Robotic-assisted surgical enucleation of esophageal gastrointestinal stromal tumor

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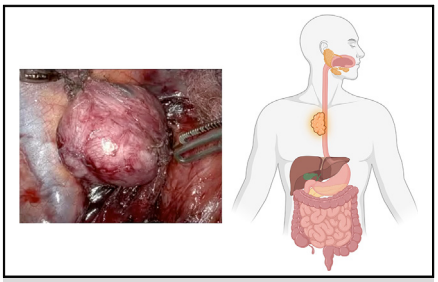


Esophageal mass exposed with visual diagram of mass location. Created with BioRender.com.

CENTRAL MESSAGE

Robotic-assisted surgical resection can be used to enucleate esophageal gastrointestinal stromal tumors and can be a safe and technically feasible procedure for treatment.

Video clip is available online.

BACKGROUND

Gastrointestinal stromal tumors (GISTs) are mesenchymal neoplasms of the gastrointestinal tract that derive from the interstitial cells of Cajal with the most common sites of occurrence being the stomach (60%-70%) and small intestine (20%-30%).[1,2] Esophageal GISTs (E-GISTs) are very uncommon, representing <2% of all GISTs and most commonly occur in the lower esophagus.[3-5] The rarity of E-GISTs makes treatment guidelines difficult. Thoracoscopic surgical approaches have largely been utilized in the management of esophageal lesions with few reports of robotic-assisted approaches for E-GISTs. Here, we report the successful treatment of a case of E-GIST utilizing robotic-assisted surgical resection after neoadjuvant chemotherapy with imatinib. The subject(s) provided informed written consent for the publication of the study data; institutional review board approval was not required.

CASE PRESENTATION

A 76-year-old male former smoker with diabetes mellitus and dermatofibrosarcoma presented initially for COVID-19 infection. A computed tomography scan incidentally showed a homogenous appearing ovoid low-attenuation mass displacing the esophagus to the left of the midline (Figure 1). The mass measured 4.4 cm in its largest dimension. Additionally, a mass was seen at the head of the pancreas. A follow-up endoscopic ultrasound showed the pancreatic lesion to be mixed main duct/branch duct intraductal papillary mucinous neoplasia with high-risk features. Fine-needle aspiration and cytology of the esophageal mass demonstrated spindle cells consistent with GIST. The patient at that time had been completely asymptomatic. It was recommended that the patient undergo a robotic Whipple procedure given the high-risk features followed by medical management and monitoring of the E-GIST. Shortly after the Whipple procedure, the patient began having symptoms of fullness after eating and mild reflux. A repeat computed tomography scan at follow-up showed no changes to the size of the mass and the patient opted for medical management of the mass with imatinib because he wanted to avoid surgery. The patient was unable to continue imatinib therapy due to rash and oral mucositis at approximately the 4-month time interval. A follow-up positron-emission tomography scan demonstrated a decrease in the mass now measuring approximately 3.0 cm, as well as mild residual F-fluorodeoxyglucose activity. Given his chemotherapy

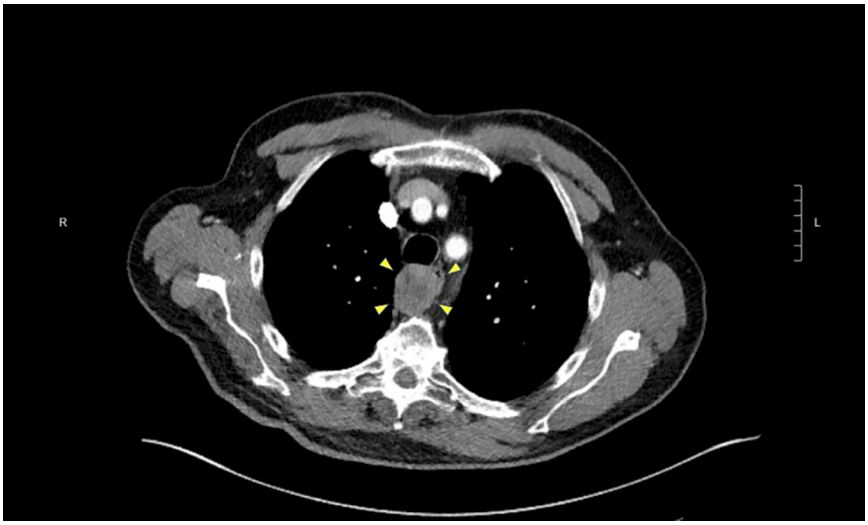
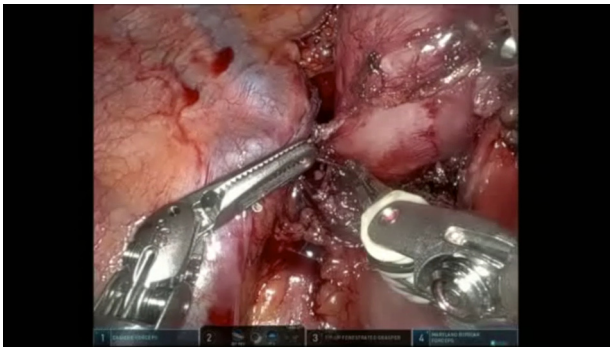


FIGURE 1. Computed tomography scan of esophageal gastrointestinal stromal tumors.

intolerance, the patient was referred to thoracic surgery to discuss surgical options. Given the options of esophagectomy versus enucleation, the patient preferred enucleation to avoid the morbidity of the esophagectomy.

ROBOTIC ENUCLEATION

The patient was placed in a left lateral decubitus position under general anesthesia. An 8-mm incision was made at approximately the posterior axillary line at the eighth intercostal space, where we entered in using carbon dioxide. Thereafter we placed 3 more additional 8-mm robotic ports. We then placed an additional 12-mm assistant port in approximately the eighth intercostal space more anteriorly. We performed this procedure with a 30° camera and Maryland bipolar, fenestrated bipolar, and tip-up graspers. We fired a stapler across the azygos vein with a 45-mm curved tip vascular load to allow for better visualization of the lesion. Thereafter, we dissected the pleura around the esophagus posteriorly and identified the location of the mass. The mass was carefully dissected off using a mixture of blunt dissection as well as electrocautery with the bipolar. There were longitudinal muscle fibers adhered to the mass, which were dissected carefully from the mass and the mass was removed en bloc. We verified that there was no mucosal injury (Video 1 and Figure 2). The mucosa was exposed and not breached. In this case, esophageal muscle was minimally involved with the GIST, and the overlying pleura was not removed with the mass because it was dissected with the azygos vein. A packet of mediastinal fat was then retrieved and placed over the esophageal muscular dissection with a running 3–0 Vicryl V-Loc suture. A mediastinal fat flap was used due to the low likelihood of injury of the mucosa during the dissection. Surgical pathology demonstrated a 3.2 cm, CD117-, and ANO1-positive spindle cell type GIST tumor. The patient's postoperative course was uneventful; esophagram on postoperative day 3 showed no evidence of a leak and the patient was discharged to home. The patient was continuing to recover well 12 months postprocedure with no new symptoms.



VIDEO 1. Right robotic enucleation of the esophageal tumor with mediastinal fat flap placement over the area of resection. Video available at: https://www.jtcvs.org/article/S2666-2507(23)00187-6/fulltext.

DISCUSSION

Enucleation of E-GISTs can differ from that of leiomyomas as they have the potential to be more adherent and invasive. In this case, a preoperative endoscopic ultrasound was performed to verify no involvement of the mucosa. There is also a higher potential risk of mucosal breach, at which point, depending on the extent of mucosal involvement we would primarily close versus abort the procedure.

We performed a literature review of the PubMed database using the keywords: *esophageal gastrointestinal stromal*

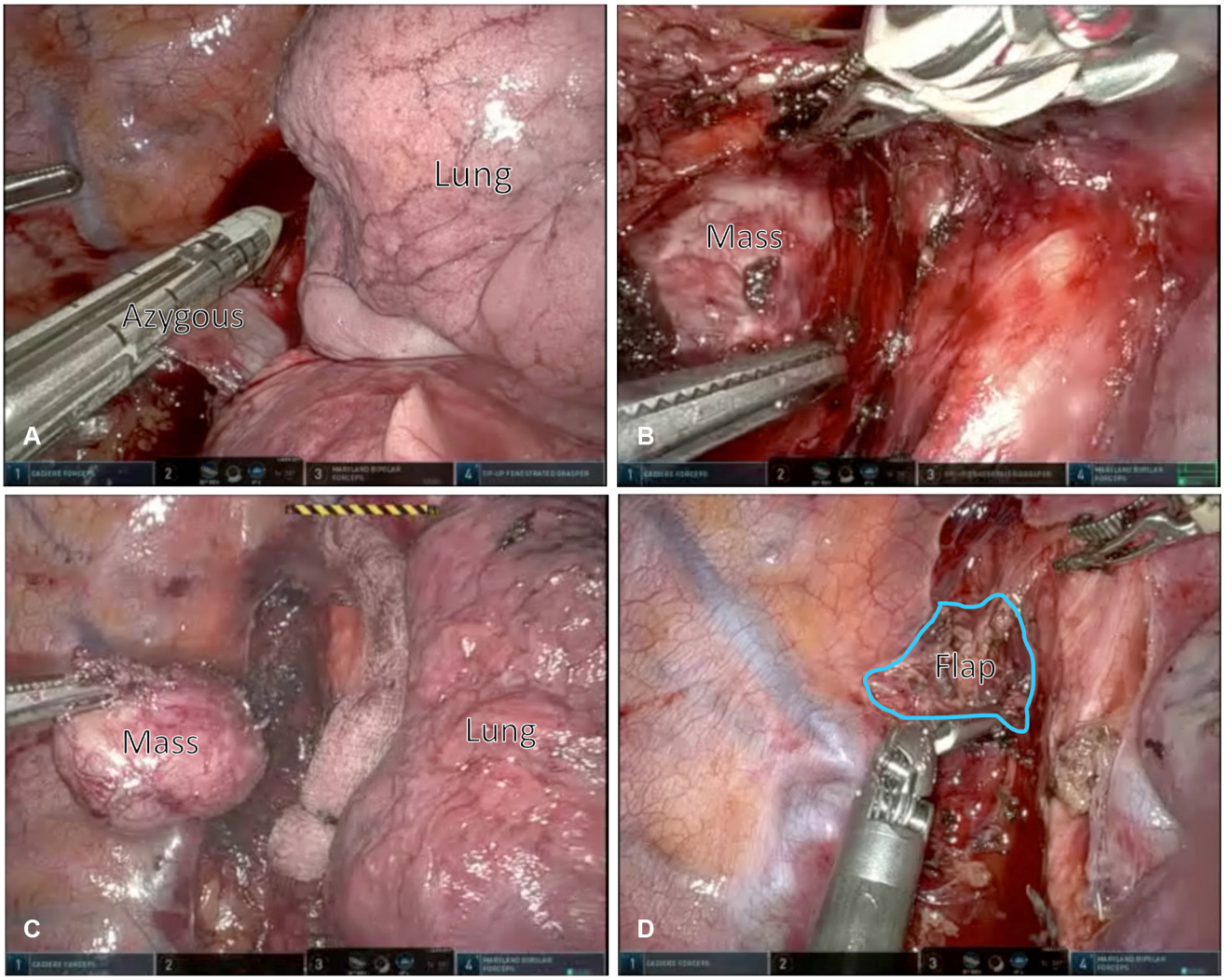


FIGURE 2. A, Exposure of the azygos vein. B, Dissection of tissue surrounding the mass. C, Mass after resection. D, Flap placement over the area of resection.

tumor and *robotic* returning 3 results. A 2021 case report by Yamamoto and colleagues[E1] describes the treatment of esophageal GIST with the use of robotic-assisted minimally invasive esophagectomy. A 2022 single-center case series reports the use of robotic-assisted surgery in 6 patients with esophageal submucosal tumors.[E2] Four patients underwent robotic enucleation (3 leiomyomas and 1 suspected GIST), whereas 1 patient with suspected GIST underwent reverse hybrid robotic esophagectomy.[E2] One patient with confirmed GIST was treated with neoadjuvant imatinib therapy followed by robotic esophagectomy.[E2]

CONCLUSIONS

We report the successful treatment of a case of esophageal GIST utilizing robotic-assisted surgical resection to enucleate the tumor. This method can be a safe and technically feasible treatment option.

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