

Laparoscopic Diverticulectomy for Massive Hemorrhage in a Duodenal Diverticulum

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Abstract: Hemorrhagic duodenal diverticula are rare and are treated by endoscopy or open diverticulectomy, especially when there is a massive hemorrhage. We report what we believe to be the first instance of urgent laparoscopic diverticulectomy of a large, inflamed duodenal diverticulum with massive hemorrhage. An elderly patient had a screening colonoscopy and additional upper gastrointestinal endoscopy because of vague upper gastrointestinal symptoms; however, both were reported to be normal. She subsequently developed massive hematemesis. Clinical examination revealed a tender right upper quadrant mass and imaging confirmed a large duodenal diverticulum with surrounding inflammatory changes. Urgent laparoscopic diverticulectomy was performed with an uneventful recovery and follow-up. Laparoscopic diverticulectomy should be considered in managing hemorrhagic duodenal diverticula.

Key Words: duodenal diverticulum, massive hemorrhage, laparoscopic diverticulectomy

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The duodenum is the second most common site of diverticula in the alimentary tract after the colon, followed by the jejunum, the ileum, and the stomach.¹ Although duodenal diverticula were first described by Chomall in 1710, the first well-documented report was by Morgagni in 1762. The true incidence of duodenal diverticula is unknown because of its asymptomatic nature in majority of the cases. However, published literature quote incidences ranging from 0.16% to 22%, depending on the diagnostic method.^{1–3} About 5% of patients presented because of complications, which include chronic upper abdominal pain, hemorrhage, perforation, diverticulitis, duodenal obstruction, duodenal ulcer, obstruction of the main biliary or pancreatic duct, ascending cholangitis, or pancreatitis.^{1–6}

We present a case of a juxtaepapillary, extraluminal duodenal diverticulum whose fundus projected from the anteromedial aspect of the second part of the duodenum, which was inflamed but not perforated. This patient presented with massive upper gastrointestinal bleeding after

upper endoscopy. The condition was successfully managed by aggressive resuscitation followed by an urgent laparoscopic duodenal diverticulectomy.

CASE REPORT

An 80-year-old woman of Asian descent visited her gastroenterologist with complaints of weight loss despite increasing her dietary intake. She had screening colonoscopy 10 years before this presentation, which was normal. At the time of presentation, she also suffered from intermittent epigastric pain for which she self-medicated with apple cider and honey. She was subjected to another screening colonoscopy, which was normal. An upper gastrointestinal endoscopy of the second part of the duodenum (with an end-viewing endoscope) was also reportedly normal. Immediately after the procedure the patient complained of malaise, which was followed by episodes of massive hematemesis. Prompt resuscitation was commenced, and she was admitted to the intensive care unit for invasive monitoring and continued support while further management was decided. On examination, she was found to have a tender mass in the right upper quadrant. The rest of the abdomen was soft. Her hemoglobin, which was 13 g/dL before endoscopy, fell to 8 g/dL and 2 units of packed red blood cells were transfused.

Computerized tomography scan of the abdomen with oral and intravenous contrast demonstrated a 7-cm right upper quadrant mass anterolateral to the second part of the duodenum, anterior to Gerota fascia, superior to the hepatic flexure of the colon and inferior to the gall bladder (Fig. 1). There was some free fluid in the abdomen with stranding of the mesentery surrounding this mass, but there was no free air. Liver biochemistry tests were normal.

After the patient was stabilized hemodynamically, urgent laparoscopy was undertaken. Pneumoperitoneum was created through a supraumbilical open Hassan-type port. A 12-mm port was inserted superiorly in the right midclavicular region and another in the epigastrium. Two 5-mm ports were placed in the left abdomen. The diverticulum was easily visible, as it protruded from beneath the gastrocolic omentum (Fig. 2). There was murky peritoneal fluid collection but no blood. Peridiverticular dissection was performed using the harmonic scalpel (ETHICON) until the neck of the diverticulum was identified by the observation of muscle fibers. The mass was quite friable in several areas and was inadvertently entered (Fig. 3). During dissection, the diverticulum was found to be protruding through the pancreatic tissue at the posterior and medial aspect of the second part of the duodenum. The neck was well exposed to ensure that no other structure (bile or pancreatic duct) was engaged by the stapler. The base was wide and viable, and diverticulectomy was executed with the Echelon 60-mm (white) linear stapler (ETHICON) (Fig. 4).

The operative procedure took 105 minutes. The patient had an unremarkable postoperative recovery and was started on liquids on third postoperative day. She was discharged home on a normal diet on the fifth postoperative day. The histologic findings were consistent with inflamed duodenal mucosa. She had no complaints up to 6 months postoperatively and liver function tests remained normal.

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FIGURE 1. Transverse section of computed tomography scan of the abdomen with oral and intravenous contrast showing a large duodenal diverticulum with an air/fluid level of mixed density.

DISCUSSION

Diverticula of the alimentary tract can be categorized as either “true” (the diverticular consisting of all layers) or “false” (consisting of mucosa only). Duodenal diverticula are classified as “false” and can be intraluminal or extraluminal and single or multiple. Depending on its relation to the ampulla of Vater, the extraluminal duodenal diverticula may be periampullary (containing the ampulla of Vater or the intraluminal portion of the common bile duct) or juxtapapillary (within a radius of 2 cm of the major papilla but not containing it). Diverticulum of the second part of the duodenum is the most common site (85% to 90%) and of these >95% project from the inner or pancreatic border, making them more difficult to treat surgically.^{1,3}

The juxtapapillary position is the placement most frequently seen and accounts for 70% of all duodenal diverticula.³ They occur in the latter decades of life, the majority being discovered incidentally,¹ requiring treatment only when they become symptomatic. Although there is no characteristic symptom-complex from which one may make a positive diagnosis of duodenal diverticulum, the peptic ulcer like syndrome has been noted in several patients;

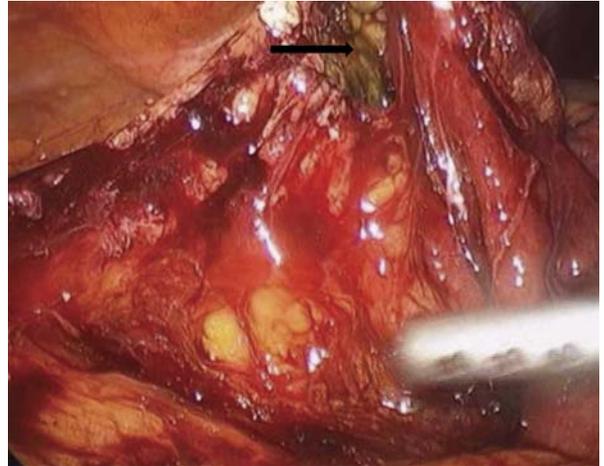


FIGURE 3. Arrow showing the inner wall of the diverticulum which appears inflamed.

however, in the absence of ulcers, the symptoms may be because of inflammation and stasis in the sac.¹

Hemorrhage from a duodenal diverticulum is considered a rare complication. Patterson and Bromberg⁷ were the first two investigators to document duodenal diverticular bleeding. Since the endoscopy era, Ryan et al⁸ described the first endoscopic diagnosis of duodenal diverticulum and Sim et al⁹ performed the first endoscopic hemostasis of duodenal diverticular bleeding. Chen et al² found that endoscopy had become the first line of therapy for this disease. However, in our case, endoscopy was not only unable to diagnose the condition but may have even provoked the massive bleeding which followed the procedure.

Since the early 20th century, when Forsell and Cey performed the first surgical treatment for duodenal diverticulum, the surgical approach to the complicated duodenal diverticulum has been in the form of an open technique. Resection of the diverticulum after Kocher maneuver and repairing the defect transversely with 1 or 2 layer closure has been described most frequently, but more invasive surgery such as the Whipple procedure may be required



FIGURE 2. Large duodenal diverticulum under the gastrocolic omentum seen at laparoscopy.

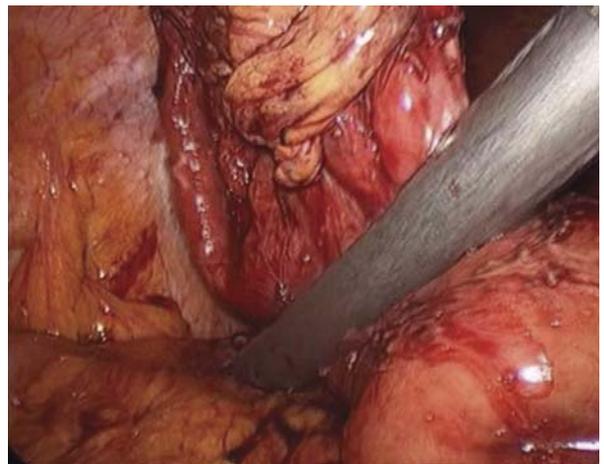


FIGURE 4. Stapling of the diverticulum at its base with the 60-mm Echelon linear stapler.

based on the location, the degree of inflammation, or the diagnostic dilemma.^{3,5} The laparoscopic approach has been reported sparsely in the literature. In 1994, Callery et al. reported the first laparoscopic resection with a stapler and Coelho et al reported laparoscopic inversion in 1999.^{10,11} In recent times Graur and colleagues reported the laparoscopic resection of a diverticulum (2 cm in diameter) with an endo-gastrointestinal anastomosis linear stapler in a 35-year-old woman with a history of upper abdominal pain, nausea, and regurgitation. This diverticulum on the external border of the second part of the duodenum was diagnosed using upper gastrointestinal radiography.³ Lee et al⁵ reported laparoscopic diverticulectomy for a perforated duodenal diverticulum in a 61-year-old woman, where the opening of the diverticulum was closed in 2 layers using an intracorporeal hand-sewn sutures. Kella et al⁶ reported a case of laparoscopic duodenal diverticulectomy and choledochoduodenostomy in a 78-year-old woman with an abnormal cholestatic liver function profile and dilated common bile duct who complained of upper abdominal pain.

To our knowledge, there has been no published report of laparoscopic management of a large inflamed duodenal diverticulum with massive hemorrhage, our case being the first reported one.

CONCLUSIONS

Duodenal diverticula are usually asymptomatic. They can present with inflammation resulting in perforation or bleeding and also cause obstruction of the common bile duct or duodenum. Surgery is reserved for these complications. Diagnosis can be elusive with a combination of barium upper gastrointestinal study, endoscopy, and computed tomography scan being useful. Diverticulectomy is regarded as the safest treatment option. The laparoscopic

approach offers a safe and minimally invasive approach for diverticulectomy.

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