Human hybrid endoscopic and laparoscopic management of mass lesions of the foregut (with video)

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Endoscopically unresectable mass lesions of the foregut are managed with surgical techniques that vary in complexity and postoperative morbidity. Lesions in the body of the stomach may be amenable to wedge resection; however, antral lesions may require antrectomy with gastroduodenostomy or gastrojejunostomy, and lesions of the gastroesophageal (GE) junction may require total gastrectomy with esophagojejunostomy. Although a wedge resection may have little impact on long-term quality of life, a total gastrectomy is a major resection with morbidity rates of 10% to 50% in the immediate postoperative period,[1-6] in-hospital mortality of 1% to 11%,[1-6] and a prolonged postoperative hospital stay of 10 to 20 days.[1-4,7] After discharge, patients with a subtotal or total gastrectomy may have a significant decrease in quality of life, with nausea, reflux, vomiting, bowel and bladder complaints, fatigue, and dumping syndrome. Patients often report that work, financial stability, home life, and recreation are affected.[8-12] Patients with lesions in the second portion of the duodenum may require a pancreaticoduodenectomy (Whipple procedure), a major operation with significant in-hospital morbidity and long-term quality-of-life implications.

Abbreviations: ESD, endoscopic submucosal dissection; GE, gastroesophageal; NOTES, natural orifice transluminal endoscopic surgery.

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Natural orifice transluminal endoscopic surgery (NOTES) has been reported in humans, primarily describing peritoneoscopy,[13-15] transgastric appendectomy,[16,17] and transgastric[18] and transvaginal cholecystectomy.[19] These procedures required technical advances and endosurgical proficiency; however, most human studies to date have recapitulated laparoscopic surgeries with an excellent safety profile and little impact on quality of life postoperatively.[20] Hybrid approaches merge minimally invasive laparoscopic and interventional endoscopic techniques and could enable more complex procedures, with a potentially greater benefit in outcome.

A minimally invasive, hybrid laparoscopic and endoscopic approach was developed for a highly selected subset of patients with mass lesions of the foregut. If successful, the approach could demonstrate the potential of NOTES and hybrid surgery, not in recapitulating standard management, but in offering an alternative for a subset of patients. The purpose of this study was to assess patient selection and outcomes in our early experience with such a hybrid approach for mass lesions of the foregut.

PATIENTS AND METHODS

Study design

This study was a single center, nonrandomized, retrospective, cohort study and was performed in a tertiary-care academic medical center. The study was approved by the Institutional Review Board for Emory University. All patients provided written informed consent for the surgical and endoscopic procedures described. For the hybrid procedures, patients were consented for the hybrid approach as well as for the corresponding standard surgical management (eg, total gastrectomy). The primary aim of the study was to examine the patient selection, procedural characteristics, and postoperative course for the first group of patients undergoing a novel hybrid endoscopic and laparoscopic surgery for mass lesions of the foregut. All data regarding preoperative pathologic diagnoses, presurgical imaging and endoscopic evaluation, operative details, final pathologic diagnoses, and postoperative course were abstracted from electronic patient records. Data were collected for patients offered hybrid management from July 2009 through April 2011. All hybrid procedures were performed by one attending surgeon (D.K., S.M., S.D.) and one attending gastroenterologist (F.W.).

Patients

Patients were considered for hybrid management when they had mass lesions in the foregut that were not deemed to be resectable by the referring gastroenterologist and the academic interventional endoscopist. The study site is a high volume center for EMR. Lesions that could be resected by EMR were removed at the time of the endoscopy and were not referred for consideration for hybrid management. Patients with lesions that were too large for EMR were referred for standard surgical management. Each patient was discussed at the weekly GI tumor board on a case-by-case basis. Options such as endoscopic submucosal dissection (ESD) and standard surgical management were discussed, in addition to the hybrid technique. As more hybrid procedures were performed, our understanding of an ideal lesion for the hybrid procedure was refined. Those with potentially amenable lesions were considered for the hybrid approach. All management options, risks, benefits, and alternatives, emphasizing the standard surgical approach, were discussed with the patients. Patients had to be candidates for surgery based on review of their performance status and comorbid conditions. Preoperative EGD, EUS with or without FNA, and cross-sectional imaging were done.

Hybrid endoscopic and laparoscopic procedure

All procedures were performed in the operating room with patients under general anesthesia in a supine position. The endoscopist was positioned at the patient's head. The surgeon stood on the left side of the patient and the first assistant on the right side. The abdomen was prepared and draped in standard sterile fashion.

A periumbilical, 12-mm Hasson port (Ethicon Endo-Surgery Inc. Blue Ash, OH) was placed by open technique or by using the optical view method. The abdominal cavity was insufflated to 15 mm Hg by using carbon dioxide gas. Two or more additional transabdominal ports were placed under direct visualization. The number of ports and port placement varied by procedure. The stomach was exposed and mobilized laparoscopically. The esophagus was intubated with a standard single-channel or double-channel Olympus upper endoscope (Olympus America Inc, Center Valley, Pa). The GI lesions were approached endoscopically under direct visualization and were then located laparoscopically by using both endoscopic and laparoscopic manipulation to confirm the positioning (Video 1, available online at www.giejournal.org). The target plane for resection was developed intraoperatively by using endoscopic and laparoscopic guidance, positioning, and endoscopic and laparoscopic manipulation to stabilize the lesion. In most cases, the lesion was stabilized and was pushed into a 5.5-cm needle tip endoscopic electrocautery snare (Cook Medical, Bloomington, Ind) (Fig. 1) with laparoscopic atraumatic bowel graspers positioned at the exterior aspect of the mass via the serosal surface of the gastric wall. In some cases, a rat-toothed forceps was introduced through the second channel of the endoscope to aid in positioning and constraint within the snare. Resection was performed by using electrocautery, augmenting the current as needed to transect the mass below the base. Resected mass lesions were retrieved orally by using a Roth net (US Endoscopy, Mentor, Ohio). The surgical team was prepared to perform laparoscopic closure if a full-thickness defect occurred. The surgical team also was prepared for the placement of intragastric trocars if needed for manipulation of the lesions. The endoscopic team was prepared for management of bleeding from the site with cautery or endoscopic clips as needed. The resection sites were tested for evidence of leakage by using water emersion and/or bubble testing as endoscopic insufflation was repeated with laparoscopic observation over the site. Patients failing the hybrid approach were converted intraoperatively to the corresponding standard formal surgical resection. All patients were admitted to the hospital for monitoring.

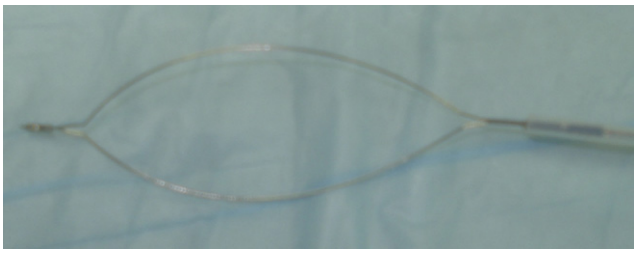

Figure 1. The 5.5-cm needle-tip electrocautery snare used for the hybrid procedure.

RESULTS

Between July 2009 and the end of April 2011, 7 patients were offered, and elected to undergo, a hybrid procedure. All patients were consented for the hybrid procedure and the formal surgical resection. Patients understood that if the hybrid approach was unsuccessful, they would proceed to standard laparoscopic or open surgical resection at the same procedure. There were 4 women and 3 men in the cohort. The age range was 32 to 63 years (Table 1).

In 3 patients, the mass lesion was located at the GE junction (Table 1). The first patient, on a preoperative biopsy, had a 2.6-cm adenomatous polyp with high-grade dysplasia (Fig. 2A). This patient underwent a successful hybrid resection and was spared a total or subtotal gastrectomy. Final histopathology revealed an intramucosal adenocarcinoma arising in a background of high-grade dysplasia (Fig. 3A). The deep and lateral margins of resection were negative for involvement. The second patient had a large, malignant-appearing, 3.3-cm mass (Fig. 2B) at the GE junction, for which a pathologic diagnosis could not be obtained despite 4 endoscopies with multiple biopsies and EUS with FNA. This patient underwent a hybrid resection of the GE junction mass. Complete resection was successful, and intraoperative frozen section was performed,