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Laparoscopic-assisted endoscopic full-thickness resection of large gastric schwannoma: A case repor

Laparoscopic-endoscopic resection of gastric schwannoma

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Abstract

BACKGROUND

Schwannomas, also known as neurinomas, are benign tumors derived from Schwann cells. Gastrointestinal schwannomas are rare and are most frequently reported in the stomach. They are usually asymptomatic and are difficult to diagnose preoperatively; however, endoscopy and imaging modalities can provide beneficial preliminary diagnostic data. There are various surgical options for management. Here, we present a case of a large gastric schwannoma (GS) managed *via* combined laparoscopic-endoscopic surgery.

CASE SUMMARY

A 28-year-old woman presented with a 2-month history of epigastric discomfort and a sense of abdominal fullness. On upper gastrointestinal endoscopy and endoscopic ultrasonography (EUS), a hypoechogenic submucosal mass was detected in the gastric antrum. It arose from the muscularis propria and projected intraluminally. Computed tomography (CT) showed a nodular lesion (4 cm × 3.5 cm) in the wall of the gastric antrum, that exhibited uniform enhancement on enhanced CT. Based on these findings, a preliminary diagnosis of gastrointestinal stromal tumor (GIST) was made, with schwannoma as a differential. Considering the large tumor size, we planned to perform endoscopic resection and convert to laparoscopic treatment, if necessary. Eventually, the patient underwent combined laparoscopic-gastroscopic surgery. Immunohistochemically, the resected specimen showed S-100 positivity and negativity of desmin, DOG-1, α-smooth muscle actin, CD34, CD117, and p53. Ki-67 index was 3%. A final diagnosis of GS was made.

CONCLUSION

Combined laparoscopic-endoscopic surgery is a minimally invasive and effective treatment option for large GSs.

Key Words: Gastric schwannoma; Laparoscopy; Gastroscopy; Immunohistochemical staining; Operation method; Case report

He C, Lin S, Chen Z, Li W, Weng C, Guo Y, Li G. Laparoscopic-assisted endoscopic full-thickness resection of large gastric schwannoma: A case report and Literature Review. *World J Gastrointest Surg* 2022; In press

Core Tip: GSs do not have specific clinical and endoscopic characteristics. As such, preoperative diagnosis may be difficult, and they can be misdiagnosed as GISTs. While laparoscopic resection is possible, it is difficult to determine the location of intraluminal tumors. On the other hand, endoscopic resection is only suitable for small submucosal tumors. Here, we present a case of GS excised using laparoscopic-gastroscopic cooperative surgery. We also performed a literature review on CT findings and surgical interventions used in the management of GIST and GS.

INTRODUCTION

Schwannomas are neurogenic tumors arising from Schwann cells. The most common site of GS is the stomach, followed by the colon and rectum[1]. They usually arise in the muscularis layer, with no specific clinical and endoscopic characteristics, and can frequently be mistaken for GISTs, which are more common[2].

There are various surgical options for managing GS, each with its pros and cons. Here, we report a case of GS that was resected using combined gastroscopic and laparoscopic surgery.

CASE PRESENTATION

Chief complaints

A 28-year-old woman presented with a 2-month history of epigastric discomfort and a feeling of abdominal fullness.

History of present illness

Two months prior to presentation, the patient developed epigastric discomfort, which was accompanied by a sense of abdominal fullness. She had no abdominal pain, melena, vomiting, or other discomfort.

History of past illness

The patient was a non-smoker and did not drink alcohol. She reported no known food or drug allergies. Additionally, there was no history of blood transfusion or prior surgical procedure.

Personal and family history

The patient reported no significant family history.

Physical examination

Clinical data on admission were as follows: body temperature, 36 °C; blood pressure, 120/84 mmHg; heart rate, 80 beats/min; and respiratory rate, of 16 breaths/min. The abdomen appeared flat and soft, and the patient did not experience any abdominal tenderness or rebound pain.

Laboratory examinations

No marked irregularities were detected in routine bloodwork, liver and kidney function tests, and electrolyte assay, tumor markers were also negative.

Imaging examinations

On upper GI endoscopy and EUS, we detected a hypoechogenic submucosal mass in the gastric antrum,that arose from the muscularis propria and projected into the lumen (Figure 1). CT images revealed a nodular lesion (4.5 cm × 4 cm), that showed homogeneous enhancement, in the wall of the gastric antrum(Figure 2).

INITIAL DIAGNOSIS

Our working diagnosis was GIST, with schwannoma as a differential.

FINAL DIAGNOSIS

Histopathological examination confirmed that the tumor was localized within the gastric muscularis propria. The tumor was well circumscribed and was made up of fusiform cells. Immunohistochemically, it showed: S-100(+), 3% Ki-67 index, desmin(-), DOG-1(-), α-smooth muscle actin(-), CD34(-), CD117(-), and P53(-). A final diagnosis of GS was reached(Figure 3).

TREATMENT

We began with endoscopic resection. Endoscopic full-thickness resection (EFTR) was conducted under general anesthesia with endotracheal intubation. A smooth, 5 cm in diameter, submucosal lesion was seen on the anterior wall of the gastric antrum. We marked the edge of the lesion, injected a solution of methylene blue and saline into the mucosa, and subsequently used a hook knife to gradually excise the tumor. Bleeding was minimal and easily controlled with electric hemostatic forceps. Following a successful EFTR, a large full-thickness defect was left in the gastric wall. Considering the large defect size, difficulty with endoscopic closure, and difficulty extracting the tumor *via* the esophagus, a supplementary laparoscopic surgery was conducted. The patient was placed in a supine position, and a tiny arc-shaped incision was made under the umbilicus. Next, the abdominal cavity was punctured using a pneumoperitoneum (PP) needle and filled with CO_2 gas to generate a 1.59 kPa PP. The PP needle was then removed. Subsequently, a cannula needle was used to puncture the abdominal cavity. The inner core of the cannula was removed, and the needle was placed into a laparoscope. Two trocar punctures were made on the left side of the abdomen, and two on the right side using the open technique. A 5.5 cm × 5 cm defect was detected in the anterior wall of the gastric antrum, approximately 2 cm from the pylorus, and surrounded by small amounts of bloody fluid. The 5 cm x 4 cm large, excised tumor

dropped into the abdominal cavity and was placed in an extraction pouch which was then removed *via* the main surgical incision. The edge of the defect in the stomach wall was trimmed using an ultrasonic knife. Then, the wound was closed with a 3-0 slippery thread. Finally, we confirmed lack of bleeding in the abdominal cavity, extracted the laparoscope, checked for appropriate retrieval of all instruments and gauze, and closed the incision and puncture sites with silk thread.

OUTCOME AND FOLLOW-UP

The patient recovered fully and was discharged on the 7th postoperative day. A check-up was performed 3 mo after the operation. Gastroscopy showed that the gastric wall was healing well. Figure 4 is the timeline.

DISCUSSION

Gastrointestinal (GI) mesenchymal tumors comprise a wide range of spindle cell tumors, including GISTs, leiomyomas, leiomyosarcomas, and schwannomas[3]. Schwannomas are spindle cell mesenchymal tumors that originate from Schwann cells. GSs originate from the gastrointestinal neural plexus. Most GSs are benign, and only a few malignant cases have been documented in the literature[4,5]. Schwannomas are generally asymptomatic, but in some instances, may cause abdominal discomfort, pain, or digestive symptoms. A palpable mass may be detected if the tumor is large and exophytic. Dysphagia and obstipation are potential symptoms when the lesions originate from the esophagus or rectum, respectively. Bleeding may occur if deep ulcerations are present[6,7].

GISTs are the most prevalent mesenchymal tumors of the GI tract, and 60–70% of cases occur in the stomach. They are similar to GSs in terms of age of onset, clinical manifestations, and gross and histological appearance. However, the prognosis differs. Schwannomas are almost always benign and have excellent prognosis, while 10–30% of GISTs are malignant[3]. Therefore, it is essential to distinguish between a GS and GIST and develop a targeted treatment plan. The diagnostic workup for gastric tumors

mainly includes upper GI endoscopy, CT, magnetic resonance imaging, and intracavitary (endoscopic) ultrasound. On endoscopy, both GS and GIST present as elevated submucosal lesions with a firm consistency. EUS of GS usually shows a hypoechogenic lesion originating from the muscularis propria[8]. Reports on EUS assessment show that round shape, definite borders, heterogeneous hypoechogenicity or isoechogenicity, and lack of cystic alteration and calcification are crucial markers for GS diagnosis. EUS of GIST usually shows a hypoechoic or anechoic and slightly heterogeneous tumor. Hyperechogenicity can be a sign of malignancy. GISTs usually lie in the third or fourth layer of the gastric wall, and rarely in the second layer[8]. Unlike GISTs, on CT, schwannomas appear to be uniform, significantly contrast-enhancing tumors with no evidence of hemorrhage, necrosis, cystic alteration, or calcification[9]. Despite these differences, making accurate preoperative diagnoses of GS and GIST is challenging.

In our patient, the tumor was detected on abdominal CT, and it was initially thought to be a GIST. Gastroscopic and EUS findings were not contradictory; therefore, the tumor was misdiagnosed as a GIST until the correct diagnosis was made based on the tumor's immunohistochemical profile.

GS rarely presents with specific clinical features and imaging characteristics. Therefore, preoperative diagnosis is challenging, and definitive diagnosis can only be made after careful pathological examination of the resected specimen. Given these challenges, surgical resection is the optimal treatment approach. Local extirpation, wedge resection, and partial, subtotal, or total gastrectomy are all acceptable approaches. Laparoscopic techniques can also be employed[10].

Submucosal gastric tumor therapies have greatly advanced in recent years, making way for minimally invasive endoscopic techniques like snare polypectomy, endoscopic submucosal dissection, and EFTR, to be used more often. Some studies have shown that EFTR is safe and effective for schwannomas and other tumors originating in the muscularis propria[11,12]. However, for larger gastric schwannomas, endoscopic

resection should not be indicated without careful consideration, because we believe this could increase the risk of surgery and the incidence of postoperative complications.

Although laparoscopic resection has potential in treating GS, it is difficult to precisely locate tumors that lie within the gastric lumen with a laparoscopic view from the serosal surface alone. As a result, a large portion of the stomach wall may be removed, leading to gastric deformity and gastric outlet obstruction. Laparoscopic endoscopic cooperative surgery (LECS) was first introduced by Hiki *et al*.[13] as a surgical intervention for GIST and is currently classified as "classical LECS." LECS is superior to laparoscopic or robot-assisted wedge resection and partial resection in that the gastric serosa resection area is substantially reduced, which lowers post-surgical gastric deformity and reduces the impact on patients' quality of life[14]. Subsequently, Mitsui *et al*[15]. developed another non-exposure technique, known as "non-exposure endoscopic wall-inversion surgery" (NEWS), that can prevent contamination and tumor dissemination into the peritoneal cavity. Only a few studies[13,15,16,17,18,19] have previously reported gastric schwannoma resection using LECS and NEWS (TABLE 1) . Shoji Y *et al*[20] report that LECS or NEWS is suitable for submucosal tumors less than 5 cm in diameter. In this case, because the diameter of the gastric tumor reached 5 cm, we felt endoscopic treatment alone might be complicated by difficulty in closing the gastric wall defect after tumor excision and in removing the specimen through the esophagus. Therefore, after discussing with the patient, we decided to remove the tumor endoscopically, and if difficulties arose, laparoscopy would be performed. This way, we could excise the tumor completely without removing a large part of the gastric wall, while causing minimal trauma and ensuring safety. The tumor was removed using a gastroscope. The large defect in the gastric wall after tumor resection was difficult to close; therefore, suturing was done laparoscopically. This combined surgery resulted in complete tumor excision and avoided wound expansion. Although our procedure differed from classical LECS in terms of surgical details, the principle of treatment was still to achieve complete resection of the lesion and avoid expanding the incision. Postoperative patient management included gastric acid inhibition, fluid replacement,

dietary restriction, and nutritional support. The patient was mobile on postoperative day 1. She recovered completely and was discharged from the hospital 1-week post-surgery. From this case we believe that laparoscopic-assisted endoscopic full-thickness resection can reduce the risk of endoscopic surgery, and at the same time achieve precise resection of lesions, which is worthy of further study.

CONCLUSION

GSs are uncommon and almost always benign. Despite advances in endoscopic and imaging techniques, accurate preoperative diagnosis of GS is difficult to make. Final diagnosis requires histopathological and immunohistochemical examination. Surgical resection is the optimal treatment option, and the emergence of techniques like EFTR has greatly increased the possibility of minimally invasive removal of small tumors. For larger GSs, combined laparoscopic-gastroscopic surgery is recommended for tumor resection.

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