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Case Report

Laparoscopic Sleeve Gastrectomy for the Management of Gastric Gastrointestinal Stromal Tumors: A Case Report and a New Concept

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Abstract

Purpose: The surgical principle of gastric resection for gastrointestinal stromal tumor is en-bloc resection with negative margins. We present a case of synchronous giant gastric gastrointestinal stromal tumors (GISTs) to demonstrate the feasibility of laparoscopic sleeve gastrectomy (LSG) and propose the technical and metabolic advantages of this approach.

Case Presentation: A 51-year-old woman with a body mass index (BMI) of 35 kg/m^2 and metabolic syndrome was diagnosed with synchronous multifocal gastric GISTs and underwent LSG. Post-operative oncologic and metabolic outcomes were evaluated.

Results: The patient's recovery was uneventful and pathology confirmed a R0 resection. At the 6-month follow-up, the patient achieved a 22% Excess Weight Loss (%EWL) with a BMI of 31.5 kg/m^2, a decrease from pre-operative BMI of 35 kg/m^2. Patient's diabetes was resolved with an HbA1c of 5.6%. At the one-year follow up, surveillance showed no tumor recurrence and the patient had lost an additional weight and achieved a 37% EWL.

Conclusion: In patients with obesity and metabolic syndrome, LSG should be considered as a preferred surgical approach for resection of GISTs.

Keywords: *Gastrectomy; Gastrointestinal Stromal Tumors; Stomach Neoplasms; Disease Management; Laparoscopy*

Abbreviations

BMI: Body Mass Index; EGD: Esophagogastroduodenoscopy; %EWL: Excess Weight Loss; ICC: Interstitial cells of Cajal; GIST: Gastrointestinal Tumor; LSG: Laparoscopic Sleeve Gastrectomy

Introduction

LSG for weight loss was first described by Marceau in 1993 as a component of biliopancreatic diversion [1]. Since then, gastric sleeve procedures have been modified and are now considered a stand-alone bariatric procedure. Among all bariatric procedures, the popularity of LSG has been increasing. The global trends from 2003 to 2011 show a marked increase in utilization of sleeve gastrectomy among bariatric surgery, from 0 to 27.89% [2]. The recent estimates of bariatric surgeries performed in 2015 by the American Society for Metabolic and Bariatric Surgery (ASMBS), places LSG as the most frequently (53.8%) performed bariatric procedure [3]. LSG is increasingly recognized as a safe and effective bariatric procedure [4]. It has not been previously described for the surgical management of gastrointestinal stromal tumors. Metabolic improvements in patients with gastric resection seen in bariatric surgery is a new concept in the surgical management of GIST.

GISTs arise from interstitial cells of Cajal (ICC) in the myenteric plexus which are distributed along the entire GI tract [5]. GISTs are predominantly found in the stomach (60%), as well as in the small bowel (30%), the esophagus and the remainder of the GI tract (10%). The majority of GISTs are solitary (> 95%) [6]. Multiple or synchronous GISTs have been associated with hereditary GIST syndromes, germline

mutations, and ICC hyperplasia. Sporadic multiple synchronous GISTs are reported only in few case series [7-9]. The surgical management of multiple synchronous GISTs is similar to that of solitary GIST. The goal is the en-block resection with negative margins [10]. The size and location of the tumor determines the surgical approach. On the other hand, incidental GISTs on final pathology in bariatric surgery have been reported without added complications and have not precluded the continuation of the planned operation [11-15]. We present the technical details and underline all potential advantages of LSG for the surgical management of GISTs.

Case Presentation

We present a case of a 51-year-old female with type II diabetes and body mass index (BMI) of 35 kg/m^2 found to have a gastric mass on the upper endoscopic examination performed as a work up for chronic anemia. Esophagogastroduodenoscopy (EGD) demonstrated a submucosal mass on the greater curvature of the gastric body. Endoscopic ultrasound demonstrated two submucosal hypoechoic masses with well-defined borders arising from the muscularis propria. The first tumor was found in the proximal stomach on the posterior wall and measured 69mm in diameter. The second tumor was in the distal body of the stomach and was 57 mm in diameter. The proximal tumor was not visible on EGD due to its submucosal and extra luminal growth (Figure 1). Contrast computerized tomography (CT) demonstrated two exophytic, smooth, heterogeneous gastric lesions: 5.7 x 5.4 x 6.1 cm in the anterior gastric antrum and 6.1 x 7.1 x 7.7 cm in the posterior midgastric body (Figure 2). There was no radiographic evidence of metastases or local invasion. Fine needle aspirations of both tumors revealed spindle cells that were CD117 positive, consistent with GISTs.

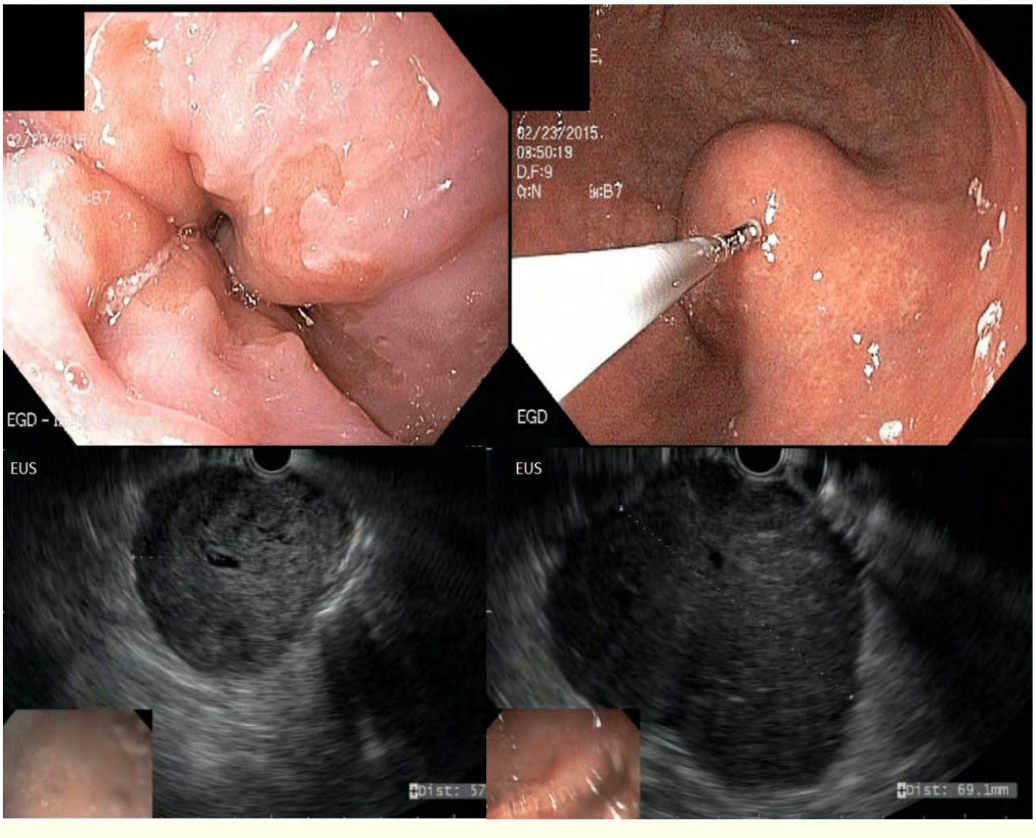

Figure 1: *Esophagogastroduodenoscopy demonstrated 5 to 6 cm submucosal mass on the greater curvature of the stomach in the distal gastric body. Endoscopic ultrasound demonstrated two large submucosal hypoechoic mass with well-defined borders arising from the muscularis propria. The first tumor was identified in the proximal stomach on the posterior wall measuring 69 mm. The second tumor was identified in the distal stomach measuring 57 mm.*

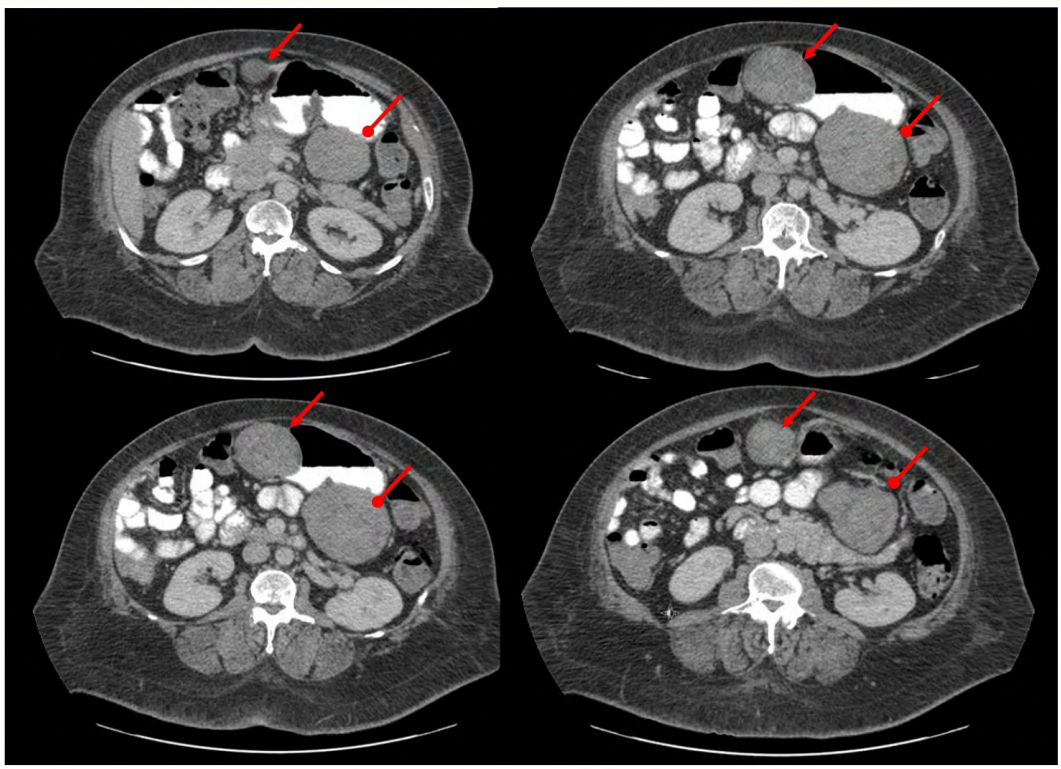

Figure 2: *Axial images of the pre-operative CT scan demonstrated two synchronous giant GISTs: 5.7 x 5.4 x 6.1 cm (triangular arrow) in the anterior aspect of the gastric antrum and 6.1 x 7.1 x 7.7 cm in the posterior aspect of mid body (circular arrow).*

Patient was optimized for surgical resection. On laparoscopy, a large submucosal tumor was visible at the antrum along the greater curvature of the stomach. There was no evidence of peritoneal metastases or visceral abnormalities. The remaining ports and liver retractor were placed. The gastric antrum was retracted anteriorly and the gastro-colic ligament was divided with a Harmonic scalpel (Ethicon EndoSurgery, Cincinnati, OH) to enter the retrogastric space. The gastro-splenic ligament and the short gastric vessels were divided. After entering the lesser sack, the tumor which extended from the posterior wall of the gastric fundus, became visible. The complete mobilization of the gastric body and fundus was performed. Dissection along the greater curvature of the stomach was carried towards the left crus. The proximal lesion was resected first in order to completely mobilize the gastric fundus and to facilitate the dissection of the left crus posteriorly. While avoiding any direct manipulation of the GIST tumor, lateral retraction of the gastric body aligned the anterior and posterior stomach.

A 36 French Bougie was used to facilitate the formation of the gastric conduit and to optimize the resection margin. The Echelon endocutter (Ethicon EndoSurgery, Cincinnati, OH) was used to proceed with creation of the gastric sleeve starting at 3 cm from the pylorus and progressing up to1 cm to the left from the angle of His. Patient was then extubated and her recovery was uneventful.

Figure 3: *The gastric remnant with two tumors measures 22 x 4 x 4 cm.*

Results and Discussion

Pathology revealed two high histologic grades (mitotic rate 5 - 6/50 HPF) spindle cell GISTs, measuring 6.5 x 4.9 x 5 cm and 7.5 x 7 x 5.5 cm. The resection margins were negative for tumor with a 0.7 cm at the closest margin. At the 6-month follow-up, the patient achieved a 22 % Excess Weight Loss (% EWL) with a BMI of 31.5 kg/m^2, a decrease from pre-operative BMI of 35 kg/m^2. Patient's diabetes was resolved with an HbA1c of 5.6 %. At the one-year follow up, surveillance showed no tumor recurrence and the patient had lost an additional weight and achieved a 37%EWL.

The surgical management for GISTs consists of en-bloc resection and negative margins [10]. The size and location of the tumor determines the surgical approach [16-18]. Majority of gastric GISTs less than 5 cm may be amenable to a laparoscopic gastric wedge resection [19]. Larger tumors require larger gastric resection to maintain negative margins. Formal LSG has not been applied to the management of gastric GIST. In systematic review of LSG outcome studies with >100 patients, the overall complication rates ranged from 0% to 15.3% (Brethauer *et al*.). In high volume centers, the complication rate in reported consecutive case series has been much lower. Our experience also demonstrates a low complication rate and low 30-day hospital readmission rate [21]. There have not yet been comparative studies on a larger scale. LSG outcomes have only been studied in the setting of morbid obesity and metabolic syndrome, which are known risk factors for an increase in peri-operative complications.

LSG should be considered for the surgical management of GISTs in patients with obesity or metabolic syndrome. GISTs located in the gastric antrum, body and fundus may all be amenable to resection by LSG. In borderline resectable GIST tumors, neoadjuvant tyrosine kinase inhibitor therapy has been used to downstage the GIST tumors [22]. The tumor then may be resectable by LSG, if anatomically feasible. More than 80 % of the volume of the stomach maybe resected. LSG as compared to other gastric resection modalities preserves gastric conduit anatomy. While avoiding sharp angulation and "spiraling" of the gastric sleeve staple line with good lateral retraction, complications related to stricture maybe decreased, namely leaks and dysphagia [23]. Staple line leaks and bleeding after LSG are the most serious complications and occur in 1 - 3 % of patients in large published series [4].

There are few controversies regarding the technical aspects of LSG: the size of the Bougie, the distance from the pylorus where staple line begins, and the distance from the angle of His where the staple line ends. The debate centers on postoperative weight loss and complications [24]. We suggest that the LSG staple line may start at 3 cm to 6 cm from the pylorus and may end at approximately 1 cm to the left from the angle of His, in order to form a gastric conduit facilitated by ≥ 36 French Bougie (Figure 4). The exact size of the Bougie and the distance from the pylorus may be tailored according to the location of the GIST. Patients with less or no need for weight loss and GIST at favorable locations maybe considered for less restrictive gastric sleeve resection.

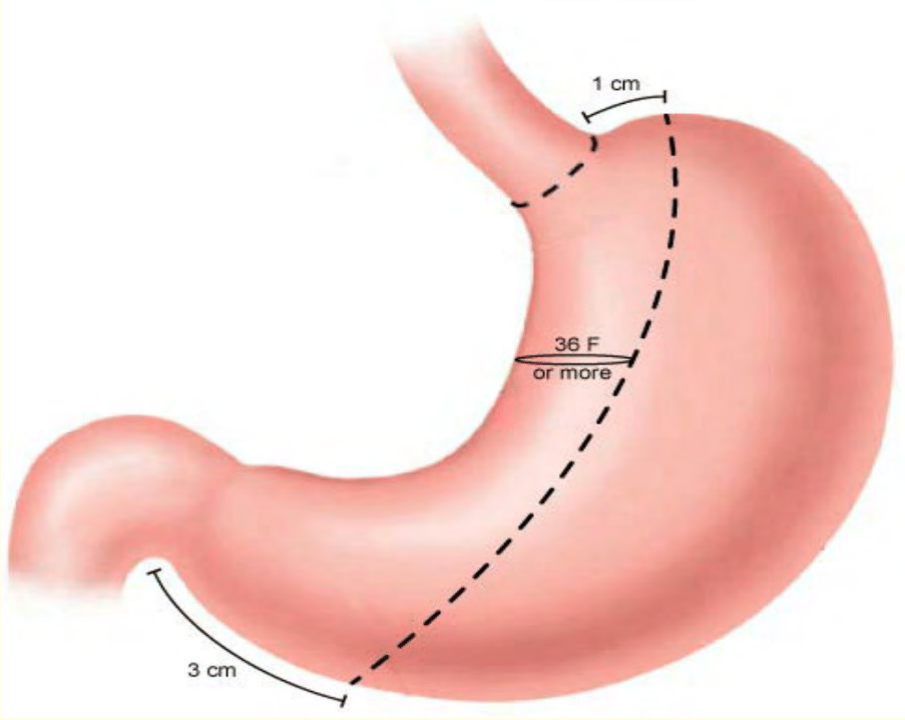

Figure 4: *LSG staple line starts at 3 cm to 6 cm from the pylorus and ends at 1 cm to the left from the angle of His, facilitated by ≥ 36 French Bougie.*

The purpose of this article is to provide the technical aspects of the formal sleeve gastrectomy as a preferred concept in the management of gastric GIST in patients with obesity and metabolic syndrome. LSG is a safe and efficacious bariatric procedure illustrated in large systematic reviews [25,26] and data from the American College of Surgeons - Bariatric Surgery Center Network accreditation program [27]. Systematic review of randomized control trials of LSG found no mortality, with mean complication rate of 9.2 % (range 0 % to 18.7 %). The leak, bleeding, reoperation, and stricture rates were 1.9 %, 3.6 %, 1.6 %, and 0.6 %, respectively [28]. Additional studies are needed to further evaluate the oncologic and metabolic outcomes for LSG in the management gastric GISTs and other benign gastric tumors.

Conclusion

The use of LSG in the surgical management of gastric GISTs follows the oncological principle of complete en-bloc resection with negative margins. Weight loss, metabolic improvement, decreased staple line angulation, and increased resection margin are potential advantages of LSG compared to traditional gastric wedge resection. We suggest that in addition to the anatomy and the location of the GIST tumor, BMI and potential presence of metabolic disease should all be considered in choosing optimal resection modality. LSG should be considered as the preferred surgical management of GISTs in patients with obesity or metabolic syndrome.

Disclosure Statement

No competing financial interests exist for each author.

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