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Endoscopic-assisted laparoscopic surgical removal of a gastric neurofibroma in a child

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ABSTRACT

An 11-year-old boy, who presented with abdominal pain and vomiting was noted to have a gastric submucosal mass at endoscopy. Endoscopic ultrasound showed it arising from the fourth ultrasound level of the gastric wall precluding endoscopic removal. Open surgery was avoided by use of endoscopic-assisted laparoscopic surgery (EALS) to remove the mass. The mass was found to be an isolated gastric neurofibroma, a rare tumor in children. We show that combined use of intraluminal endoscopy and laparoscopic surgery allows for safe and less-invasive surgery for removal of a submucosal mass in a child. Further, we review the rare finding of gastric neurofibromas.

Submucosal gastric tumors present both a diagnostic and therapeutic challenge for surgeons and gastroenterologists alike. These tumors are most commonly identified as gastrointestinal stromal tumors (GIST) or leiomyomas; more rare tumors include leiomyosarcomas, schwannomas, and neurofibromas. The therapeutic approach to such tumors is dependent on the type of tumor (benign or malignant), location within the stomach, and depth within the gastric wall from which the tumor arises. Historically, open resection was the preferred therapeutic option, but advances in laparoscopic surgery and therapeutic endoscopy have led to less invasive options. Laparoscopic surgery and endoscopic resection each offer unique advantages over the other; combining the techniques offers the advantages of both procedures, a technique referred to as endoscopic-assisted laparoscopic surgery (EALS). This technique is well-established in adults. To date there have been no reports of EALS for the removal of submucosal gastric tumors in children. We report our experience with EALS for removal of a gastric neurofibroma in a child and offer a brief review gastric neurofibromas.

1. Patient report

An 11-year-old male presented with a several week history of abdominal pain and vomiting. The pain occurred daily without identifiable triggering or relieving factors, persisted for hours, and resolved spontaneously. The pain was localized to the epigastrium but was poorly characterized; it awakened him from sleep 5 days a week. He had associated vomiting, which was devoid of blood, coffee-ground material, and bile. He had no fever, diarrhea, rectal bleeding, jaundice, or weight loss. Past medical history was positive only for hospitalization for wheezing at 6 months of age, and incision and drainage of a suppurative lymph node at 2 years of age. Family history was significant for a hiatal hernia and gastroesophageal reflux in the father; there was no history of migraines, peptic ulcer disease, or inflammatory bowel disease. Examination revealed normal growth parameters, a normal abdominal examination, and a rectal examination negative for occult blood. Laboratory studies to include a complete blood count, erythrocytic sedimentation rate, and urinalysis were normal. He was placed on a weight-appropriate dose of omeprazole for 2 months, without improvement in the abdominal pain. An upper endoscopy was performed which showed erythema of the antrum without nodularity, erosion, or ulceration; a rapid urease test was positive within 15 min. A 1-cm submucosal mass with central ulceration was seen on the greater curvature of the body of the stomach (Fig. 1); it was non-compressible with closed biopsy forceps. Biopsies taken from the

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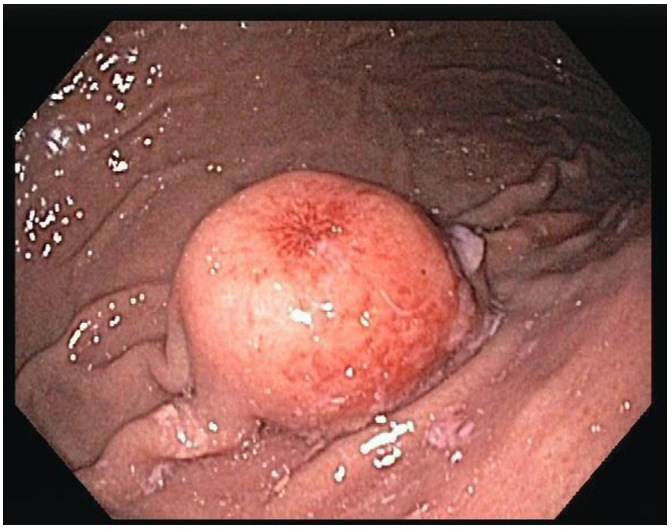

Fig. 1. Endoscopic features of the gastric tumor. At the initial endoscopy a firm, non-compressible mass with central ulceration was seen on the posterior wall of the stomach.

antrum revealed moderate active chronic gastritis with *Helicobacter pylori* (Hp) organisms identified on toluidine blue-stained sections. The patient was treated with a 2 week course of amoxicillin, clarithromycin, and lansoprazole for Hp-induced gastritis and repeat endoscopy scheduled for endoscopic ultrasound and biopsy of the mass.

One month later the patient had resolution of his abdominal pain, and stool for Hp antigen was negative. At repeat endoscopy the mass was determined to arise from the fourth ultrasound level of the gastric wall suggesting a gastrointestinal stromal tumor (Fig. 2). Attempts at fine needle biopsy were unsuccessful so a needle knife was used to open the mucosa followed by pinch biopsies of the mass. The mucosal defect was closed with endoclips. The biopsies showed a bland spindle cell neoplasm with lack of nuclear pleomorphism and mitotic activity within the tumor cells. Immunohistochemical studies showed that the tumor cells were diffusely positive for S-100 and negative for desmin, myogenin, CD117 and CD34 supporting a diagnosis of neurofibroma.

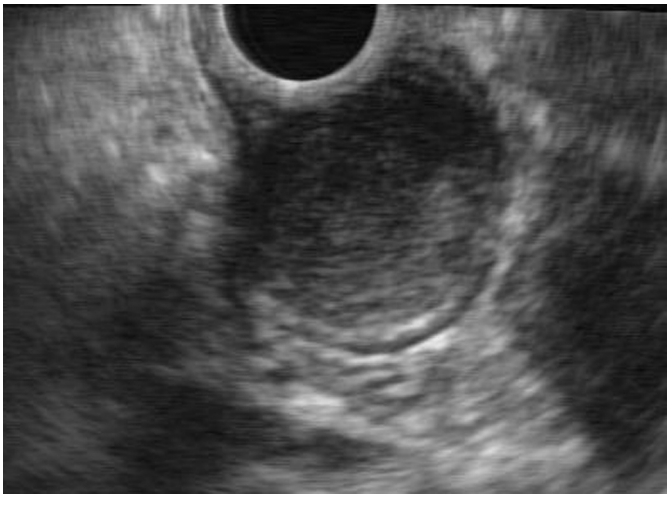

Fig. 2. Endoscopic ultrasound of the gastric tumor. Endoscopic ultrasound showed that the tumor arose from the fourth ultrasound level of the gastric mucosa representing the muscularis propria, suggestive for a gastrointestinal stromal tumor.

After discussion with the family and Pediatric Surgery, it was decided to perform endoscopic-assisted laparoscopic removal of the gastric mass. Following informed consent, placement of appropriate monitoring lines, and induction of general anesthesia, a 5-mm trocar was placed. Carbon dioxide was infused into the abdominal cavity to a pressure of 15 mm Hg. A 30-degree laparoscope was introduced into the abdominal cavity. Next, three 5-mm trocars were placed; one in the right upper quadrant and two in the left to mid upper quadrant. The stomach was examined laparoscopically, but the location of the mass could not be identified. The pylorus was then occluded with a grasper, and an upper endoscopy was performed showing a mass arising the on the posterior wall of the stomach (Fig. 3). The stomach was desufflated, and the short gastric arteries were taken down using a harmonic scalpel. The stomach was then turned to expose the posterior wall. Once again, the pylorus was occluded with a grasper, and upper endoscopy was performed. Pressure was applied to the gastric mass from within the stomach with biopsy forceps, and the tented-out stomach was grasped on the serosal surface through the laparoscope. The stomach was then desufflated, and an Endo GIA60 stapler™ (2.5-mm load) was placed across the stomach containing the gastric mass. Prior to deploying the stapler, the endoscope was advanced back into the stomach to confirm that the mass was successfully captured within the portion of the stomach to be removed. The stapler was then deployed to ligate and transect the portion of the stomach containing the mass. The stomach specimen was then removed through the umbilical port and submitted to pathology.

The tumor was a firm nodule ($2.0 \times 1.5 \times 1.5$ cm) with ulceration at the center (Fig. 4A), composed of interlacing bundles of bland spindle cells with wavy nuclei admixed with fibroblasts and characteristic dense bundles of collagen (Fig. 4B and C). Immunohistochemical studies again showed that the tumor cells were diffusely positive for S-100 and negative for desmin, myogenin, CD117 and CD34 confirming a diagnosis of neurofibroma (Fig. 4D and E).

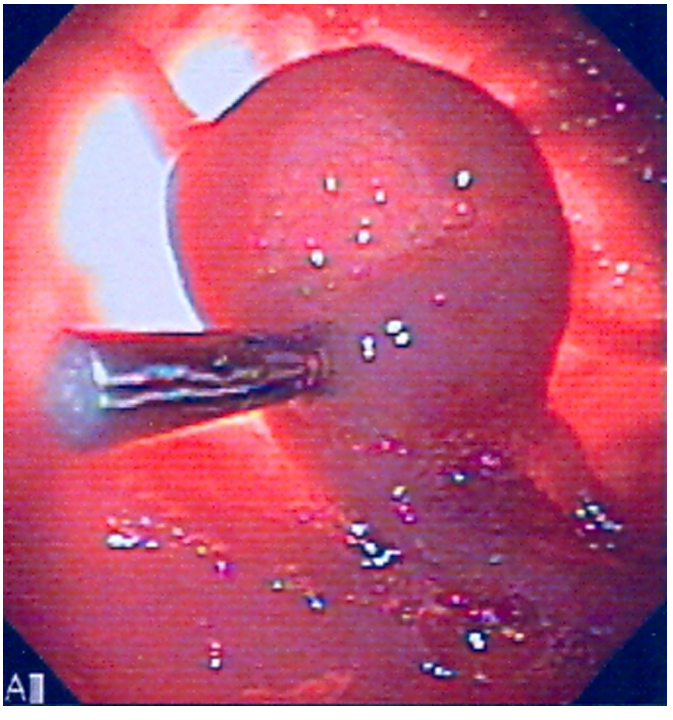

Fig. 3. Endoscopic findings at the time of surgery. At surgery, light from the laparoscopic illuminated the tumor. An endoclip from the previous biopsy is seen attached to the surface of the tumor.