



Canadian Association  
of General Surgeons

**BRIEF SPECIALTY UPDATES FOR THE GENERAL SURGEON**  
**Clinical Practice Committee**

**Bariatric Surgery Literature Update: *Edition 1.***

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**To Sleeve or To Bypass?**

**BACKGROUND**

Variations of the roux-en-y gastric bypass (RYGB) have been performed since the late 1960s. It was performed laparoscopically beginning in the 1990s, and its uptake as a primary weight-loss surgery increased thereafter [1]. The sleeve gastrectomy (SG) is a relatively new procedure by comparison, originally developed as the first step of a two stage duodenal switch [2]. Today, the RYGB and SG account for the vast majority of the bariatric surgical procedures performed in North America and around the world [3]. As the wealth of literature available on surgical outcomes for the two procedures continues to increase, there is ongoing debate about which procedure is best when it comes to achieving long term weight-loss, maximizing metabolic benefits, and minimizing short and long term complications [1,4].

**CURRENT STATUS OF THE LITERATURE**

Three recent publications reflect the challenge in selecting a single procedure that provides the best outcomes and minimizes complications. The first is a long term PCORnet cohort study collecting data on weight loss from over 65,000 patients. The authors found a difference of about 7-8% greater total body weight loss sustained after 5-years post-operatively when comparing RYGB to SG. Furthermore, the study found that there was an approximately 1 in 8 chance that patients with SG would experience weight recidivism taking them to their pre-surgery weight compared to 1 in 30 in RYGB patients [5]. The 30-day adverse event rate is twice as high for RYGB as it was for SG at 5% and 2.6% respectively. To date, this is the largest long-term observational cohort available [5]. Second, the SLEEVEPASS RCT from Finland comparing postoperative weight loss and metabolic outcomes found no differences in these variables between SG and RYGB after five years of follow up [6]. The study found excess weight loss of 57% vs 49% between RYGB and SG respectively at 5 years, however this did not meet pre-specified equivalence criteria (as the weight loss CI was not within the predefined calculated margins of equivalence at -9 to 9). No statistical difference was found for secondary outcomes including, but not limited to, resolution of type 2 diabetes and dyslipidemia [6]. These results were closely echoed by the third study, SM-BOSS RCT from Switzerland, which also found no differences between SG and RYGB for weight-loss and metabolic outcomes including diabetes and hypertension at 5 years [7].

**UPDATE**

Based on the up to date relevant data there is no consensus on the single best bariatric procedure. Data from the largest studies favors RYGB for longterm (5 year) sustained weight loss with a lower chance of long-term weight recidivism compared to SG. This same data shows



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an increased rate of adverse events in the immediate postoperative period for RYGB which must be factored into procedure selection. There have been no clear differences demonstrated between SG and RYGB in the long-term resolution of comorbidities.

## **Common Bariatric Postoperative Complications: Internal Hernias**

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### **BACKGROUND**

There are several post-operative bariatric complications that prompt emergency room visits and inpatient admissions, and there is no commonly accepted management. Internal hernias (IH) are one such complication [8]. Initial workup includes a complete history and physical to determine the need for immediate management of patients presenting with acute obstruction with imminent bowel compromise and stratifying them from those able to have workup as an outpatient. Stable patients with symptoms concerning for IH include worsening central cyclical pain and post prandial difficulty. Such patients should be assessed with bloodwork and a CT of the abdomen (preferably bariatric protocol) reviewed with a radiologist experienced in assessing bariatric CT scans [8,9]. The bariatric protocol CT includes oral contrast (to assess passage past the GJ as well as JJ ruling out a leak and obstruction) and IV contrast to assess bowel viability and enhance abdominal vasculature [8-10]. There has been great variability in the reported utility of CT imaging to diagnose IH in the past [10].

### **CURRENT STATUS OF THE LITERATURE**

Recent improvements in imaging techniques have led to greater accuracy in IH imaging [10-11]. Swirl sign, signs of small bowel obstruction (distended bowel loops, remnant distension), clustered loops (mostly LUQ in Petersen herniation, lower quadrants in mesenteric herniation), mushroom sign (shape of mesenteric root with protrusion of bowel between SMA and its branches), presence of small bowel behind SMA, right sided location of J-J anastomosis, venous congestion and mesenteric edema, as well as presence of enlarged nodes have all been used with varying success [12-15]. Despite the subjective nature of reported characteristics, several recent studies have demonstrated good interobserver reliability as well as high moderate (60-75%) sensitivity for swirl sign, venous congestion and mesenteric edema [13-15]. SMV compression or cut-off has the highest reported individual sensitivity (80-85%) for IH [16]. Recent high volume retrospective studies examining the utility of abdominal CTs for IH in high volume centers report high NPV (>90%) and specificity (>80%) in these patients [12]. The potentially intermittent nature of IH can lead to negative imaging studies despite patients reporting ongoing obstructive symptoms [17].

### **UPDATE**

Patients with CT findings concerning for IH and those with equivocal imaging and symptoms concerning for IH should be taken for a diagnostic laparoscopy [8,18]. At the time of



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OR, both the mesenteric and Petersen's defects must be assessed and closed if open [18]. Stable patients with no evidence of IH on CT scan but persistent pain may be considered for a diagnostic laparoscopy or further testing to rule out other common conditions, such as biliary disease or marginal ulcers.

## **Sleeve Gastrectomy and Gastroesophageal Reflux Disease**

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### **BACKGROUND**

Laparoscopic sleeve gastrectomy (LSG) is increasingly performed as a primary bariatric procedure in both academic and community hospitals in Canada [19]. Given a high prevalence of gastroesophageal reflux disease (GERD) in patients with obesity [20], there is controversy about the role of LSG in patients with GERD. This update will discuss the current evidence on GERD after LSG and guidelines on preoperative evaluation for GERD prior to LSG.

### **CURRENT STATUS OF THE LITERATURE**

A recent systematic review that included 33 studies found a 20% pooled incidence of new-onset GERD symptoms after LSG [21]. There was also a reported incidence of new-onset esophagitis between 6.3 to 63.3%. However, when authors analyzed the use of anti-reflux medications, there were mixed results with some studies indicating an increased use and others showing decreased use. Objective testing with esophageal function tests also reported paradoxical results. Other studies found high rates of resolution of GERD symptoms after LSG ranging from 15.9 to 53% [22, 23]. However, the recently published SM-BOSS trial found that, in patients with pre-existing GERD, 34.1% of patients had remission or improvement, 34.1% had unchanged symptoms, and 31.8% were worse after LSG [24]. Although some patients may have improvement after LSG, almost one-third have worsened symptoms.

### **UPDATE**

Current guidelines from the American Society for Metabolic and Bariatric Surgery (ASMBS) state that due to the unpredictable effect of LSG on GERD, all patients should be carefully counseled on GERD-specific outcomes prior to undergoing LSG [25]. Furthermore, the American Gastroenterological Association recommends Roux-en-Y gastric bypass as the best operation for patients with obesity and GERD given its effectiveness as an anti-reflux procedure [26].

The ASMBS also has recommendations for preoperative work-up for LSG. Prior to LSG, patients with GERD symptoms should be evaluated with preoperative esophagoduodenoscopy to evaluate for the presence of hiatal hernias, esophagitis, ulcers and tumors. Furthermore, an upper gastrointestinal series may be performed to assess for the size of hiatal hernias for operative planning. Esophageal pH and manometry testing may also be done to assess the severity of GERD symptoms and to exclude esophageal motility disorders [27].



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READ MORE

<https://asmbs.org/resources/updated-position-statement-on-sleeve-gastroectomy-as-a-bariatric-procedure>

[https://asmbs.org/app/uploads/2017/08/Telem-et-al\\_LSG-Pathway\\_2016\\_Final.pdf](https://asmbs.org/app/uploads/2017/08/Telem-et-al_LSG-Pathway_2016_Final.pdf)



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REFERENCES

1. Buchwald H, Avidor Y, Braunwald E, et al. Bariatric surgery: a systematic review and meta-analysis. *JAMA*. 2004;292:1724–37.
2. Rope GO, Birkmeyer JD, Finlnyeson S. National trends in utilization and in hospital outcome of bariatric surgery. *J Gastrointest Surg*. 2002;6:855–86.
3. Sjostrom L, Narbro K, Sjostrom D, et al. Effect of bariatric surgery on mortality in Swedish obese subjects. *NEJM*. 2007;357:741–52.
4. Adams TD, Gress RE, Smith SC, et al. Long-term mortality after gastric bypass surgery. *N Engl J Med*. 2007;357(8):753–61. doi:10.1056/NEJMoa066603.
5. Arterburn D, Wellman R, Emiliano A, Smith SR, Odegaard AO, Murali S, et al. Comparative Effectiveness and Safety of Bariatric Procedures for Weight Loss: A PCORnet Cohort Study. *Ann Intern Med*. [Epub ahead of print 30 October 2018]169:741–750. doi: 10.7326/M17-2786
6. Salminen P, Helmiö M, Ovaska J, et al. Effect of Laparoscopic Sleeve Gastrectomy vs Laparoscopic Roux-en-Y Gastric Bypass on Weight Loss at 5 Years Among Patients With Morbid Obesity: The SLEEVEPASS Randomized Clinical Trial. *JAMA*. 2018;319(3):241–254. doi:10.1001/jama.2017.20313
7. Peterli R, Wölnerhanssen BK, Peters T, et al. Effect of laparoscopic sleeve gastrectomy vs laparoscopic Roux-en-Y gastric bypass on weight loss in patients with morbid obesity: the SM-BOSS randomized clinical trial. *JAMA*. 2018;319(3):255-265.
8. Comeau, E., Gagner, M., Inabnet, W.B., Herron, D.M., Quinn, T.M., and Pomp, A. Symptomatic internal hernias after laparoscopic bariatric surgery. *Surg Endosc*. 2005; 19: 34–39
9. Paroz A, Calmes JM, Giusti V, et al. Internal hernia after laparoscopic Roux-en-Y gastric bypass for morbid obesity: a continuous challenge in bariatric surgery. *Obes Surg*. 2006;16:1482–7.
10. Geubbels, N., Lijftogt, N., Fiocco, M., van Leersum, N.J., Wouters, MWJM, and de Brauw, L.M. Meta-analysis of internal herniation after gastric bypass surgery. *Br J Surg*. 2015; 102: 451–460
11. J. C. Ederveen, M. M. G. van Berckel, S. W. Nienhuijs, R. J. P. Weber and J. Nederend, Predictive value of abdominal CT in evaluating internal herniation after bariatric laparoscopic Roux-en-Y gastric bypass, *BJS*, 105, 12, (1623-1629), (2018).
12. Jeannette C. Ederveen, Marijn M. G. van Berckel, Saskia Jol, Simon W. Nienhuijs and Joost Nederend, Diagnosing internal herniation after laparoscopic Roux-en-Y gastric bypass: usefulness of systematically reviewing CT scans using ten signs, *European Radiology*, 10.1007/s00330-018-5332-3, 28, 9, (3583-3590), (2018).
13. Dilauro M, McInnes MDF, Schieda N et al (2017) Internal hernia after laparoscopic Roux-en-Y gastric bypass: optimal CT signs for diagnosis and clinical decision making. *Radiology* 282:752–760



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14. Goudsmedt F, Deylgat B, Coenegrachts K, van de Moortele K, Dillemans B (2015) Internal hernia after laparoscopic Roux-en-Y gastric bypass: a correlation between radiological and operative findings. *Obes Surg* 25:622–627
15. Iannuccilli JD, Grand D, Murphy BL, Evangelista P, Roye GD, Mayo-Smith W (2009) Sensitivity and specificity of eight CT signs in the preoperative diagnosis of internal mesenteric hernia following Roux-en-Y gastric bypass surgery. *Clin Radiol* 64:373–380
16. Maier J, Herrasti Gallego A, Floyd AK (2017) Compression of the superior mesenteric vein - a sign of acute internal herniation in patients with antecolic laparoscopic Roux-en-Y gastric bypass. *Eur Radiol* 27:1733–1739
17. Jorunn Sandvik, Torstein Hole, Christian A. Klöckner, Bård E. Kulseng and Arne Wibe, High-Frequency of Computer Tomography and Surgery for Abdominal Pain After Roux-en-Y Gastric Bypass, *Obesity Surgery*, 10.1007/s11695-018-3223-y, 28, 9, (2609-2616), (2018).
18. Erik Stenberg, Ingmar Näslund, Eva Szabo and Johan Ottosson, Impact of mesenteric defect closure technique on complications after gastric bypass, *Langenbeck's Archives of Surgery*, 10.1007/s00423-018-1684-z, 403, 4, (481-486), (2018).
19. Angrisani L, Santonicola & A, Iovino & P, Vitiello & A, Higa & K, Himpens & J, Buchwald & H, Scopinaro & N (2018) IFSO Worldwide Survey 2016: Primary, Endoluminal, and Revisional Procedures. doi: 10.1007/s11695-018-3450-2
20. El-serag H (2008) The Association Between Obesity and GERD : A Review of the Epidemiological Evidence. 2307–2312 . doi: 10.1007/s10620-008-0413-9
21. Oor JE, Roks DJ, Ünlü Ç, Hazebroek EJ (2016) Laparoscopic sleeve gastrectomy and gastroesophageal reflux disease: A systematic review and meta-analysis. *Am J Surg* 211:250–267 . doi: 10.1016/j.amjsurg.2015.05.031
22. DuPree CE, Blair K, Steele SR, Martin MJ (2014) Laparoscopic sleeve gastrectomy in patients with preexisting gastroesophageal reflux disease a national analysis. *JAMA Surg* 149:328–334 . doi: 10.1001/jamasurg.2013.4323
23. Rawlins L, Rawlins MP, Brown CC, Schumacher DL (2013) Sleeve gastrectomy: 5-year outcomes of a single institution. *Surg Obes Relat Dis* 9:21–25 . doi: 10.1016/j.soard.2012.08.014
24. Peterli R, Wölnerhanssen BK, Peters T, Vetter D, Kröll D, Borbély Y, Schultes B, Beglinger C, Drewe J, Schiesser M, Nett P, Bueter M (2018) Effect of Laparoscopic Sleeve Gastrectomy vs Laparoscopic Roux-en-Y Gastric Bypass on Weight Loss in Patients With Morbid Obesity. *Jama* 319:255 . doi: 10.1001/jama.2017.20897
25. Ali M, El Char M, Ghiassi S, Rogers AM (2017) American Society for Metabolic and Bariatric Surgery updated position statement on sleeve gastrectomy as a bariatric procedure. *Surg Obes Relat Dis* 13:1652–1657 . doi: 10.1016/j.soard.2017.08.007
26. Acosta A, Streett S, Kroh MD, Cheskin LJ, Saunders KH, Kurian M, Schofield M, Barlow SE, Aronne L (2017) White Paper AGA: POWER — Practice Guide on Obesity and Weight Management, Education, and



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Resources. Clin Gastroenterol Hepatol 15:631–649.e10 . doi: 10.1016/j.cgh.2016.10.023

27. Telem DA, Gould J, Pesta C, Powers K, Majid S, Greenberg JA, Teixeira A, Brounts L, Lin H, DeMaria E, Rosenthal R (2017) American Society for Metabolic and Bariatric Surgery: care pathway for laparoscopic sleeve gastrectomy. Surg Obes Relat Dis 13:742–749 . doi: 10.1016/j.soard.2017.01.027