ISSN 1948-5190 (online)

World Journal of *Gastrointestinal Endoscopy*

World J Gastrointest Endosc 2020 March 16; 12(3): 83-118

Published by Baishideng Publishing Group Inc

World Journal of Gastrointestinal Endoscopy

Contents

Monthly Volume 12 Number 3 March 16, 2020

Contents

World Journal of Gastrointestinal Endoscopy

Volume 12 Number 3 March 16, 2020

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INDEXING/ABSTRACTING

The *WJGE* is now abstracted and indexed in Emerging Sources Citation Index (Web of Science), PubMed, PubMed Central, China National Knowledge Infrastructure (CNKI), and Superstar Journals Database.

RESPONSIBLE EDITORS FOR THIS ISSUE

Responsible Electronic Editor: *Ji-Hong Liu*

Proofing Production Department Director: *Xiang Li*

NAME OF JOURNAL
World Journal of Gastrointestinal Endoscopy

ISSN
ISSN 1948-5190 (online)

LAUNCH DATE
October 15, 2009

FREQUENCY
Monthly

EDITORS-IN-CHIEF
Bing Hu, Anastasios Koulaouzidis, Sang Chul Lee

EDITORIAL BOARD MEMBERS
https://www.wjgnet.com/1948-5190/editorialboard.htm

EDITORIAL OFFICE
Ruo-Yu Ma, Director

PUBLICATION DATE
March 16, 2020

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World Journal of Gastrointestinal Endoscopy

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World J Gastrointest Endosc 2020 March 16; 12(3): 111-118

DOI: 10.4253/wjge.v12.i3.111

ISSN 1948-5190 (online)

CASE REPORT

Gallbladder perforation due to endoscopic sleeve gastroplasty: A case report and review of literature

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Author contributions: de Moura DTH and Barrichello SA conceived and designed the study; de Siqueira Neto J performed the procedure; Ribeiro IB carried out the literature search; Harthorn KE and Thompson CC reviewed the case and edited the manuscript; all authors contributed to finalizing the present version of the paper and approved the manuscript for publication.

Informed consent statement: Written informed consent was obtained from the patient.

Conflict-of-interest statement: Thompson CC reports personal fees from Boston Scientific, personal fees from Olympus, outside the submitted work.

CARE Checklist (2016) statement: The authors have read the CARE Checklist (2016), and the manuscript was prepared and revised according to the CARE Checklist (2016).

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Abstract

BACKGROUND

The healthcare impact of obesity is enormous, and there have been calls for new approaches to containing the epidemic worldwide. Minimally invasive procedures have become more popular, with one of the most widely used being endoscopic sleeve gastroplasty (ESG). Although major adverse events after ESG are rare, some can cause considerable mortality. To our knowledge, there has been no previous report of biliary ascites after ESG.

CASE SUMMARY

A 48-year-old female with obesity refractory to lifestyle changes and prior gastric balloon placement underwent uncomplicated ESG and was discharged on the following day. On postoperative day 3, she developed abdominal pain, which led to an emergency department visit the following day. She was readmitted to the hospital, with poor general health status and signs of peritoneal irritation. Computed tomography imaging showed fluid in the abdominal cavity. Laparoscopy revealed biliary ascites and showed that the gallbladder was sutured to the gastric wall. The patient underwent cholecystectomy and lavage of the abdominal cavity and was admitted to the intensive care unit post-operatively. After 7 d of antibiotic therapy and 20 d of hospitalization, she was discharged. Fortunately, 6 mo later, she presented in excellent general condition and with a 20.2% weight loss.

Manuscript source: Unsolicited manuscript

Received: November 6, 2019
Peer-review started: November 6, 2019
First decision: November 20, 2019
Revised: November 29, 2019
Accepted: December 23, 2019
Article in press: December 23, 2019
Published online: March 16, 2020

P-Reviewer: Galloro G, Martini F
S-Editor: Yan JP
L-Editor: A
E-Editor: Liu JH

CONCLUSION
ESG is a safe procedure. However, adverse events can still occur, and precautions should be taken by the endoscopist. In general, patient position, depth of tissue acquisition, location of stitch placement, and endoscopist experience are all important factors to consider to mitigate procedural risk.

Key words: Bariatric surgery; Obesity; Weight loss; Peritonitis; Case report

Core tip: Despite broader acceptance of endoscopic sleeve gastroplasty for weight loss management, the procedure can still present challenges for endoscopists. Although the inadvertent puncture of organs adjacent to the stomach is a rare occurrence, it can lead to catastrophic outcomes. Early identification of possible unintended events and an assertive approach to case management can be life-saving. Patient selection and optimal technique remain under debate. With broader adoption of endoscopic sleeve gastroplasty worldwide, risk mitigation strategies must be emphasized to optimize procedural safety.

Citation: de Siqueira Neto J, de Moura DTH, Ribeiro IB, Barrichello SA, Harthorn KE, Thompson CC. Gallbladder perforation due to endoscopic sleeve gastroplasty: A case report and review of literature. *World J Gastrointest Endosc* 2020; 12(3): 111-118
URL: https://www.wjgnet.com/1948-5190/full/v12/i3/111.htm
DOI: https://dx.doi.org/10.4253/wjge.v12.i3.111

INTRODUCTION

Obesity is a disease of great social and financial impact which can lead to significant health conditions, such as cardiovascular disease, non-alcoholic steatohepatitis, osteoarthritis, obstructive sleep apnea, depression, and gastroesophageal reflux disease[1-3]. In recent years, endoscopic procedures have begun to fill the large gap between medical and surgical treatments aimed at controlling this disease[4,5]. One of the recently developed procedures is endoscopic sleeve gastroplasty (ESG), which is performed with a suturing device coupled to the distal tip of an endoscope enabling placement of full thickness sutures in the gastric wall to alter the form and function of the stomach.

Although ESG is considered to be a safe procedure[6-8], various major and minor adverse events have been described[9]. According to previous studies, the most common symptoms occurring after ESG are nausea, vomiting, and mild-to-moderate abdominal pain[9-11]. Severe adverse events, such as peritoneal fluid collections requiring drainage or surgical intervention, gastrointestinal or intraabdominal hemorrhage requiring intervention or transfusion, or severe abdominal pain are rare, occurring in only 0-2% of reported cases[9-12].

To our knowledge, only one prior case of biliary peritonitis during ESG has been reported[13], however, ascites was not described in this case. Our case of gallbladder perforation and biliary ascites was identified early and appropriately managed leading to a favorable outcome for the patient, similar to the aforementioned case. Given the rapid increase in the number of ESG procedures worldwide, it is imperative to document and educate one another on adverse events to reduce their rate of occurrence and minimize the morbidity associated with the procedure.

CASE PRESENTATION

Chief complaint

A 48-year-old female with obesity and with various comorbidities.

History of present illness

A 48-year-old female with obesity was referred for consideration of ESG. She had a medical history significant for hypertension that was controlled with oral agents. She had no prior history of bariatric surgery. At initial presentation, her weight was 93 kg, with a body mass index of 31.4 kg/m^2, despite lifestyle changes and prior placement

of a gastric balloon.

The patient gave written informed consent, after which she underwent ESG at a private hospital (Hospital Meridional, Cariacica, ES, Brazil). This was the first ESG performed at this center. There were no immediate procedural related complications. The procedure was performed under general anesthesia, with an endoscopic suturing system (OverStitch endosuturing device; Apollo Endosurgery, Austin, TX, United States) coupled to a dual-channel endoscope (GIF-2T160; Olympus America, Center Valley, PA, United States). Carbon dioxide insufflation was used. A full thickness U-shaped suture pattern was used by the physician to perform ESG, as previously described[10] (Figure 1). A total of five sutures were used.

In the immediate postoperative period, the patient was treated daily with antiemetics (ondansetron, dimenhydrinate, dexamethasone, and scopolamine), as well as dipyrone and omeprazole. The patient was discharged on post-operative day 1, in good condition and without any complaints, with prescriptions for omeprazole, ondansetron, dipyrone, scopolamine, and codeine phosphate combined with acetaminophen if necessary.

On postoperative day 3, the patient developed abdominal pain which continued to worsen over the next 24 h; thus, she was referred to the emergency department for further evaluation.

History of past illness

Obesity and hypertension.

Physical examination

Physical examination was normal preoperatively. On the fourth postoperative day, the patient had a rigid abdomen with signs of peritoneal irritation.

Laboratory examinations

On the fourth postoperative day and admission to the emergency department, the patient had significant leukocytosis (19800 × 103 leukocytes/μL) and an increased C-reactive protein level (147 mg/L).

Imaging examinations

At the emergency entrance, computed tomography imaging revealed free fluid in the peritoneal cavity (Figure 2).

FINAL DIAGNOSIS

The patient was diagnosed with biliary ascites caused by inadvertent puncture of the gallbladder.

TREATMENT

Patient was taken for emergent diagnostic laparoscopy. In addition to the biliary ascites, the stomach appeared to be tubular in shape as expected post-ESG. After significant lavage of the peritoneal cavity, it was noted that the fundus of the gallbladder was transfixed to the stomach (Figure 3). Biliary fluid collections were identified throughout the upper abdomen (Figure 4). Thus, the suture was cut and laparoscopic cholecystectomy was performed. At the conclusion of the case, intraoperative endoscopy with a methylene blue test was performed, finding no evidence of additional complications.

OUTCOME AND FOLLOW-UP

The patient was admitted to the intensive care unit, where she remained for one week, requiring IV antibiotics for septic shock. She did not require further surgical intervention. She ultimately improved from an infectious perspective, and was discharged to home 20 d after her initial admission to the hospital.

At the time of this case report (Table 1), the patient continued to follow in the outpatient clinic, and had no further complications related to the procedure. She had lost 18.7 kg (20.2% of her total body weight) in the first six months after the ESG. She was still undergoing interdisciplinary follow-up with a nutritionist, a psychologist, and a physical therapist.

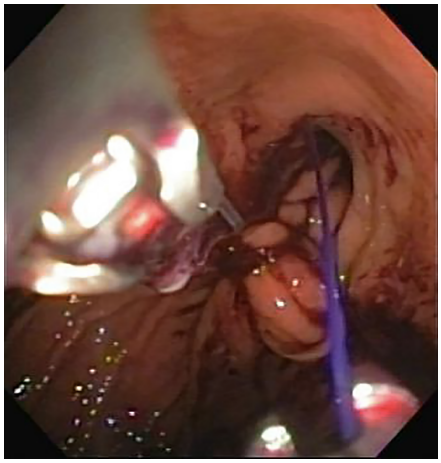

Figure 1 Endoscopic suture placement during endoscopic sleeve.

DISCUSSION

Endoscopic treatment of obesity has begun to rapidly fill the gap between medical and surgical therapies, as endoscopic therapy provides a minimally invasive option, which has greater efficiency than medical interventions and a greater safety profile than open surgical interventions[14-17]. The advent of endoscopic suturing was a major step forward in the minimally invasive treatment of a number of gastrointestinal pathologies[18,19]. The OverStitch Endosuturing device has stood out from other such systems and is currently the only system in widespread use[8]. Since 2001, endoscopic suturing systems have been adapted for the treatment of obesity, as experiments in *ex vivo* animal models have led to the development of the systems and techniques in use today[20]. In ESG, full thickness sutures are placed throughout the gastric body to bring the anterior wall, greater curvature, and posterior wall of the gastric body all closer together, resulting in a tubular configuration[8], in a manner similar to that achieved with surgical sleeve gastrectomy. The technique has been improving since 2012, when Thompson and Hawes performed the first ESG[11,21]. Since then, Abu Dayyeh *et al*[22] and Sharaiha *et al*[23] confirmed the technical feasibility of the procedure, as well as its safety and efficacy for weight reduction.

Minor adverse events, such as nausea, vomiting, and mild-to-moderate abdominal pain are the most common symptoms following ESG. In a study involving 1000 patients whom underwent ESG, Alqahtani *et al*[10] observed minor adverse events in 92.2% of patients. However, while there were high rates of minor adverse events reported, there were very few major adverse events associated with the procedure[10]. A recently published review article on the topic by Jain *et al*[24] evaluated nine original articles and confirmed that there was a high incidence of minor adverse events, while similarly demonstrated a low rate of major adverse events, seen only in 2.3% of cases. Of note, there was no incidence of biliary injury or ascites described in this analysis.

Despite an exhaustive search of the literature, we found no reports of death related to the procedure. Readmissions due to upper gastrointestinal hemorrhage requiring endoscopic intervention or administration of blood products occur only occasionally, having a minimal impact on morbidity and length of hospital stay[10,25]. Among the major adverse events occurring after ESG, leaks and peritoneal fluid collections are most common, having been reported in various studies in the literature[7,10,11,25-30]. In most cases, the complication was treated conservatively or by image-guided percutaneous drainage.

On detailed review of this case, there were several factors that may have contributed to this adverse event. There is a learning curve associated with any endoscopic procedure, including ESG, and this case was the very first ESG performed by the endoscopist. Despite this procedure being performed under the supervision of an experienced proctor, this may have contributed. Additionally, the patient was in the "swimmers" position, instead of a more conventional supine, lazy left-lateral position, which may have brought the stomach and gallbladder into closer proximity, thus increasing the risk of gallbladder perforation with a full-thickness gastric suturing technique. And finally, we believe that the suturing was started in close proximity to the lesser curvature of the stomach, which could have also increased the risk of biliary injury.

As described in this case report, biliary ascites after ESG should be considered as a

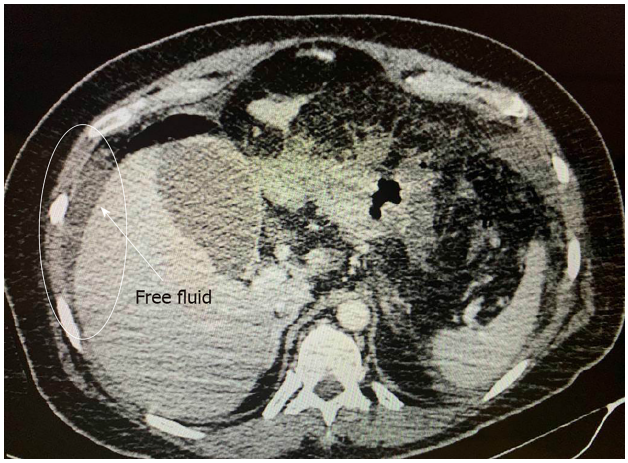

Figure 2 Computerized tomography showing free fluid in the abdominal cavity.

rare but major adverse event of great clinical severity. The treatment team must maintain a high level of diagnostic suspicion in a patient presenting with fever and abdominal pain following ESG. Timely, aggressive therapy must be taken to minimize long term sequelae.

CONCLUSION

Although rare, gallbladder perforation can occur during ESG, and can have significant clinical consequences. Further studies, focusing on patient positioning, use of anatomic landmarks to guide suture patterns, and learning curve should be performed to further reduce the occurrence of adverse events such as the one described here.

Table 1 Case report time line

Time line	
1	Patient underwent endoscopic sleeve gastroplasty with no complications
2	On postoperative day 3, she developed abdominal pain, which led to an emergency department visit on postoperative day
3	She was readmitted to the hospital, with poor general health status and signs of peritoneal irritation
4	Computed tomography showed fluid in the abdominal cavity
5	Laparoscopy revealed biliary ascites and showed that the gallbladder was sutured to the gastric wall
6	The patient underwent cholecystectomy, together with review and lavage of the abdominal cavity, and was admitted to the intensive care unit
7	After 7 d of antibiotic therapy and 20 d of hospitalization, she was discharged
8	Of 6 mo later, she presented excellent general condition and a 20.2% weight loss

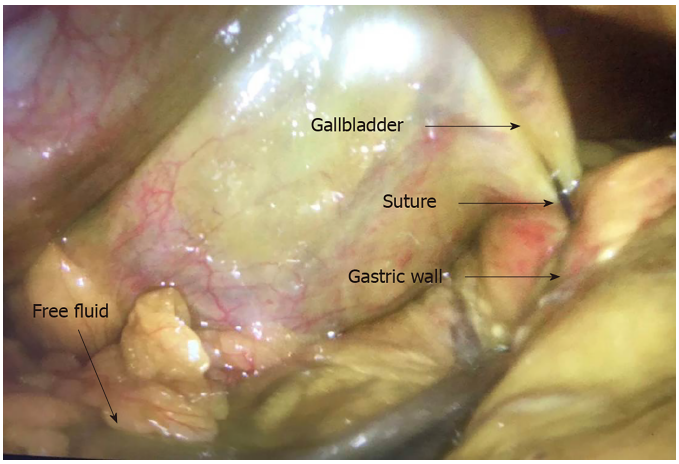

Figure 3 Laparoscopic visualization showing bile ascites, the gallbladder, the stomach, and a suture between the gallbladder and the stomach.

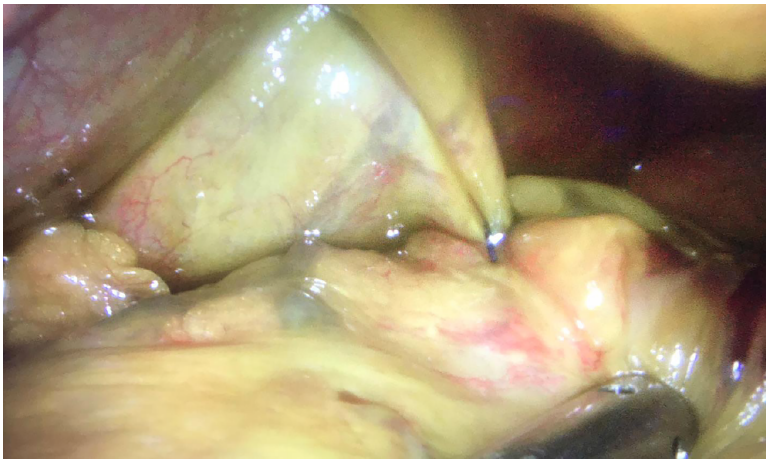

Figure 4 Laparoscopic visualization of a suture in the gallbladder after aspiration of bile ascites.

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