



Concomitant Hiatal Hernia Repair Is more Common in Laparoscopic Sleeve Gastrectomy than During Laparoscopic Roux-en-Y Gastric Bypass: an Analysis of 130,772 Cases

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Abstract

Obesity is associated with the development of gastroesophageal reflux disease (GERD) and hiatal hernia (HH). This study aimed to assess practice patterns regarding concomitant HH repair (HHR) during laparoscopic sleeve gastrectomy (SG) and Roux-en-Y gastric bypass (RYGB). The incidence of concomitant HHR with LSG or LRYGB was analyzed using the 2015 Metabolic and Bariatric Surgery Accreditation and Quality Improvement Program database. One hundred thirty thousand, seven hundred seventy-two patients underwent RYGB (30.5%) and LSG (69.5%). Concomitant HHR was more common, despite less GERD, in SG patients compared to RYGB (21.0% vs 10.8%, $p < 0.0001$; adjusted OR 2.14, 95% CI 2.06–2.22). This marked difference in the intraoperative management of HH during bariatric surgeries may hinder our ability to evaluate the long-term effects of bariatric surgery on GERD.

Keywords Hiatal hernia · Bariatric surgery · Sleeve gastrectomy · Roux-en-Y gastric bypass · Obesity

Introduction

Obesity is an established risk factor for the development of gastroesophageal reflux disease (GERD). The prevalence of GERD is approximately 10–20% in Western

countries [1]. Multiple studies have established a strong association between increasing body mass index (BMI) and GERD [2]. However, the exact mechanism underlying the link between high BMI and GERD is unknown.

The impact of the presence of a hiatal hernia (HH) on the pathogenesis of GERD is well established. HH is a common occurrence in bariatric patients but there is no consensus on HH repair (HHR) during bariatric surgery. Thirty-five to 40% of patients who underwent bariatric surgery are diagnosed with a HH [3], mostly during surgery. The effect of a bariatric procedure type on postoperative GERD is not fully understood but published data point to the Roux-en-Y gastric bypass (RYGB) having an advantage in terms of GERD improvement compared to laparoscopic sleeve gastrectomy (SG) [4]. With the national-wide bariatric practice changing to predominantly SG [5], and new alarming evidence of a high rate of Barrett's esophagus following this procedure [6], such a relationship between procedure type and GERD response may be of high importance. Specific technical details involving hiatal inspection and HHR have surfaced as of paramount value for the effect of SG on GERD [7, 8]. This study aimed to assess differences in practice patterns regarding concomitant HHR during SG and RYGB.

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Methods

The Metabolic and Bariatric Surgery Accreditation Quality and Improvement Program (MBSAQIP) public use file for 2015 was used to identify patients who underwent laparoscopic RYGB or SG procedures. This de-identified database includes demographics, patient characteristics including BMI, and procedural details from all centers that participated in the MBSAQIP. Patient demographics and the incidence of concomitant HHR with SG or RYGB were analyzed. At each center, trained clinical abstractors collect and enter data. Centers with an integrity disagreement audit rate higher than 5%, a 30-day follow rate less than 80%, or noncompliance with the data collection guidelines did not contribute cases to the public use file. Patients with revisional and previous bariatric or foregut procedures were excluded from this study.

The Stony Brook University Institutional Review Board deemed this study exempt. The American College of Surgeons Metabolic and Bariatric Surgery Accreditation Quality and Improvement Program and the participating centers are the sources of the data used herein; they have not verified and are not responsible for the statistical validity of the data analysis or the conclusions derived by the authors. Continuous variables were compared using *t* test and reported as mean (\pm standard deviation). Categorical variables were compared using chi-square and reported as counts (percentages). Odds ratios (OR) with 95% confidence intervals (CIs) are reported as appropriate and multivariable logistic regression was performed to control for baseline differences. Statistical analysis was performed using SPSS Statistics version 25 for Windows (IBM Corp; Armonk, NY).

Results

We identified 130,772 patients who underwent RYGB (30.5%) and SG (69.5%). The majority were female (78.8%), Caucasian (74.5%), with a mean age and BMI of 44.6 ± 12 years and 45.7 ± 8.4 kg/m². Preoperative GERD

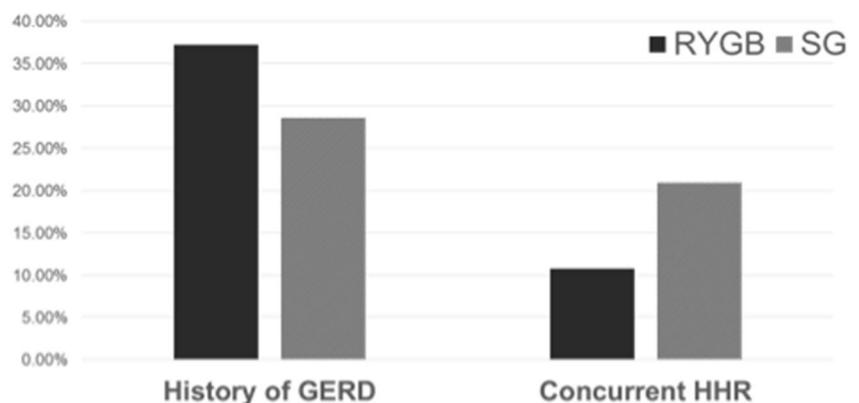
requiring medication was noted in 31.2% and HHR was performed in 17.9% of the entire cohort. Concomitant HHR was more common, despite less GERD, in SG patients compared to RYGB (21.0% vs 10.8%, $p < 0.0001$). Figure 1 demonstrates the incidence of both GERD and concurrent hiatal hernia in SG and RYGB patients. Controlling for baseline differences between patients who underwent HHR and the ones who did not, SG patients were significantly more likely to undergo concomitant HHR (adjusted OR 2.14, 95% CI 2.06–2.22, $p < 0.0001$).

Discussion

Our results showed that RYGB patients were more likely to have preoperative GERD compared to SG. However, SG patients were twice more likely to undergo concurrent HHR compared to their RYGB counterparts. This finding can be explained considering current studies support HHR in SG patients as a safe and effective measure to relieve GERD symptoms [9]. Additionally, studies have shown that SG may worsen or induce de novo GERD symptoms in patients undergoing this procedure, possibly due to increased intragastric pressure [9]. As a result, HHR may be done in an effort to reduce this known risk of GERD in SG patients.

Several studies have reported the efficacy and success of RYGB in reducing GERD symptoms up to 3 years postoperatively [10]. Therefore, the lower rate of concurrent HHR in RYGB patients could be attributed to the overall success rate of RYGB in treating GERD symptoms, possibly attributed to the minimization of acid production in addition to bile diversion, inherent components of this procedure. However, a less aggressive approach to HHR during RYGB may lead to less than favorable outcomes. Madalosso et al. evaluated 53 patients undergoing a RYGB with routine pH testing and endoscopy before, 6 and 3 months after surgery. A HH when present was not repaired in this cohort, which may explain in part the fact that 30% and 17% of patients had abnormal acid exposure at 6 and 39 months, respectively. Similarly, of the nine patients

Fig. 1 Clinical history of GERD and concurrent hiatal hernia in sleeve gastrectomy and roux-en-y gastric bypass patients



with a known HH and reflux esophagitis (RE) preoperatively, three (33%) continued to have RE on postoperative evaluation. Furthermore, this nationwide difference in approach towards HH in RYGB versus SG patients can significantly bias the assessment of GERD-related outcomes of bariatric surgery in the future.

Establishing guidelines for HHR during bariatric surgery can help understand the relationship between SG, HH, and GERD, and help prevent its associated complications. Importantly, since RYGB alone in the setting of a HH may not universally reverse the GERD-related GE junction pathophysiology, a less vigorous approach to HH management at the time of RYGB may have significant long-term effects in terms of GERD.

Conclusion

Concomitant HHR is significantly more common during SG compared to RYGB despite less GERD preoperatively, suggesting a marked difference in the intraoperative management of HH during bariatric surgery procedures. Such practice patterns may hinder our ability to evaluate the long-term effects of bariatric surgery on GERD.

Compliance with Ethical Standards

Ethical Approval For this retrospective study, formal consent is not required.

Informed Consent Does not apply to this retrospective study.

Conflicts of Interest Dr. Docimo reports non-financial support from Boston Scientific, from null, outside the submitted work; Dr. Spaniolas reports non-financial support from Mallinckrodt, grants from Merck,

outside the submitted work; Dr. Pryor reports personal fees from Ethicon, personal fees from Medtronic, personal fees from Stryker, and from Gore, and grants from Baranova and from Obalon, outside the submitted work; Drs. Bates and Talamini have no conflicts of interest. Uzma Rahmana has no conflicts of interest.

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References

1. Katz PO, Gerson LB, Vela MF. Guidelines for the diagnosis and management of gastroesophageal reflux disease. *Am J Gastroenterol.* 2013;108:308–28.
2. Roman S, Pandolfino JE. Environmental–life style related factors. *Best Pract Res Clin Gastroenterol.* 2010;24(6):847–59.
3. Che F, Nguyen B, Cohen A, et al. Prevalence of hiatal hernia in the morbidly obese. *SOARD.* 2013;9(6):920–4.
4. Nadaletto Herbella FAM, Patti MG. Gastroesophageal reflux disease in the obese: pathophysiology and treatment. *Surgery.* 2015;159(2):475–486BF.
5. Sippey M, Kasten KR, Chapman WH, et al. 30-day readmissions after sleeve gastrectomy versus Roux-en-Y gastric bypass. *Surg Obes Relat Dis.* 2016;12(5):991–6.
6. Genco A, Soricelli E, Casella G, et al. Gastroesophageal reflux disease and Barrett's esophagus after laparoscopic sleeve gastrectomy: a possible, underestimated long-term complication. *Surg Obes Relat Dis.* 2017 Apr;13(4):568–74.
7. Daes J, Jimenez ME, Said N, et al. Laparoscopic sleeve gastrectomy: symptoms of gastroesophageal reflux can be reduced by changes in surgical technique. *Obes Surg.* 2012;22(12):1874–9.
8. Ece I, Yilmaz H, Acar F, et al. A new algorithm to reduce the incidence of gastroesophageal reflux symptoms after laparoscopic sleeve gastrectomy. *Obes Surg.* 2017;27(6):1460–5.
9. Redondo R, Albertson H, Gandsas A. Hiatal hernia repair after sleeve gastrectomy: a case series. *Surg Obes Relat Dis.* 2017;13(10):S186.
10. Madalosso CA, Gurski RR, Callegari-Jacques SM, et al. The impact of gastric bypass on gastroesophageal reflux disease in morbidly obese patients. *Ann Surg.* 2016;263(1):110–6.