Laparoscopic Left Gastric Artery Aneurysm Resection

Vijay Kamath, MD¹ Anthony L. Rios, MD¹ Nitin Mishra, MD¹ Sandeep A. Sathyanarayana, MD¹
Kambhampaty V. Krishnasastri, MD¹ Eugene Rubach, MD²

¹ Department of Surgery, North Shore University Hospital, Manhasset, New York

² Department of Surgery, St. Francis Hospital, Roslyn, New York

Address for correspondence Anthony Rios, MD, North Shore University Hospital, 300 Community Drive, Manhasset, NY 11030 (e-mail: arios1@nshs.edu).

Int J Angiol 2016;25:e115–e117.

Abstract

Keywords

- aneurysm
- resection
- artery
- risk factors
- coil embolization
- repair
- laparoscopic

Aneurysmal degeneration of the visceral branches of the abdominal aorta is a rare and potentially life-threatening disease entity. Visceral artery aneurysms (VAAs) are exceedingly rare and have a prevalence of 0.1 to 2%. The left gastric artery aneurysm (LGAA) is even more rare and accounts for less than 4% of all VAAs. There is scarce literature on treatment of LGAA by embolization; however, to date successful laparoscopic repair of an LGAA has not been described. We describe the successful treatment of an LGAA by laparoscopic ligation and resection in a 68-year-old male patient.

Aneurysmal degeneration of the visceral branches of the abdominal aorta is a rare and potentially life-threatening disease entity^{1,2} with a documented prevalence of 0.1 to 2%.^{3,4} Visceral artery aneurysms (VAAs) most often involve the splenic, hepatic, celiac, and superior mesenteric vessels. Collectively, these splanchnic aneurysms frequently rupture, with an associated high mortality rate. Shanley et al⁵ reviewed cases of VAA from 1985 to 1995, reporting a mortality rate of 21% for ruptured hepatic artery aneurysms and 100% for ruptured celiac artery aneurysms. The left gastric artery aneurysm (LGAA) are even more infrequent, with an incidence of less than 4% of all VAA.⁶ As a result, there is a paucity of literature on the treatment of LGAA, most of which describe radiologic or endovascular embolization.^{7,8} To date, there have been no reported cases of successful ligation and resection of LGAA when performed using a laparoscopic approach.

Case Report

A 68-year-old man was referred for treatment of a known 2 cm LGAA. Medical and surgical history were significant for atrial flutter, hypercholesterolemia, and duodenal ulcer requiring endoscopic cauterization. The patient had developed epigastric and back pain which had prompted a work-up

including computed tomographic (CT) imaging with intravenous contrast (►Figs. 1 and 2) revealing LGAA. At that time, the patient did not have abdominal tenderness or a pulsatile mass on examination.

The patient underwent hematologic work-up to rule out polyarteritis nodosum and collagen vascular diseases. The cytoplasmic antineutrophil cytoplasmic antibodies and perinuclear antineutrophil cytoplasmic antibodies were not present in the blood. The C3 and C4 levels were found to be normal. His antinuclear antibody (ANA) level was within normal limits. Surgical treatments were discussed with the patient, including percutaneous embolization, laparoscopic and open ligation, as well as the option for conservative management. The patient opted for surgical resection of the aneurysm, feeling it would be the most definitive treatment.

The anatomy showing the LGAA was preoperatively delineated after reviewing the CT scan. A supraumbilical Veress needle, Step TM insufflation/access needle (Medtronic, Minneapolis, MN), was employed to establish pneumoperitoneum. A 10-mm flexible tip laparoscope was placed in the paraumbilical region for visualization. The flexible liver retractor was positioned through a right upper quadrant 5 mm trocar to provide upward retraction onto the left lateral segment of the liver. The operating surgeon worked through

Fig. 1 The celiac artery and superior mesenteric artery originating from the aorta. A white arrow indicates the left gastric artery aneurysm.

one 5-mm subxyphoid port and one 5-mm left midabdominal port. Finally, one 12-mm left subcostal trocar was placed for the assisting surgeon. A total of five trocars were used (►Fig. 3). Dissection began with opening the pars flaccida of the gastrohepatic ligament with ultrasonic scalpel. The origin of the left gastric artery was identified and skeletonized circumferentially using a combination of blunt dissection and hook electrocautery (►Fig. 4). The inflow of the aneurysm was then occluded at the neck of the aneurysm immediately adjacent to the celiac trunk, using a laparoscopic vascular TA stapler (Covidien Multifire Endo TA, Medtronic, Minneapolis, MN) with a 30-mm white vascular load (2.5 mm staple height). The outflow of the aneurysm was dissected immediately adjacent to the lesser curve of the stomach and

Fig. 2 Shown is a computed tomography with three-dimensional reconstruction of the left gastric artery aneurysm (arrow), with clear visualization of the aorta, celiac artery, and superior mesenteric artery.

Fig. 3 One 10 mm Hasson trocar was paraumbilical. Three 5 mm ports were placed, two laterally and one in the epigastrium. A 12 mm port to allow passage of a stapler was placed in the left subcostal region.

Fig. 4 The liver is patient right (1), while the lesser omentum is patient left (2). The black arrow indicates the left gastric artery aneurysm.

Fig. 5 Liver margin (1) and lesser omentum (2), with arrow pointing to the staple line of the excised left gastric artery aneurysm.

divided using a GIA stapler (Covidien Endo GIA, Medtronic, Minneapolis, MN) with a 30-mm gray vascular load (2 mm staple height) (►Fig. 5). The aneurysm was opened to ensure the absence of any remaining flow through the sac, excised, and passed off the operating table as a specimen. Laparoscopic trocar sites were closed in the usual fashion with 0 Vicryl (Ethicon, Johnson and Johnson, New Brunswick, NJ) for fascia and 4-0 Monocryl (Ethicon) for the skin. Laparoscopic ligation of the LGAA was performed without complication.

The aneurysm wall was preserved in formalin for microscopic analysis. The final pathology was consistent with a true LGAA. Postoperative recuperation was uncomplicated and the patient was discharged from the hospital after an overnight stay. After his 6-month postsurgical follow-up, the patient is doing well.

Discussion

The management of visceral aneurysms, in particular LGAA, is challenging because of their difficult anatomical location. VAAs historically have been managed by close surveillance or in some cases open surgical intervention. Current open surgical therapeutic options for VAAs include aneurysm resection with revascularization, aneurysm ligation, or end-organ resection in the case of the splenic artery aneurysms. Endoluminal ablation of VAAs has been shown to be highly technically successful,⁹ but the concern of aneurysm reperfusion persists.¹⁰ Furthermore, ablative endoluminal therapy often requires highly radiodense materials, such as glue and coils, making postoperative surveillance for aneurysm reperfusion and parent vessel patency suboptimal.¹¹ As described in this case report, laparoscopic approaches to managing VAAs may offer an alternative to conventional open surgery, providing the benefit of lower procedural morbidity secondary to a smaller incision while maintaining the ability to sample tissue for pathologic analysis.

Open aneurysm resection remains the gold standard but has limitations. First, open surgical repair in difficult anatomic locations is often laden with technical challenges which can potentially increase the associated morbidity of the repair. Furthermore, the patient cohort presenting with VAA often presents with significant comorbidities including pancreatic and hepatobiliary diseases, which elevate the risk of major operative vascular reconstructions.

Given the inherent problems with both endovascular and open methods for the treatment of VAAs we propose laparoscopic resection as a safe and viable alternative for a selected subset of patients. Elective laparoscopic management of

aneurysms in the visceral circulation was first reported in 1993. A further search of the literature revealed only one case report of laparoscopic *ligation* of an LGAA¹² but no reports involving laparoscopic resection. The ability to perform laparoscopic resection for visceral arterial aneurysms is a crucial step in permanently tackling this life-threatening problem. Resection is superior to endoluminal techniques as the underlying pathology is removed, the tissue is obtained for analysis, and the need for prolonged radiological follow-up with potential reinterventions is eliminated. To our knowledge, this is the first report of laparoscopic resection of an LGAA, taking the role of laparoscopy a step forward in the management of all VAA.

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