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Laparoscopic sleeve gastrectomy in a patient with situs inversus

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Abstract

Background: Obesity in the United States is estimated to be 41.9% in adults over the age of 20 years old. Prevalence of situs inversus totalis is 1 in 10,000 people. With incidence of obesity increasing, the probability of encountering a patient meeting criterion for bariatric surgery with situs inversus increases. Situs inversus presents challenges in pre-operative work up and intra-operative preparation and set up.

Objectives: The objective of our paper was to synthesize the information available in literature about Laparoscopic Sleeve Gastrectomy in patients with situs inversus totalis. Additionally, we have added a detailed description of our procedure and outcomes that will hopefully be able to guide a surgeon encountering this situation for the first time.

Methods: Case report with literature published within the last 10 years on the management of situs inversus and bariatric surgery. Twenty-three case reports were found after a PubMed literature search that included key search words of “situs inversus”, “Bariatric surgery”, “anastomosis”, “Roux-en-Y”, “gastrectomy”, and / or “obesity”.

Results: The results included 12 cases of Laparoscopic SG, 6 cases of Roux-en-Y gastric bypass, 2 cases of laparoscopic one-anastomosis gastric bypass, 1 case of laparoscopic SG with duodeno-jejunal bypass, 1 case of stomach intestinal pylorus sparing surgery (SIPS), and 1 case of laparoscopic biliopancreatic diversion.

Conclusion: Based on current literature and our case report, laparoscopic SG can be successfully performed on patients with situs inversus totalis.

Keywords: Sleeve gastrectomy, laparoscopic sleeve gastrectomy, situs inversus, Situs inversus Totalis, Titan SGS

Introduction

The Centers for Disease Control and Prevention estimates the prevalence of obesity in the United States to be at 41.9% for adults over the age of 20 years old ^[1]. Current guidelines propose bariatric surgery as a method for management of obesity and weight loss in patients with a body mass index ≥ 40 kg/m² or patients with a body mass index ≥ 35 kg/m² when there are also obesity-related comorbidities, such as diabetes mellitus ^[2]. The American Society for Metabolic and Bariatric Surgery endorses Sleeve Gastrectomy (SG) as a primary procedure for weight loss ^[3]. A recent Cochrane review of literature on the efficacy of bariatric surgery concluded that surgical interventions including laparoscopic SG led to significant weight loss changes in comparison to nonsurgical interventions and improvement in obesity-related comorbidities, such as diabetes ^[4]. Of the seven randomized controlled trials comparing surgical to nonsurgical interventions for obesity included within the Cochrane review, there was no significant difference in weight loss outcomes between surgical interventions of Roux-en-Y gastric bypass and laparoscopic SG for primary surgical intervention for obesity ^[4]. Situs inversus totalis is the total reversal of all visceral organs in a mirror-image fashion in comparison to situs solitus, the normal configuration of thoracic and abdominal visceral organs ^[5]. The prevalence of situs inversus totalis is estimated to be at 1: 10,000 ^[5]. Although situs inversus totalis is a rare condition that results in the complete reversal of thoracic and abdominal visceral organs ^[5], it poses a potential challenge for patients with this condition who seek bariatric surgery treatment for obesity. Although the surgery itself can be challenging, associated co-morbidities with situs inversus including bronchiectasis can be compounded by obesity related co-morbidities such as obstructive sleep apnea or diabetes. This can increase the risk of surgical and anesthesia related complications.

The anatomical variation of situs inversus totalis poses a potential challenge for patients scheduled to undergo bariatric surgery for treatment of obesity, including surgical candidates for laparoscopic SG. The main challenge these patients pose, is technical in nature. With such low prevalence and even less of those receiving surgery, there is limited experience available to guide or perform these procedures.

We present a case of a 34-year-old female with situs inversus totalis who underwent laparoscopic SG for primary surgical treatment of obesity.

Case

This is a case of a 34-year-old female with a past medical history of bipolar disorder, anxiety, depression, situs inversus viscerum totalis, prediabetes, morbid obesity class 2, hypertension and obstructive sleep apnea who is semi-compliant with continuous positive airway pressure and a significant past surgical history of cholecystectomy who presented for initial evaluation by bariatric surgery for possible laparoscopic SG for treatment of chronic morbid obesity and related comorbidities. Patient reported unsuccessful attempt for weight loss with weight watchers program. Patient reported chronic fatigue, back pain, and joint pain. The patient underwent a comprehensive evaluation including a surgical weight loss program, psychological, nutritional, and medical evaluations. The patient had a body mass index of 35.8 kg/m² at time of initial evaluation which decreased to 35 kg/m² by time of operation. Her vitals demonstrated hypertension at 153/100 mmHg but were otherwise within normal limits. Her physical exam demonstrated a morbidly obese abdomen with evenly distributed weight with exam otherwise unremarkable. Her preoperative labs demonstrated a Hemoglobin A1c of 6.2, glucose at 172, and white blood count at 11.17, labs otherwise were within normal limits. The patient underwent preoperative imaging and evaluation with an electrocardiogram that showed normal sinus rhythm. She also underwent an Upper Gastrointestinal (GI) study which confirmed situs inversus totalis, a small sliding hiatal hernia with minimal gastroesophageal reflux and several small round filling defects within the gastric body incompletely characterized which may represent gastric polyps. Home sleep testing confirmed mild obstructive sleep apnea hypopnea syndrome which was being treated with continuous positive airway pressure use prior to surgery. The patient successfully completed the comprehensive surgical weight loss program and complete evaluation and was deemed a candidate for laparoscopic SG.

Operation

The patient was placed on the operating table in a supine fashion. The patient was prepped and draped in a sterile fashion. A transverse incision was created just to the right of midline at the level of the umbilicus and an optical trocar 5 millimeter (mm) port was utilized to gain access to the abdominal cavity. Abdominal inspection confirmed no visceral or vascular injury with optical view, significant visceral fat was noted, and situs inversus totalis was confirmed. A 30° lens was introduced and two additional 5 mm ports were placed in the left and right flanks. A 15 mm port was placed just left of midline at the level of the umbilicus. Intraoperative trocar placement can be seen in Figure 1. The patient was placed in reverse Trendelenburg.

The hiatus was inspected and no hiatal hernia was noted. The gastro-esophageal junction was inspected and noted to be free. A snake retractor was placed through the 5 mm port in the left flank for liver retraction. The dissection for the gastrectomy was begun by dissecting the greater curvature of the stomach opposite to the incisura angularis. The vessels of the omentum were taken using the harmonic scalpel 6 centimeter (cm) proximal from the pylorus up to the angle of Hiss. The stomach was flipped anteriorly such that adhesions to posterior wall of the stomach to the retroperitoneum were taken down. Three points were drawn along the anterior aspect of the stomach: Point A was drawn 1 cm from the angle of Hiss, Point B 3 cm from the incisura angularis perpendicular to the tangent, and Point C was 6 cm from the pylorus. A 38 French orogastric tube was placed at the pylorus and suction was applied. The 15 mm trocar was swapped for a 19 mm trocar. The Standard Bariatric Titan SGS Stapler was introduced, parked lateral to the right crus, and opened. The fundus of the stomach was passed through the stapler making sure all three points aligned and the stapler was clamped. The non-tissue zone of the stapler was free and the stapler was fired. The result is seen in Figure 2. Clips were applied at the staple line to obtain hemostasis. The liver retractor was removed. The 19 mm trocar was removed and a Kelley clamp was placed to grab the tip of the stomach remnant. The greater curvature of the stomach specimen was removed. A trans fascial suture was utilized to close the fascia at the 19 mm port site. The remainder of the ports were retrieved under direct visualization, pneumoperitoneum was evacuated, and skin was closed. No immediate intraoperative or postoperative complications were noted.

Methods

Literature published within the last 10 years on the management of situs inversus and bariatric surgery was reviewed for inclusion in this report to determine rarity of the case and to compare our management and findings to previous literature. Twenty-three case reports were found after a PubMed literature search that included key search words of “situs inversus”, “bariatric surgery”, “anastomosis”, “Roux-en-Y”, “gastrectomy”, and/ or “obesity”. The results included 12 cases of Laparoscopic SG [6-17] 6 cases of Roux-en-Y gastric bypass,^[8, 18-22] 2 cases of laparoscopic one-anastomosis gastric bypass,^[23-24] 1 case of laparoscopic SG with duodeno-jejunal bypass,^[25] 1 case of stomach intestinal pylorus sparing surgery (SIPS),^[26] and 1 case of laparoscopic biliopancreatic diversion^[27]. This can be seen in Figure 3.

Discussions

Increasing public health concerns related to unhealthy weight in the United States has allowed for bariatric surgery to be an important treatment option for obesity and obesity-related comorbidities [1-4]. Available literature on the surgical management of obesity in patients with situs inversus are limited to case reports. Our review of literature produced 23 total case reports on bariatric surgery performed in patients with situs inversus. We contribute to the discussion and technical adjustments made during bariatric surgery in patients with situs inversus by presenting a case of laparoscopic SG in a patient with known situs inversus totalis.

Of the case reports published within the last 10 years, 12

were cases of laparoscopic SG; among these 12 cases, 10 patients had a situs inversus totalis and two patients had noting levocardia [12, 15]. Two complications were noted within those 12 cases; one patient had bradycardia on post-operative day one that resolved and the patient was discharged on post-operative day two [15]. The other complication noted within the available literature was a patient who underwent laparoscopic SG with known situs inversus and experienced renal colic two months post operatively which was successfully managed nonoperatively [16].

Average operative time for a laparoscopic SG at our institution takes approximately 30 to 40 minutes from incision to skin closure. For the patient presented here, surgical time in the present case was one hour and 30 minutes- that is, three times longer than the normative 30-minute surgical procedure. The increased operative time was not due to complications, but rather attributed to the patient's situs inversus totalis condition. Within the literature, two case reports of laparoscopic SG in patients with situs inversus specifically noted significantly increased operative time in comparison to their standard operations [14, 17]. Villavazo *et al.*, noted both difficulty with liver retraction and staple line creation due to mirror image anatomy and pointed to an increase in operative time of 108 minutes from a standard time of 64 minutes for a patient with situs solius [17]. Additionally, Paipilla *et al.*, reported an increase in operative time to 130 minutes in a patient who was newly diagnosed with situs inversus during their preoperative workup [14]. Of note, neither case that reported increased operative time in a laparoscopic SG patient with situs inversus was performed in French position, both cases were performed with the surgeon to the side of the patient [14, 17].

Key technical changes noted throughout the literature available included both mirror trocar placement from standard and mirror-image instrument placement from standard. Alternatively, one case reported the use of single port placement for both their standard patients and the case with situs inversus which allowed them to make relatively no changes to their surgical technique other than performing the maneuvers in a mirror fashion due to patient anatomy [11]. Our standard setup was reversed in conjunction with the patient's reversed anatomy. Of the 12 cases of SG performed in a patient with situs inversus noted above, patients were discharged between post-operative day two

and five [6-17]. Contrarily, our patient tolerated the procedure well and was discharged successfully on postoperative day zero. Recent literature has shown that a fast-track approach to discharging patients on post-operative day one after laparoscopic SG and laparoscopic Roux-en-Y gastric bypass was not associated with increased incidence of readmission or complications in comparison to patients discharged on post-operative day two or three [28].



Fig 1: Intraoperative trocar placement.

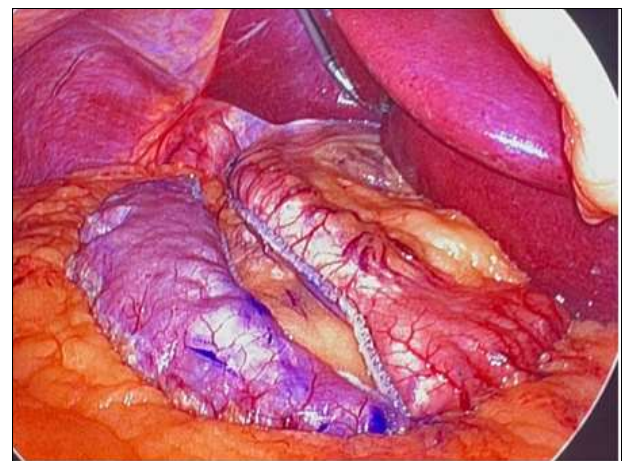


Fig 2: Creation of laparoscopic sleeve in a patient with situs inversus totalis.

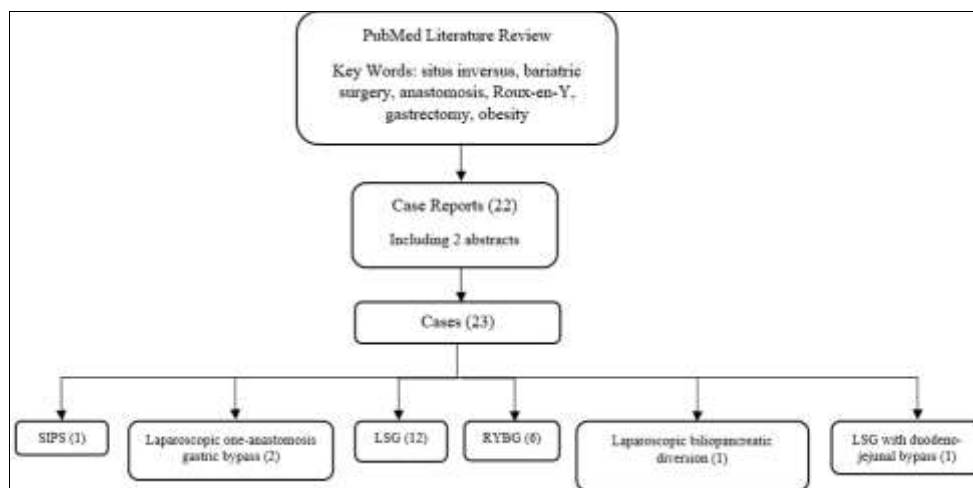


Fig 3: Literature Review

Conclusion

Based on current literature and our case report, laparoscopic SG can be successfully performed on patients with situs inversus totalis. Previous knowledge of situs inversus diagnosis and confirmation on preoperative imaging allowed for the surgical team to plan accordingly for trocar and instrument placement. Our patient tolerated the procedure well without significant complications to this point. At the patient's two-month follow-up visit post-surgery, the patient had a decrease in body mass index from 35 kg/m² to 28.57 kg/m².

Declarations/Acknowledgements

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Conflict of Interest

Not available

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