as radical, it doesn't involve stapling the intestine. So, I guess my question for you is, how do we really choose the best operation? Is this a patient choosing the operation? Is this the surgeon choosing the operation? I had an epiphany when, you know, a patient told me it's not as drastic, it's not as radical. What does that mean to you as a surgeon? It means mortality, morbidity, leaks, bleeding. What does it mean to a patient? They can eat better. So I think, you know, the patient doesn't want a radical effect on their diet and their food intake. I just read a paper yesterday in the latest edition of The Surgery for Obesity Related Disorders suggesting 50% of the patients are not meeting 50% excess weight loss goals. So, in your opinion, what do you think is driving this change in operation? Is it patients that don't want a radical operation, or is it surgeons wanting to do an easier operation?

Dr Vikrom K. Dhar: I think it's a combination of both. As you mention, I think primarily as surgeons we're the ones that are looking to create quality initiatives like MBSAQIP, trying to create centers of excellence and looking at our outcomes. As you mentioned, there are a few studies now coming out that are showing the more long-term outcomes after sleeve gastrectomy, whereas primarily we have been looking at one- to three- to five-year outcomes. So I think what's going to drive the direction we go is our own evaluation and review of our outcomes and seeing how we're doing. Of course, patients play a significant factor in the decision.

Dr Shimul Shah (Cincinnati, Ohio): A big downfall of these databases is that you don't have long-term outcomes. The MSAQIP database includes only perioperative data, so how do we assess what the national weight loss results are? We need to combine single center reports or figure out how to do that, because these national databases aren't going to have longitudinal data for us to assess what's the difference between the sleeve and the gastric bypass.

I have many friends that have done sleeve gastrectomy weekend courses so that they can do the operation. So I think it's driven by the surgeon, personally, because it's an easier operation. I think that's what you're implying. I would tend to agree with you. If you can do a weekend course and then start doing six or seven a day, it seems pretty reasonable.

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