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Benign gastric tumors

Minimally invasive approach

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Abstract
Background: Historically, major subsets of benign gastric tumors requiring surgical excision have required open laparotomy.
Methods: We have used laparoscopy to resect lesions in eight such patients. Lesion locations were gastroesophageal junction (one), gastric body (three), and pylorus (four). Four lesions were successfully located by instrument palpation. Six lesions were excised using gastrotomy, eversion of tumor, and resection, followed by stapled gastrotomy closure. The lesion at the posterior GE junction was evaluated through a gastrotomy and resected transgastrically. The two pyloric lesions were removed by laparoscopic distal gastrectomy and gastrojejunostomy.
Results: Procedure times were 55–210 min; oral feeding was instituted on postoperative day 1–5; patients were discharged 1–6 days postoperatively.
Conclusions: Benign tumors of the stomach may be approached and resected laparoscopically; a transgastric, intra-organ approach is safe and efficient; laparoscopic distal gastrectomy is safe and technically feasible; patients have a shorter recovery interval and shorter postoperative hospital stay. Cautious progress in this field is recommended.

Key words: Laparoscopic gastrectomy — Laparoscopic transgastric gastroscopy — Benign gastric tumor

Benign tumors of the stomach with broad-based polypoid configuration, or those in submucosal locations, have most often required open surgical excision. Most often, these patients must undergo either wedge resection of the stomach or formal gastric resection. The advent of technological advances in laparoscopic surgery meant these tumors might be treated by alternate, less-invasive approaches [3, 8]. In fact, investigators have reported technical success using a laparoscopic transgastric approach to intra-organ excision of early malignancies of the stomach combined with tumor removal endoscopically. It is not clear whether malignant tumors should be definitively treated by this methodology, but excision of benign tumors of the stomach, utilizing minimally invasive approaches, appears to be safe and effective. Therefore, to reduce the postoperative recovery interval, to diminish postoperative pain, and to reduce morbidity, we have used minimally invasive approaches to resect benign gastric tumors.

Methodology

In the past 24 months, we have encountered eight patients who have presented with benign tumors of the stomach which were either intimately involved with the muscular wall of the stomach or were polypoid on a broad-based stalk. Patients ranged in age from 47 to 72 years; three were males and five were females. Two patients presented with occult gastrointestinal (GI) bleeding, three presented with symptoms of intermittent gastric outlet obstruction, and two were asymptomatic—having been diagnosed inadvertently by upper GI radiographs or upper endoscopy performed for other reasons. One patient was diagnosed after massive upper GI bleeding requiring hospital admission and blood transfusions. Preoperative diagnosis was made in all patients using a combination of upper endoscopic biopsy and upper GI radiograph.

All patients underwent laparoscopy in which the intent was to perform local resection of the tumor using minimally invasive approaches. The location and size of each lesion were evaluated by utilizing transgastric palpation with an endoscopic Babcock and by reevaluation of the upper GI radiograph. In three patients, the lesions were accurately located within the body of the stomach (Fig. 1). In these cases, an anterior gastrotomy was performed, the lesion and associated gastric wall were everted through the gastrotomy, and the lesion and associated gastric wall were excised utilizing an endoscopic linear stapler/cutter with thick tissue staples (Fig. 2). The tumor was placed in a specimen bag and removed. The anterior gastrotomy was closed utilizing an endoscopic linear stapler followed by use of interrupted sutures. In one patient, the lesion was along the posterior wall near the gastroesophageal junction. It was impossible to ascertain either by preoperative assessment or by intraoperative transgastric palpation whether

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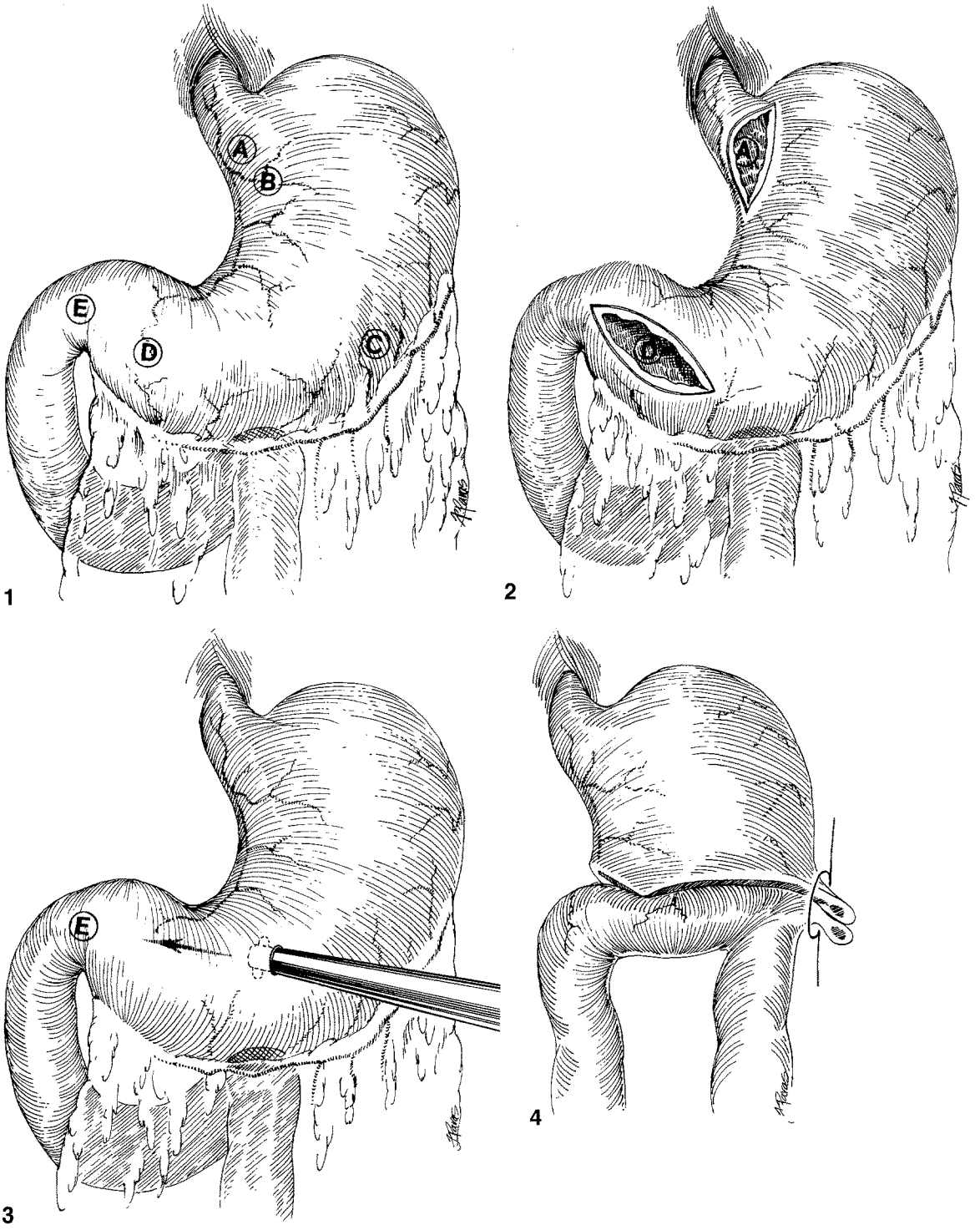

Fig. 1. Locations of benign gastric tumors. *Circles* within the stomach identify the locations of eight benign gastric tumors. Specific difficult locations included "*A*" and "*B*" location at GE junction and "*D*" and "*E*" locations at pylorus or prepyloric area, "*C*" location in body of stomach.
Fig. 2. Laparoscopic anterior gastrotomy. Figure delineates two examples of laparoscopic gastrotomies performed to locate, extract, and resect tumors.
Fig. 3. Laparoscopic trans-gastric gastroscopy. Illustration delineates placement of a transabdominal transgastric laparoscopic port to inflate stomach and perform gastroscopy with laparoscope. Technique is used to delineate exact location of gastric tumor.
Fig. 4. Laparoscopic distal gastrectomy. Illustration delineates distal gastric resection with Billroth II gastrojejunal anastomosis. Greater curvature of stomach and jejunal limb is retracted through left upper abdomen mini-incision to perform gastrojejunal anastomosis.

this lesion could be excised without disruption of the GE junction and lower esophageal sphincter. Therefore, an anterior gastrotomy was performed near the GE junction to assess the resectability of this lesion. This 7-cm leiomyoma of the posterior gastric wall was everted through the anterior gastrotomy along with its associated posterior gastric wall and resected utilizing the linear stapler/cutter without injury to the GE junction. The anterior gastrotomy was closed with a linear stapler/cutter and reinforced with sutures.

In four patients, the lesions were either at the pylorus or in the first portion of the duodenum. In these patients, assessment of the exact location of the lesion was performed by placing a transabdominal, radial, expanding dilator port (Radial Expanding Dilator [R.E.D.], Innerdyne Inc.) through

Table 1. Patients and outcomes

Age	Sex	Diagnosis	Operation Time (min)	Lesion		Treatment	Days in hospital
				Size (cm)	Location		
54	M	Leiomyoma	140	7.0	Posterior GE junction	Excision	3
47	M	Adenoma	55	3.0	Body	Excision	2
58	F	Adenoma	85	5.0	Body	Excision	1
58	M	Leiomyoma	130	4.0	Body	Excision	2
66	F	Adenoma	210	5.0	Pre-pylorus	Excision	4
72	F	Leiomyoma	190	4.0	Pylorus	Gastrectomy	6
67	F	Leiomyoma	160	4.0	Pre-pylorus	Excision	4
62	F	Adenoma	170	5.0	Pylorus	Gastrectomy	6

the abdominal wall, through the wall of the stomach, and into the lumen of the stomach (Fig. 3). This method obviates the need for upper endoscopy operatively to determine lesion location [2]. In two cases, more than one port was placed into the stomach to facilitate manipulation of the lesion. These ports were 5 mm in diameter. Simultaneous insufflation of the stomach and partial desufflation of the laparoscopy insufflation pressure allowed the 5-mm laparoscope to be placed through the transgastric port in order to evaluate the exact location and size of the four lesions near the pylorus. In one case, the lesion was obviously prepyloric on examination; in a second case, the lesion appeared to be in the duodenum, but it was retracted into the stomach and proved to be a tubular adenoma on a prepyloric stalk. These two former lesions were each excised utilizing a gastrotomy followed by excision of the tumor and associated gastric wall, as described earlier. The final two lesions were determined to be intimately involved in the pyloric channel and both were causing partial gastric outlet obstruction. Both of these lesions were leiomyomata. In each of these latter two cases, a laparoscopic-assisted gastric resection was performed along with a large Billroth II anastomosis [1] to a loop of jejunum (Fig. 4). In both of these cases, the stomach was mildly dilated. Therefore, a large gastrojejunostomy lumen was fashioned utilizing a 75-mm linear stapler. The stapler was introduced by retracting the greater curvature of the stomach and the antimesenteric border of the jejunum through a 33-mm incision in the left upper quadrant of the abdomen and by inserting the stapler into the greater curvature of the stomach and into the jejunum from the skin surface. Thus, the anastomosis was performed transabdominally, and the deep portion of the anastomosis was performed within the abdominal cavity. Reinforcement of the anastomosis was performed with a few seromuscular sutures.

All patients were placed on nasogastric suction postoperatively and a gastrografin upper GI radiograph was performed in the first 1–3 days postoperatively. When patients passed flatus, their nasogastric tubes were removed, and they were fed by mouth.

Results

Table 1 delineates pertinent information regarding each of the patients. In the four patients in whom the gastric tumor was in the body or adjacent to the GE junction, transgastric palpation with a Babcock clamp successfully determined the location of the tumor. In each of these tumors, the minimum diameter was 3 cm and maximum diameter was 7 cm. The intimate involvement of two of the tumors with the pylorus made it impossible to palpably delineate these two tumors. Further, one of the prepyloric lesions was on a stalk, allowing the tumor to sink through the pylorus and into the first portion of duodenum, and this was similarly not appreciated palpably.

In six of the eight cases, an anterior gastrotomy plus eversion of the tumor and its associated gastric wall allowed performance of resection utilizing a linear stapler/cutter. In all circumstances, a free margin of normal gastric wall was appreciated histologically. Further, the final diagnosis in all eight cases coincided with the preoperative diagnosis (Table 1).

The tumor at the posterior wall of the stomach near the GE junction required a diagnostic anterior gastrotomy in order to determine its resectability prior to resection by the eversion technique. The four lesions near the pylorus each required a translaparoscopic gastroscopy to adequately assess the exact location of the lesion in order to determine the most efficient method for extirpation. In two of the lesions, the anterior gastrotomy was determined to be the appropriate choice. In two other circumstances, the tumor intimately involved the pylorus, causing partial obstruction. In these latter two cases, a laparoscopic gastric resection was performed with Billroth II anastomosis [4, 6].

The postoperative hospital stay ranged from 1 to 6 days. The final determinant in deciding to discharge the patient was the ability to tolerate oral intake. The three patients with the longest hospital stay all had large distended stomachs and the clinical suggestion of partial gastric outlet obstruction. While two of these three patients had laparoscopic gastric resection as their treatment, all three acted as if the stomach (or gastric remnant) was atonic during the postoperative interval as determined by normal bowel sounds combined with a large amount of nasogastric return for 2–3 days postoperatively.

Discussion

Our experience with these eight patients has allowed us to become comfortable with a few important concepts associated with the minimally invasive treatment of being gastric tumors. The ability to palpate tumors 3–7 cm in diameter with a 10-mm Babcock by transgastric compression was impressive. Even tumors of the posterior gastric wall were palpated rather expeditiously. The only tumors whose location could not be palpated were those intimately involved with the pylorus. We, therefore, conclude that gastric tumors 3 cm in diameter or greater, should be palpable laparoscopically unless the tumor is near or involves the pylorus. Two techniques not used in this series, laparoscopic diagnostic ultrasound and preoperative upper endoscopy with tattooing of the adjacent gastric wall for laparoscopic identification, are likely to provide similar benefits during localization of tumor laparoscopically. The use of an anterior gastrotomy to evert and resect the tumor with attached normal gastric wall [8] has been universally successful. The excised specimens always had a normal rim of gastric wall indicating that an adequate resection with margins is possible utilizing this eversion technique with a linear stapler/cutter. Further, there were no gastric leaks from the resected

site or from the anterior gastrotomy sites, reinforcing the safety and efficiency of this method of closure of the wall of the stomach.

In each case, the preoperative biopsy diagnosis and/or the correlation with radiographic findings on the upper GI exam was consistent with the final histologic diagnosis for benign disease. We conclude that preoperative diagnosis of benign disease is an indicator that it is safe to treat these tumors by local excision.

Gastric resection was successfully used to remove two tumors involving the pylorus which had been causing partial gastric outlet obstruction [7]. These results confirm the safety and feasibility of performing gastric resection for benign tumors using the laparoscopic approach. Further, since these patients had dilated, atonic stomach, postoperative gastric atony contributed to a delay in their tolerance for oral feedings. This factor delayed their discharge from the hospital and, similarly, delayed the discharge of another patient who had a distended stomach but was treated with anterior gastrotomy and local excision. It would seem, therefore, that the atonic distended stomach will delay discharge of the patient from the hospital postoperatively, even if a gastric resection is performed. Billroth II anastomosis with a large anastomotic lumen was chosen instead of Billroth I anastomosis [5] to facilitate gastric emptying.

In order to maximize the emptying of the proximal gastric remnant following gastrectomy, the gastrojejunostomy was performed utilizing a 75-mm linear stapler. Since this stapler is not available in the laparoscopic variety, the greater curvature of the stomach and the anti-mesenteric border of the jejunum were brought to the skin level through a 33-mm port site in the left hemiabdomen.The process allowed the 75-mm stapler to be used to perform a successful large-diameter gastrojejunal anastomosis. Lastly, the 33-mm incision in the left upper abdomen was also used for extraction of the distal resected component of the stomach.

References

1. Anvari M, Park A (1994) Laparoscopic-assisted vagotomy and distal gastrectomy. Surg Endosc 8: 1312–1315
2. Clancy TV, Moore PM, Ramshaw DG, Kays CR (1994) Laparoscopic excision of benign gastric tumor. J Laparoendosc Surg 4: 277–280
3. Fowler DL, White SA (1991) Laparoscopic resection of submucosal gastric lipoma: a case report. J Laparoendosc Surg 1: 303–306
4. Goh P, Tekant Y, Isaac J, Kum CK, Ngoi SS (1992) The technique of laparoscopic Billroth II gastrectomy. Surg Laparosc Endosc 2: 258–260
5. Kitano S, Iso Y, Moriyama M, Sugimachi K (1994) Laparoscopy-assisted Billroth I gastrectomy. Surg Laparosc Endosc 4: 146–148
6. Lointier P, Leroux S, Ferrier C, Dapoigny M (1993) A technique of laparoscopic gastrectomy and Billroth II gastrojejunostomy. J Laparoendosc Surg 3: 353–364
7. Llorente J (1994) Laparoscopic gastric resection for gastric leiomyoma. Surg Endosc 8: 887–889
8. Lukaszczyk JJ, Preletz RJ (1992) Laparoscopic resection of benign stromal tumor of the stomach. J Laparoendosc Surg 2: 331–334