

Simultaneous Repair of Paraesophageal Hernia and Colectomy for Colon Cancer

Matthew Mackowsky, MD, Nicole Hadjiloucas, MD, Cassandra Lira, MS3, Frank Borao, MD

Department of Surgery, Monmouth Medical Center, Long Branch, New Jersey (Drs. Mackowsky and Borao).

Department of Surgery, Hackensack University Medical Center, Hackensack, New Jersey (Drs. Hadjiloucas and Lira).

ABSTRACT

Background: Concurrent laparoscopic paraesophageal repair with colectomy has yet to be described in the literature.

Case Description: An 88-y-old male with shortness of breath and rectal bleeding presented to the emergency department. Workup ultimately revealed a nonobstructing ascending colon mass within the sac of type IV paraesophageal hernia. The decision was made to proceed with laparoscopic colectomy with concurrent paraesophageal hernia repair.

Conclusion: To reduce overall operative time and optimize recovery, the decision was made to perform both operations synchronously. The patient suffered no intraoperative or postoperative complications and experienced a full and timely recovery. To the best of our knowledge, simultaneous colon resection with paraesophageal hernia repair has not been described in the literature. Despite the inherent high risk, performing both procedures in a single operation helped to decrease the patient's anesthesia time and overall recovery time as well as risks of reoperation.

Key Words: paraesophageal hernia repair, colectomy, adenocarcinoma.

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Address correspondence to: Matthew Mackowsky, MD, Department of Surgery, Monmouth Medical Center, 300 Second Avenue, Long Branch, New Jersey; Telephone: 609-440-8513, E-mail: matt91990@gmail.com.

INTRODUCTION

Type IV paraesophageal hernias (PEHs) are an uncommon form of hernia, involving a large diaphragmatic defect with herniation of organs other than the stomach across the diaphragm and into the mediastinum. Four types of paraesophageal hernias have been noted: type I sliding hiatal hernia (approximately 90% of PEHs), in which the gastroesophageal junction slides above the diaphragm; type II (true) PEH results from a localized defect in the paraesophageal membrane in which the fundus serves as the lead point to herniation; type III PEH is a combination of types I and II; and type IV as previously described involves the herniation of abdominal organs other than the stomach into the hernia sac. Type IV PEH

represents the rarest form, comprising approximately 5%–7% of PEHs.¹ Appropriate-risk patients who develop symptoms meet indications for repair. Acute indications for emergent repair include strangulation, acute gastric volvulus or uncontrolled bleeding. Median presentation is 60 y of age with incidence increasing with age because of the continued dilation and weakening of the defect over time. Despite extensive comorbidities and surgical risks associated with advanced age, elderly patients are the main demographic targeted for PEH repairs.

Among the pertinent comorbidities affecting this population is colon cancer. Colon cancer primarily affects age groups ≥ 65 , paralleling the age distribution most commonly associated with hiatal hernias.² More than 100,000 cases of colon cancer are diagnosed annually in the

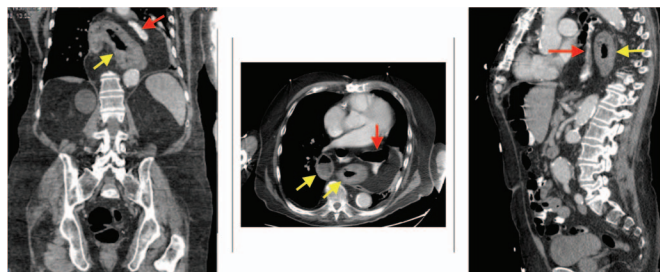


Figure 1. Preoperative computed tomography scan. Yellow arrows indicate stomach. Red arrows demonstrate collapsed colonic loops with contrast.

United states. Surgical resection with curative intent remains the standard of care for treatment of localized colon cancer. Surgical resection should include regional lymphadenectomy with a minimum of 12 lymph nodes harvested for complete pathologic staging and evaluation for adjuvant therapy.

The patient in the current case report was found to have a symptomatic type IV PEH along with a localized right-sided colon cancer. This case presented a unique clinical situation, allowing for innovation in a complex surgical patient with multiple comorbidities. After careful deliberation, the decision was made that this patient would benefit from synchronous repair of his PEH with right hemicolectomy.

CASE REPORT

An 88-y-old male with multiple comorbidities including chronic obstructive pulmonary disease (COPD), coronary artery disease, status post coronary artery bypass graft, with no prior intraabdominal surgical history presented to the emergency department with worsening shortness of breath. The patient also reported a recent history of rectal bleeding and was found to have microcytic anemia of 7.2 g/dL. A computed tomography scan (**Figure 1**) was obtained, revealing a grade IV paraesophageal hernia with associated cardiac and pulmonary compression. The sac contained the entirety of the stomach and a large segment of colon in the thoracic cavity. In addition, a mass was noted in the ascending colon. There were no suspicious pulmonary or liver lesions noted. Colonoscopy was conducted at the same admission to evaluate his anemia from rectal bleeding. A large ulcerated mass was identified in the proximal ascending colon. Biopsies determined the mass to be a moderately differentiated adenocarcinoma. The patient was medically optimized and underwent surgery a month and a half later.

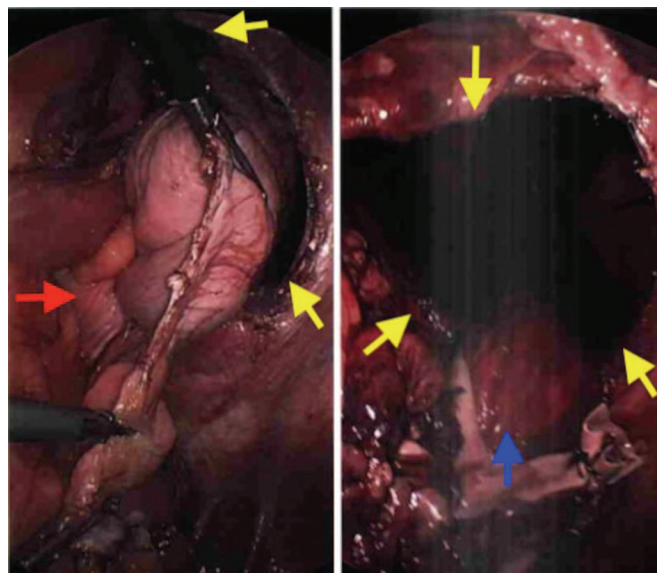


Figure 2. Intraoperative images before (left) and after (right) reduction of paraesophageal hernia. Yellow arrows demarcate boundaries of the hernia defect. Red arrow denotes ascending colon entering hernia. Blue arrow denotes esophagus looped in Penrose following reduction.

Type IV paraesophageal hernia repair

The patient completed bowel preparation the day prior to surgery. Preoperative intravenous antibiotics as well preoperative enoxaparin were administered prior to beginning the procedure. Six total port sites were utilized including a site for the liver retractor. The procedure began with careful identification and dissection of bilateral crura. After careful dissection around the hiatus, the colon was successfully reduced. A pennrose was then used to encircle and reduce the remaining contents of the hernia sac (**Figure 2**). To obtain adequate esophageal length, mediastinal dissection continued through extensive scar tissue to the level of the aortic arch. The crura were reapproximated with 0 polyester suture. Because of the fragility of the crura and the massive size of the defect, reconstruction of the diaphragm required placement of both an anterior and posterior xenograft mesh implant. A gastropexy was performed, attaching the lesser curve to the anterior abdominal wall using 2-0 polysorb suture.

Colectomy

Attention was then turned to the colonic resection. An incision was made along the white line of Toldt, and the right colon and mesentery was freed from its retroperitoneal attachments. The gastrohepatic and gastrocolic ligament was divided to beyond the level of the middle colic

vessels. A high ligation of the ileocolic pedicle was performed. We then exteriorized the bowel through a small extraction site using a wound protector. The ileum and transverse colon were divided using a stapler, the mesentery and right colic vessels were divided, and the specimen was sent to pathology. A side-side antimesenteric stapled ileocolic anastomosis was performed. Hemostasis was excellent and the abdomen and the incisions were closed. The procedure was completed in just more than 6 h and with approximately 100 cc blood loss.

Postoperative care and discharge

The patient was successfully extubated prior to returning to postanesthesia care unit. Prophylactic enoxaparin was continued postoperatively and preoperative antibiotics discontinued. The patient's aspirin, metoprolol, and bronchodilators were continued postoperatively. He was seen daily for evaluation and treatment by physical therapy. An upper gastrointestinal series was completed on postoperative day (POD) 1. Clear liquids were started on POD2. By POD3, the patient began to pass flatus and had a bowel movement, and on POD4, he was advanced to a soft diet. Pathology revealed a 6.5-cm adenocarcinoma with subserosal invasion and two of 14 collected positive lymph nodes (T3N1). The patient was discharged uneventfully and in good physical condition on POD5, with follow-up plans to begin adjuvant chemotherapy.

DISCUSSION

A review of the literature found no similar reports to the one discussed. Reports have documented bowel resections for emergent presentations of strangulated paraesophageal hernias performed open, including colonic resections.³ However, multiple aspects of this case make it unique. Most notably, the patient required a full oncologic colon resection with lymph node harvest for adequate staging and treatment, in turn requiring reduction and repair of a type IV paraesophageal hernia. The findings of a colon cancer within the hernia significantly added to overall case complexity. The elective nature of the case also afforded time for planning and coordination, enabled the use of advanced laparoscopy and also presented the opportunity to weigh the benefits of various operative approaches. These decisions carried weighty implications, given the unavoidably high risk of complications in a patient of advanced age with multiple comorbidities.⁴

The displacement of the colon into the thorax necessitated reduction of the paraesophageal hernia, in turn presenting the challenge of an additional complex procedure on an elderly patient with comorbidities. Consideration was

given to temporizing measures, such as reduction of the hernia, followed by colectomy and gastrostomy tube placement. However, it was believed that because of the size of the hiatal defect, the patient would be at high risk of recurrent herniation of intraabdominal contents, even with gastrostomy tube placement and that ensuing symptomatology could complicate the patient's oncologic treatment or even necessitate reoperation. Given these concerns and despite the additional operative difficulty and increased operative time, we opted to perform both procedures synchronously as opposed to staged procedures. Evidence supporting the efficacy and safety of combined surgical procedures (in particular patients with colorectal cancer) has some background from studies evaluating management of synchronous liver metastases with a colorectal primary.⁵ The 2014 meta-analysis reviewed 14 years of data from patients undergoing either simultaneous or staged resection of a colorectal cancer primary with liver metastases demonstrated equivalent perioperative and long-term mortality.⁵ This study also identified a statistically significant decrease in postoperative cardiac and pulmonary complications (an especially important consideration in the patient discussed, an elderly male with COPD). Other studies have given support to the potential decrease in postoperative complications for appropriately selected patients with CRC undergoing simultaneous procedures.⁶ In addition, recent reports have documented encouraging outcomes from patients undergoing simultaneous laparoscopic resection.⁷ Avoiding a staged approach to our procedures allowed elimination of a second intubation, a second round of anesthesia, and a second recovery period, likely in close succession to the first procedure. In the case of the patient discussed in this procedure, following synchronous colectomy and paraesophageal hernia repair (PEHR), the patient was discharged in good physical condition and on schedule to begin adjuvant chemotherapy.

A laparoscopic approach also benefited the patient. Laparoscopic surgery has had marked benefits in the elderly population in comparison with open procedures and has enabled life-saving surgical procedures in persons who would otherwise experience significant (and potentially prohibitive) postoperative morbidity from open procedures. Benefits included a reduction in wound complications, decreased need of postoperative rehabilitation, and decreased ileus and intraoperative blood loss in the elderly population.⁸ A previously conducted nonrandomized review demonstrated decreased length of stay as well as decreased incidence of prolonged postoperative mechanical ventilation with laparoscopic PEHR when compared with open abdominal or transthoracic repair.⁹

Given our patient's known COPD, and relatively high risk of prolonged mechanical ventilation postoperatively, we opted to begin laparoscopically, despite the complexity of the operation involved. Laparoscopic resection of colon cancers has long been demonstrated to yield similar results to open surgery regarding oncologic and mortality outcomes while decreasing length of stay and parenteral anesthetic use.¹⁰ Laparoscopy was utilized in this case to provide excellent exposure for both PEHR and colonic resection while minimizing the associated morbidity of laparotomy; six ports in total were used. In addition, the need for abdominal access for colon resection necessitated a transabdominal as opposed to a transthoracic approach for the patient discussed in this report.

Robotic surgeries are rapidly gaining popularity in operating rooms because of their ability to provide increased precision and accuracy during procedures. Whereas laparoscopic surgery is currently the most common method for PEHR, robotic-assisted PEHRs are showing to be just as safe and effective and has the potential to allow for even more technically challenging procedures. In a study that examined 61 patients undergoing robotic assisted PEHR, patient outcomes and learning curve times showed to be equivalent to laparoscopic but that with increased experience, operating times and hospitalization lengths can be markedly diminished. Some advantages noted with the use of the robot include greater ease in transhiatal dissection because of increased instrument length and extended wrist movements as well as enhanced steadiness while placing intraoperative sutures.¹¹ Decreased surgery times could permit the possibility to perform concurrent surgical repairs without causing the additional risks that are associated with prolonged operating room times. Simultaneous robotic surgeries have been discussed in previous papers and demonstrated satisfactory outcomes within a reasonable surgical operative time.¹² These new innovations may ultimately further enable surgeons to perform technically complex procedures such as the one described.

In conclusion, laparoscopic right hemicolectomy with repair of a type IV paraesophageal hernia is a formerly unreported, technically complex, but feasible procedure. The patient's requirement for an oncologic resection of the ascending colon mass added to the surgical complexity. Performing such a procedure laparoscopically when possible has the potential to facilitate a rapid and full recovery. The benefit of laparoscopic surgery has been magnified in the elderly as well as those with multiple comorbidities. Minimizing the number of operations also has the potential to decrease overall operative time, anesthesia time, and recovery time from a second procedure

and eliminate the added complexity of operating a second time in a recently disturbed surgical field. For the patient discussed, despite the high complexity and difficulty of his combined PEHR and right hemicolectomy, he went on to have an uneventful postoperative course and was discharged with plans to begin adjuvant therapy.

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