Brief Report

Gastropericardial Fistula after Laparoscopic Surgery for Reflux Disease

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LAPAROSCOPIC approaches are now commonly used to treat gastroesophageal reflux disease.[1,2] Many studies have demonstrated the safety, efficacy, and durability of these minimal-access procedures.[3] However, the learning curve for performing laparoscopic surgery in patients with reflux disease is steep,[4] and intraoperative complications can be life-threatening.[3] Reviews of long-term complications have shown that failed repairs (a "slipped wrap" or paraesophageal or hiatal hernia) can cause substantial morbidity.[3,5] We report a case in which a life-threatening, gastropericardial fistula was a late complication of a laparoscopic Nissen procedure.

CASE REPORT

A 70-year-old man who was visiting Boston came to the emergency room in January 1998 with pain in his left shoulder that radiated to his neck. The hematocrit was 16 percent. His medical history included symptomatic gastroesophageal reflux that was refractory to medical therapy and prostate cancer, which had been treated with local radiation therapy two years earlier.

In December 1996, the patient had undergone a laparoscopic Nissen fundoplication, with resolution of his reflux symptoms. The surgery was performed with a five-trocar technique. The stomach was easily reduced into the abdomen from the hiatal hernia. The short gastric arteries were divided. The right and left diaphragmatic crura were not closed behind the wrap. A complete fundal wrap of the intraabdominal esophagus was performed around an intraluminal bougie. Two nonabsorbable, nonpledgeted sutures secured the posterior portion of the wrap, the esophagus, and the anterior portion of the wrap. The wrap was not secured to the undersurface of the diaphragm.

Several months after the surgery, atrial fibrillation and congestive heart failure developed. The atrial fibrillation converted to sinus rhythm with medical therapy. On Thanksgiving Day, 1997, the patient had sudden, severe abdominal pain, which abated after a drenching sweat. Although he did not have additional episodes of severe pain, he had chronic postprandial pain. He lost 9 kg in weight, had intermittent fevers, with temperatures as high as 39.4°C, and had nocturnal sweats.

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In the emergency room, the patient was initially given sublingual nitroglycerin, but his blood pressure fell to 92/60 mm Hg. Hypotension was corrected with fluid resuscitation. He had left supraclavicular adenopathy and an enlarged prostate gland. Blood cultures obtained on admission grew anaerobic bacteria. Cardiac enzyme levels were not elevated, but the electrocardiographic find-

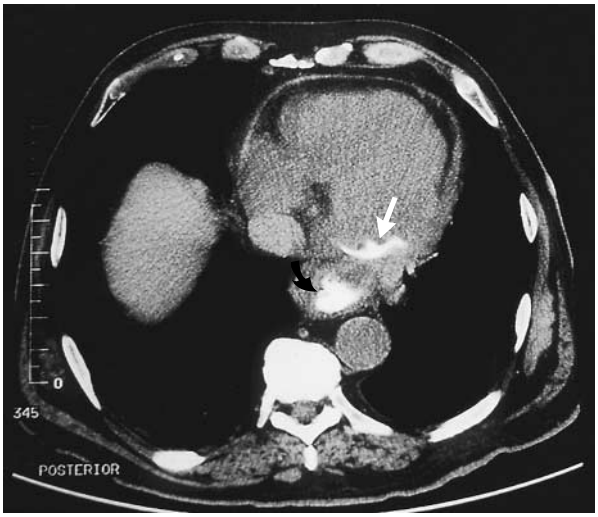


Figure 1. Computed Tomographic Scan of the Chest Obtained after the Oral Administration of Contrast Material.

Contrast material is present in the lumen of the hiatal hernia (curved arrow) and within the pericardium (straight arrow). The posterior pericardium is thickened.

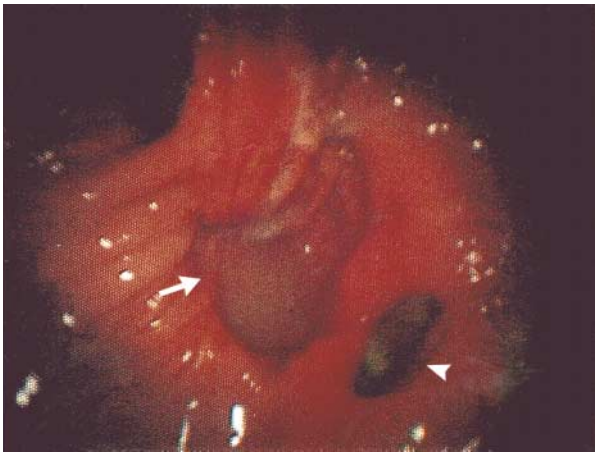


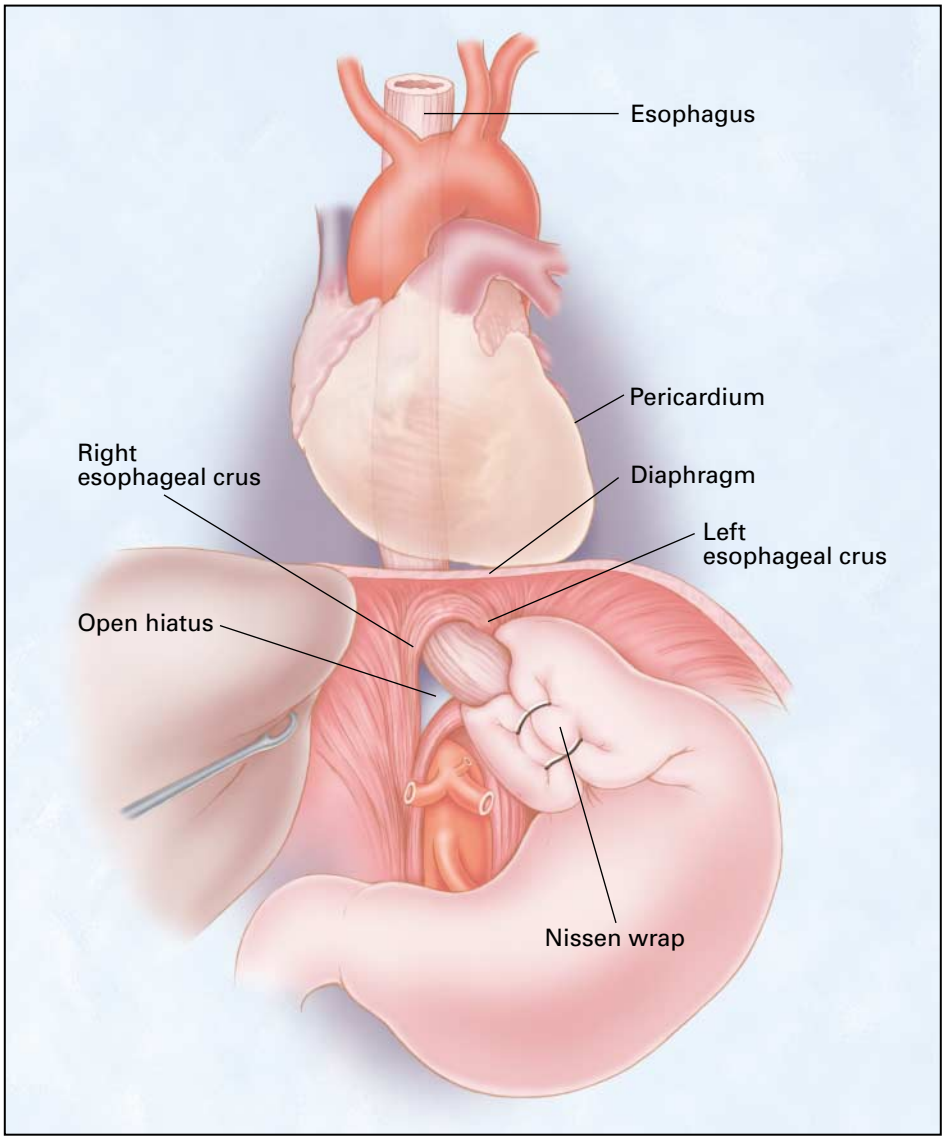
Figure 2. Endoscopic Retroflexed View of the Gastroesophageal Junction, Showing the Lumen of the Hiatal Hernia (Arrow) and the Crater of the Ulcer (Arrowhead).

The beating heart was seen at the base of the crater.

ings suggested the presence of an old inferior infarct. An echocardiogram showed posterior-wall hypokinesis, with an ejection fraction of 60 percent. A computed tomographic scan of the chest, obtained after the oral administration of contrast material, showed a sliding paraesophageal hernia and suggested the extravasation of contrast material within the pericardium (Fig. 1). Gastroscopy showed a gastric ulcer, 2 cm in diameter, high on the lesser curvature of the stomach; the beating heart was seen through the crater of the ulcer (Fig. 2). Biopsy specimens contained no cancer cells.

Vancomycin, levofloxacin, and metronidazole were administered. A specimen from a biopsy of the left supraclavicular node contained metastatic adenocarcinoma, with immunostaining for prostate-specific antigen.

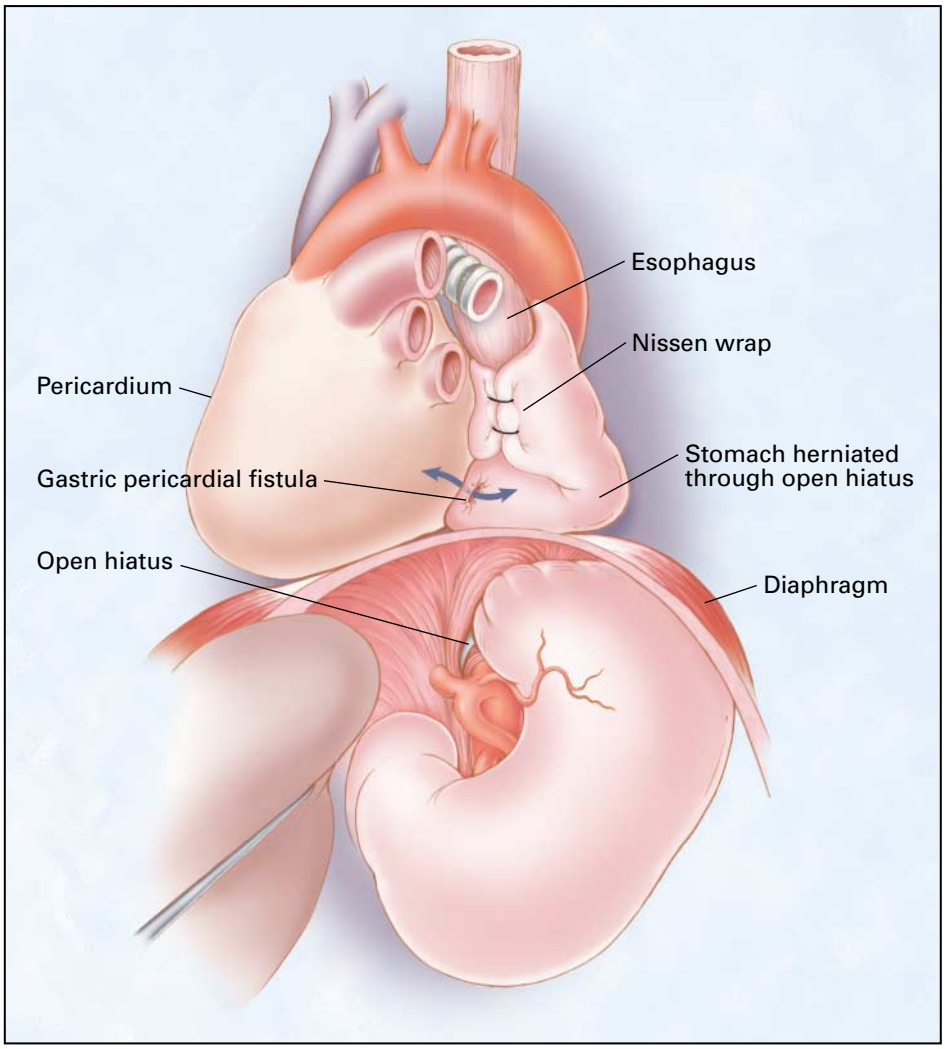
Thoracotomy through the left sixth interspace was performed to repair the gastropericardial fistula (Fig. 3). The Nissen wrap was intact but had herniated into the chest through the hiatus. There was a communication between the lesser curvature, at a point just inferior to the wrap, and the posterior pericardium. A circumfer-



A

Figure 3. Gastropericardial Fistula and Repair after Nissen Fundoplication for Reflux Disease.

Panel A shows the anatomy after the laparoscopic Nissen wrap procedure. The wrap is in the abdomen, but the hiatus has not been closed. Panel B (facing page) shows herniation of the Nissen wrap into the chest, with a gastropericardial fistula along the lesser curvature, below the wrap. The arrow shows the flow of stomach acid between the pericardial sac and the gastric lumen. In Panel C (page 331), the pericardium, lesser curvature of the stomach, and fistulous tract have been resected. The wrap has been returned to the abdomen and secured to the undersurface of the diaphragm with a modified Belsey technique. The hiatus has been closed with pledgeted sutures.



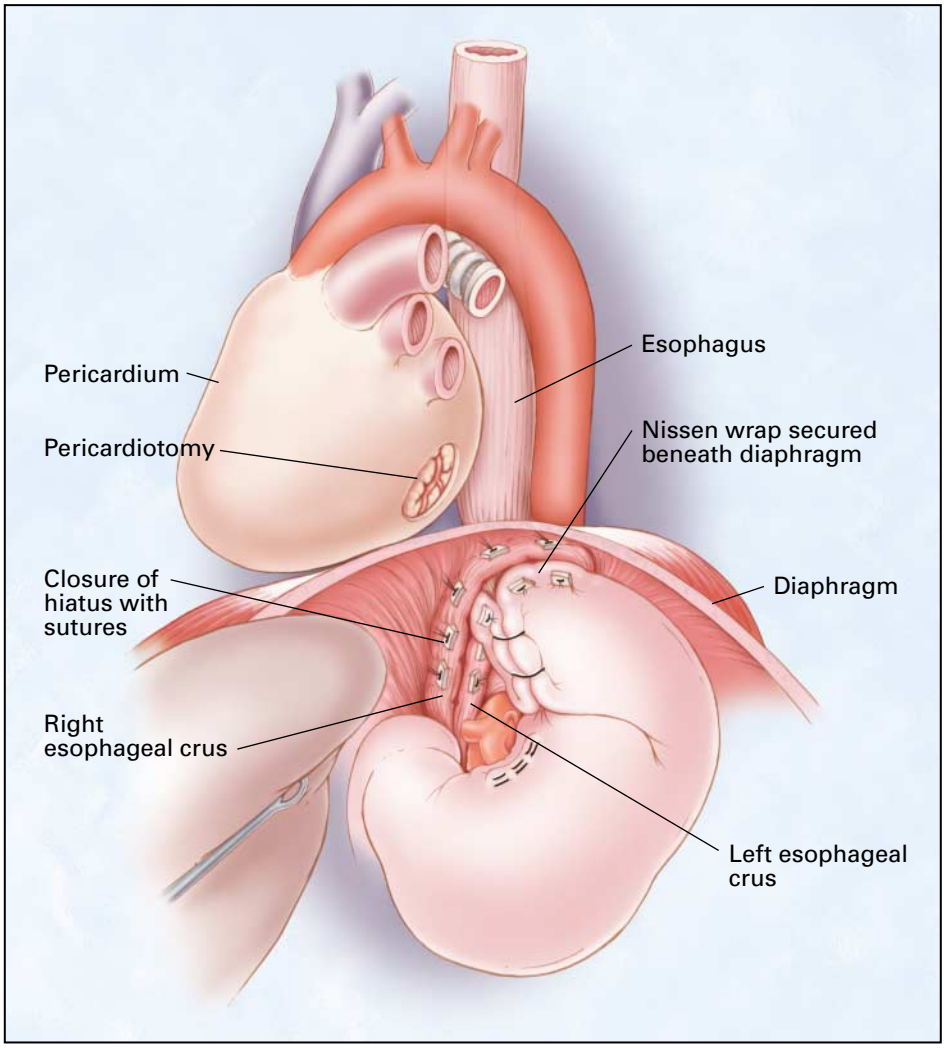
B

ential pericardiotomy was performed, with a 1-cm rim around the fistula. No erosion of the underlying myocardium was noted. Inflammatory adhesions between the pericardium and heart were lysed to drain the pericardial space. The fistula was resected by stapling beneath it, along the lesser curvature of the stomach. The Nissen wrap was easily reduced beneath the diaphragm. The intact diaphragm was used as a barrier between the line of staples along the lesser curvature and the bare myocardium. Three pledgeted sutures anchored the intact Nissen wrap to the undersurface of the diaphragm, with a partial-thickness bite of the esophagus above the Nissen wrap and a partial-thickness bite of the Nissen wrap. The sutures then passed through the diaphragm from the abdominal surface to the thoracic surface and were secured with pledgets. The diaphragmatic crura were approximated behind the repair with interrupted pledgeted sutures.

The patient was able to eat without pain four days after surgery. Examination of the pathological specimen showed only acute and chronic inflammation and granulation tissue. There were no malignant cells in the fistula or resected paraesophageal nodes. The patient was given leuprolide acetate injections for his metastatic prostate cancer. At a routine follow-up visit three months after surgery, the patient reported that he was eating well and had no reflux symptoms. He died of metastatic prostate cancer 19 months later. The gastropericardial fistula had not recurred.

DISCUSSION

Gastropericardial fistula is a rare condition with an associated mortality rate of more than 50 percent.[5,6] As early as 1854, ulcerative perforation of the alimentary tract was identified as a cause of "secondary" pericarditis.[7] A 1988 review of esophagopericardial and gastropericardial fistulas showed that previous



C

gastroesophageal surgery was the most common risk factor.[5] Pericardial involvement was recognized a mean of seven years after surgery and as early as three months afterward. The clinical presentation ranges from the subacute onset of dyspepsia and an insidious progression of epigastric pain[8] to sudden death without preceding symptoms.[9]

Approximately 3 to 5 percent of open Nissen fundoplication procedures are complicated by gastric ulceration.[10,11] Curiously, in most cases, the ulceration occurs high on the lesser curvature of the stomach, in close proximity to the fundoplication.[12,13] In one study,[12] seven of nine patients with ulcers of the lesser curvature after Nissen fundoplication were also found to have recurrent hiatal hernias. Fistulas from the stomach to the aorta,[14] the diaphragm,[15] the pericardium or right ventricle,[16] and the bronchus[17] have been reported as late complications after open Nissen fundoplication.

The cause of gastric ulceration after fundoplication is unclear, though alkaline reflux, gastric distention, stitch abscess, and ischemia may be contributing factors.[13,14] It has been postulated that the lesser curvature within a recurrent hernia becomes abnormally angulated and is subject to chronic irritation from the right crus.[12] This mechanical abnormality may explain some cases of lesser-curvature ulceration in patients with hiatal hernias that have not been surgically repaired.[18]

Laparoscopic surgery is now widely accepted as a

treatment for reflux esophagitis that is refractory to medical treatment. Unfortunately, data on the long-term efficacy and late complications of the procedure are limited because of its recent introduction into clinical practice.[3,4] Our case suggests that gastric ulceration with subsequent gastropericardial fistula can be a late complication of laparoscopic Nissen fundoplication. The anatomical location of the ulcer, the findings at surgery, and the clinical presentation in this case parallel those associated with latent ulceration after open Nissen fundoplication. Our patient had an ulcer high on the lesser curvature of the stomach, which developed in the presence of a recurrent hernia and an intact wrap. The surgical treatment (pericardiectomy and drainage, resection of the ulcer, and repair of the recurrent hernia) was similar to that for fistulas that develop after open fundoplication.

Presumably, the same mechanisms are responsible for ulceration of the lesser curvature after open and laparoscopic approaches. Furthermore, there is no reason to expect that the rate of gastric ulceration would be lower with laparoscopic Nissen fundoplication than with the open procedure. It is possible that in this case, the failure to close the diaphragmatic hiatus at the time of the laparoscopic procedure contributed to the formation of the fistula by allowing the wrap to herniate behind the pericardium. Although not a part of the original laparoscopic Nissen technique, closure of the diaphragmatic hiatus has become standard practice with the laparoscopic procedure.

The paucity of reports of latent gastric ulceration in patients undergoing only a partial wrap is noteworthy. If a chronic stitch abscess were responsible for the formation of a gastric fistula (from the inadvertent use of full-thickness plication or anchoring sutures), one would expect the frequency of this complication to be the same for all types of fundoplication. However, the 360-degree wrap appears to be a critical element in the pathogenesis of this complication — more specifically, a complete wrap in a patient with a recurrent hernia. For this reason, the wrap should be maintained beneath the diaphragmatic hiatus.[19,20]

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