CASE REPORT

Combined Endoscopic and Laparoscopic Approach to a Gastroesophageal Tumor

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ABSTRACT

Background and Objectives: Smooth muscle tumors of the stomach, especially when benign, are a common clinical entity and can represent a therapeutic challenge. Classically the removal of such a tumor requires open laparotomy. We sought to perform this surgery utilizing minimally invasive technology.

Methods: We describe a minimally invasive technique combining laparoscopy with endoscopy to remove a submucosal leiomyoma at the gastroesophageal junction.

Results: A 3.3-cm smooth muscle tumor of the gastroesophageal junction was removed completely and safely with the described procedure and thus saved the patient from requiring a laparotomy.

Conclusion: Minimally invasive techniques can be used in combination to tackle difficult problems in general surgery leading to shorter hospital stays and improved patient satisfaction.

Key Words: Laparoscopy, Endoscopy, Leiomyoma, Gastroesophageal.

INTRODUCTION

Smooth muscle tumors of the stomach are common and typically grow within the wall of the stomach. The clinical presentation varies depending on location. Nearly two-thirds of benign smooth muscle gastric tumors are found within the submucosa along the greater curvature.[1] Although laparoscopic approaches to these tumors are not new,[2] tumors in the gastroesophageal (GE) junction prove to be more difficult to resect in the standard wedge fashion creating a therapeutic challenge. Classically, patients with tumors in this area would require an open operation. Herein, we report a combined laparoscopic and endoscopic approach to the removal of a submucosal smooth muscle gastric tumor near the GE junction that is both minimally invasive and safe, with the added benefit of avoiding an open operation.

MATERIALS AND METHODS

This procedure was performed on a 64-year-old female who initially presented with complaints of dysphagia. Preoperative CT scan and upper endoscopy diagnosed a pedunculated 3x3-cm mass near the GE junction. She otherwise had a history of diabetes, hypothyroidism, and hypertension.

After gaining pneumoperitoneum in the left upper quadrant, a 5-mm, 30-degree scope was introduced into the abdominal cavity. Additional ports used included a 5-mm epigastric port, a 5-mm port in the right subcostal margin, anterior axillary line, and a 12-mm port at the base of the falciform ligament. A complete diagnostic laparoscopy was performed to rule out any additional disease.

Endoscopy was then performed and the stomach was insufflated. A gastrotomy was made laparoscopically by using electrocautery and dilated with a Maryland dissector. A 12-mm Applied Medical Kii trocar was placed into the abdominal cavity under direct laparoscopic guidance and then manipulated into the stomach using both laparoscopic and endoscopic guidance. The 5-mL balloon on this trocar was then inflated allowing us to seal the stomach and tent it to the anterior abdominal wall along with the trocar's outer device **(Figures 1** and **2)**. Two addi-

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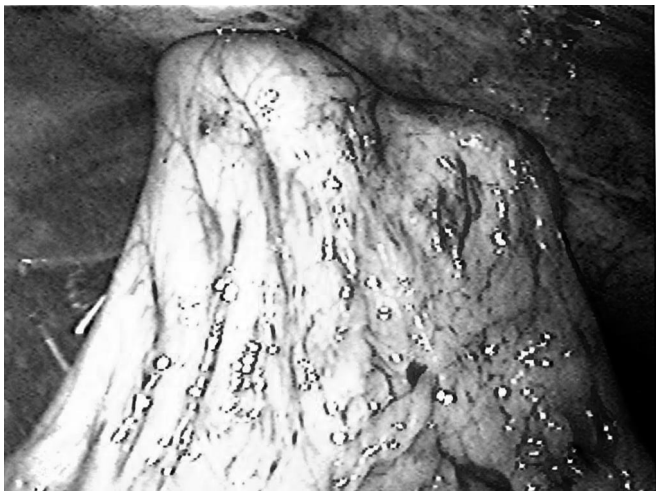

Figure 1. The stomach is tented to the anterior abdominal wall after placement of intragastric trocars.

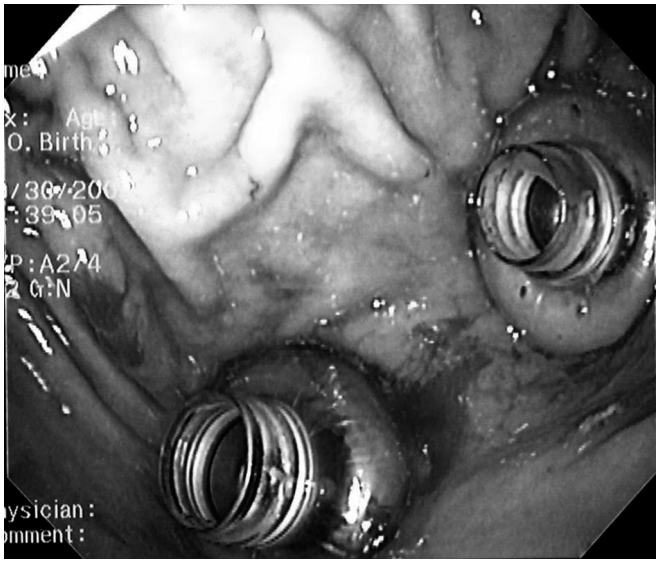

Figure 2. Endoscopic view of 2 intragastric trocars.

Figure 3. Retracting the submucosal tumor while the endoscopic defines the GE junction.

Figure 4. Resection of the tumor with an endo-GIA stapler.

tional 5-mm Kii trocars were placed into the abdomen and subsequently into the stomach in a similar fashion.

The endoscope was left in place to define the GE junction. The submucosal tumor was grasped and retracted away from the GE junction **(Figure 3)** while a 30-mm endo-GIA stapler was used to divide the mucosa just below the tumor separating it from the stomach **(Figure 4)**. There was no full-thickness injury to the stomach, and following the removal of the tumor the mucosa was noted to be intact. A small, bleeding vessel along the staple line was oversown with an intracorporeal silk suture to achieve hemostasis.

The specimen was removed using an EndoCatch bag. The endoscope was retroflexed, and the GE junction was intact. The trocars were removed from the stomach. The 2 port-site gastrotomies were resected by stapling a portion of the greater curvature with an endo-GIA stapler. The remaining gastrotomy was closed in 2 layers via intracorporeal suturing. The stomach was placed under saline to ensure no leaks were present. Lastly, the residual air was evacuated, and the endoscope was withdrawn. The remaining laparoscopic ports were removed and an endoclosure device was used to close the fascia at the 12-mm port site.

RESULTS

The patient stayed in-house for 3 days postoperatively. She was started on a regular diet on postoperative day 2 and was discharged without incident a day later. She reported no additional symptoms at her 2-week follow-up.

Pathology showed a leiomyoma with a maximal diameter of 3.3cm along with oxyntic type mucosa with chronic gastritis. There was no evidence of a GIST tumor or a schwannoma.

DISCUSSION

There are both benign and malignant varieties of smooth muscle tumors of the gastric wall. Because the majority of these tumors, when benign, grow within the submucosa,[1] this offers an opportunity to perform a minimally invasive resection as opposed to the standard laparotomy with similar long-term outcomes.[3] With recent advances, many groups have completed these operations laparoscopically[4] or even thoracoscopically[5] with good results. The earlier described laparoscopic approaches to gastric tumors were wedge resections, which work well for tumors in the body of the stomach,[6,7] but do not address tumors in the antrum or the GE junction.

Song et al[8] recognized the problem with wedge resections of tumors close to the GE junction and reported a transgastric approach where the tumor was everted through a gastrotomy created laparoscopically. While this allows minimal trauma to the stomach, it requires careful preoperative planning and patient selection to ensure proper gastrotomy placement.

A group from Seoul then reported performing resection of GE junction tumors laparoscopically via a transgastric approach where the stomach was opened with a linear stapler, the tumor resected using cautery, and the gastrotomy closed again using a stapling device. They noted that distal tumors could not be done this way due to the proximity to the pylorus.[9] This approach allows more adequate visualization of the gastric mucosa but obviously requires a larger gastrotomy.

Another option to these approaches would be to utilize endoscopy in addition to laparoscopy to assist in resection. Granger et al[10] used endoscopy in this manner to assist with localization and verify margins, but no interventions were performed via the intragastric approach in this setting. However, other groups have utilized endoscopy to guide intragastric port placement in resecting tumors in this manner.[11] This group resected the tumor with cautery (enucleation) and used anchoring stitches around the ports (versus the balloon ports presented here) to keep them in place. Another group[12] advocates endoscopic submucosal injection of saline and epinephrine to minimize blood loss during enucleation. They also raise the possibility of using 2-mm trocars to eliminate the need of closure of the gastric wall port sites.[12] Still other groups[13] utilize the endoscope even more, advocating dissection into the submucosa endoscopically using both an Argon laser and a diathermic electrosurgical knife followed by inverting the tumor away from the stomach and removing it with a laparoscopic stapler.

Our technique involved removal of the specimen through one of the trocar sites which, depending on the tumor's size, may involve enlarging the opening. Another option would be to remove the specimen transorally via the endoscope.[14]

Though not used here, endoscopic ultrasound (EUS) has been used by others to identify lesions as benign or malignant[15] and could be considered in a case such as this one for not only this purpose but also to assess the depth of a leiomyoma. It has been suggested that subepithelial tumors are more easily resectable via an endoscopic route when underlying muscle layers were seen on EUS.[16] Lesions involving the muscularis propria can easily be identified with EUS and have been known to harbor malignancy.[17,18]

Though EUS can guide fine needle aspiration, malignancy cannot often be determined by cytology.[17] Malignancy is usually determined by pathologic examination. Grossly negative margins are needed. Positive microscopic margins do not seem to influence outcomes, though re-excisions done with a minimally invasive technique has been described.[19]

CONCLUSION

Our technique offers the advantage of being minimally invasive while having excellent visualization of the tumor from both inside and outside of the stomach. Additional advancements could include utilizing the endoscope in a more active role, perhaps by providing retraction endoscopically, resulting in fewer ports being used and, subsequently, fewer gastrotomies. Further, while we closed 2 port-site gastrostomies using a stapler, these areas could also be closed with an endosuture technique as was done with the third gastrostomy site. Entirely endosutured closure may be more favorable if the gastrostomies are remote from one another or if closure with a stapling device

would either limit the stomach's volume too severely or interfere with the GE junction or pylorus. Certainly a wide variety of advanced laparoscopic and endoscopic skills may be required for these types of procedures. However, once these techniques are mastered they can be applied to this and other gastric pathology requiring surgical resection.

References:

1. Davis GB, Blanchard DK, Hatch GF, 3rd, et al. Tumors of the stomach. *World J Surg*. 2000;24(4):412–420.

2. Llorente J. Laparoscopic gastric resection for gastric leiomyoma. *Surg Endosc*. 1994;8(8):887–889.

3. Novitsky YW, Kercher KW, Sing RF, Heniford BT. Long-term outcomes of laparoscopic resection of gastric gastrointestinal stromal tumors. *Ann Surg*. 2006;243(6):738–745; discussion 745–737.

4. Feliu X, Besora P, Claveria R, Vinas X, Salazar D, Fernandez E. Laparoscopic treatment of gastric tumors. *J Laparoendosc Adv Surg Tech A*. 2007;17(2):147–152.

5. Li ZG, Chen HZ, Jin H, et al. Surgical treatment of esophageal leiomyoma located near or at the esophagogastric junction via a thoracoscopic approach. *Dis Esophagus*. 2009;22(2):185–189.

6. Tarcoveanu E, Bradea C, Dimofte G, Ferariu D, Vasilescu A. Laparoscopic wedge resection of gastric leiomyoma. *JSLS*. 2006; 10(3):368–374.

7. Palanivelu C, Rangarajan M, Parthasarathi R, Senthilkumar R. Laparoscopic resection for benign tumors of the stomach. *JSLS*. 2007;11(1):81–86.

8. Song KY, Kim SN, Park CH. Tailored-approach of laparoscopic wedge resection for treatment of submucosal tumor near the esophagogastric junction. *Surg Endosc*. 2007;21(12):2272–2276.

9. Hwang SH, Park do J, Kim YH, et al. Laparoscopic surgery for submucosal tumors located at the esophagogastric junction and the prepylorus. *Surg Endosc*. 2009;23(9):1980–1987.

10. Granger SR, Rollins MD, Mulvihill SJ, Glasgow RE. Lessons learned from laparoscopic treatment of gastric and gastroesophageal junction stromal cell tumors. *Surg Endosc*. 2006;20(8): 1299–1304.

11. Singaporewalla RM, Baladas GH, Lee TD. Laparoendoscopic removal of a benign gastric stromal tumor at the cardia. *JSLS*. 2006;10(1):117–121.

12. Walsh RM, Ponsky J, Brody F, Matthews BD, Heniford BT. Combined endoscopic/laparoscopic intragastric resection of gastric stromal tumors. *J Gastrointest Surg*. 2003;7(3):386–392.

13. Hiki N, Yamamoto Y, Fukunaga T, et al. Laparoscopic and endoscopic cooperative surgery for gastrointestinal stromal tumor dissection. *Surg Endosc*. 2008;22(7):1729–1735.

14. Uchikoshi F, Ito T, Nishida T, Kitagawa T, Endo S, Matsuda H. Laparoscopic intragastric resection of gastric stromal tumor located at the esophago-cardiac junction. *Surg Laparosc Endosc Percutan Tech*. Feb 2004;14(1):1–4.

15. Zhang W, Tong Q, Chen Z, et al. The usefulness of endoscopic ultrasound in the differential diagnosis between benign and malignant gastric ulcer. *Scand J Gastroenterol*. 2010;45(9): 1093–1096.

16. Hwang JC, Kim JH, Shin SJ, et al. Endoscopic resection for the treatment of gastric subepithelial tumors originated from the muscularis propria layer. *Hepatogastroenterology*. 2009;56(94–95):1281–1286.

17. Lee CK, Chung IK, Lee SH, et al. Endoscopic partial resection with the unroofing technique for reliable tissue diagnosis of upper GI subepithelial tumors originating from the muscularis propria on EUS (with video). *Gastrointest Endosc*. 2010;71(1): 188–194. Epub 2009 Oct 30.

18. Lee IL, Lin PY, Tung SY, Shen CH, Wei KL, Wu CS. Endoscopic submucosal dissection for the treatment of intraluminal gastric subepithelial tumors originating from the muscularis propria layer. *Endoscopy*. 2006;38(10):1024–1028.

19. Matthews BD, Walsh RM, Kercher KW, et al. Laparoscopic vs open resection of gastric stromal tumors. *Surg Endosc*. 2002; 16(5):803–807.