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A CASE OF SPLENIC LACERATION PRESENTING AS A DELAYED COMPLICATION OF COLONOSCOPY

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☐ **Abstract—Background: Colonoscopy is a frequently performed medical procedure; complications associated with this procedure often present to the emergency department (ED). Splenic laceration is a rare but life-threatening complication of colonoscopy. We report the unique case of a patient with a splenic laceration who presented after a recent colonoscopy and had no history of trauma. Case Report: A 52-year-old man presented to our ED with abdominal pain and lightheadedness the day after a routine colonoscopy. Ultrasound demonstrated hemoperitoneum, and contrast-enhanced computed tomography of the abdomen revealed a large hemoperitoneum with active contrast extravasation from the laceration of the superior pole of the spleen. After resuscitation, the patient was managed with an emergency splenectomy. Why Should an Emergency Physician Be Aware of This?: Colonoscopy complications are frequently identified and managed in the ED. Splenic laceration should be on the differential for patients that present with abdominal pain or hypotension after colonoscopy. Splenic injury carries a high mortality risk, and prompt, accurate diagnosis can be lifesaving.** © 2019 Elsevier Inc. All rights reserved.

☐ **Keywords—splenic injury; colonoscopy; hemoperitoneum**

INTRODUCTION

Widely utilized for the screening, diagnosis, and treatment of colorectal disease, colonoscopy is one of the most frequently performed invasive medical procedures. More than 11.5 million colonoscopies are performed every year in the United States, and this number is expected to increase as the population ages (1). Colonoscopy is considered a safe medical procedure with an estimated mortality rate of 2.9 per 100,000 procedures (2). Although life-threatening complications are rare, colonoscopy is not a benign procedure. The most common serious complications of colonoscopy are bleeding and perforation of the colon (2,3). Other rare but life-threatening complications have been associated with colonoscopies. Colonoscopy-associated splenic rupture has been well documented in the surgical and gastrointestinal literature (4–9). Reports from an emergency medicine perspective, however, are lacking.

Because symptoms of colonoscopy complications typically develop hours or even days after discharge from the endoscopy suite, the emergency department (ED) has become one of the primary sites for diagnosis and initial treatment of complications after colonoscopy, especially if it is "after hours" or if the gastroenterologist who performed the procedure cannot promptly fit the patient into their appointment schedule. An estimated 1.3% of outpatient colonoscopy patients present to an ED within 7 days, most commonly with a chief complaint of abdominal pain (10). Although abdominal pain after a colonoscopy can be a sign of life-threatening pathology, more commonly it is a benign phenomenon believed to result from bowel distension caused by insufflation of

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gas during the procedure. Patient surveys indicate that 5–11% of colonoscopy patients experience abdominal pain (11,12). Emergency physicians are charged with identifying dangerous complications within this population.

CASE REPORT

A 52-year-old man presented to the ED with abdominal pain and lightheadedness the morning after undergoing a screening colonoscopy. The patient had tolerated his colonoscopy well, with no complications or procedural difficulty noted by the gastroenterologist. He was discharged home, where late in the afternoon he began to experience abdominal pain. By the following morning his pain had become unbearable and he experienced a near syncopal episode when he tried to stand up from bed. He presented to our ED by private vehicle with a chief complaint of abdominal pain, where he was initially triaged as urgent (level 3) on the Emergency Severity Index scale before full vital signs were obtained.

On arrival, our patient was tachycardic with a pulse of 118 beats/min and hypotensive with a blood pressure of 71/61 mm Hg, though blood pressure was 100/65 mm Hg when repeated with a child-sized cuff prior to fluid resuscitation. Our examination revealed a pale middle-aged man with no signs of trauma. The patient's abdomen was diffusely tender to palpation, with moderate involuntary guarding and rebound tenderness. Chest radiograph was negative for free air under the diaphragm. We performed a rapid ultrasound for shock and hypotension (RUSH) examination, which revealed free fluid in the peritoneal cavity (Figure 1). We sent for typed and screened blood and began fluid resuscitation. One hour after ED arrival, the patient had received 2 L normal saline, blood pressure had increased to 139/65 mm Hg, and heart rate decreased to 109 beats/min. Enhanced computed tomography (CT) demonstrated a large hemoperitoneum with active contrast extraversion from the posterior superior pole of the spleen (Figure 2). The patient was taken to the operating room, where exploratory laparotomy revealed grade V splenic laceration and large hemoperitoneum. Splenectomy was performed and 800 mL of blood was evacuated from the peritoneal cavity. The patient had an uncomplicated postoperative course and was discharged home after administration of the standard postsplenectomy immunizations.

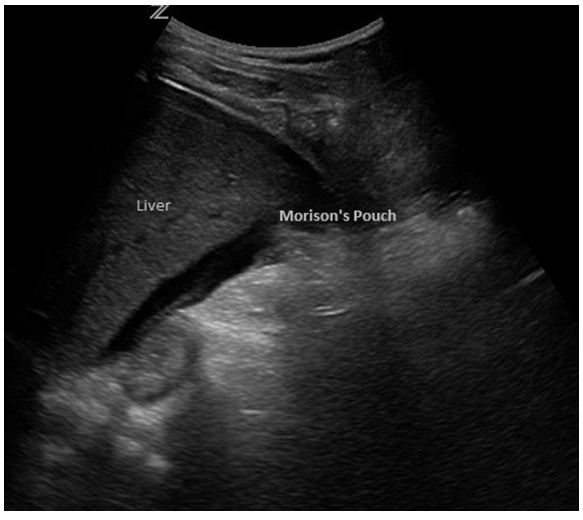

Figure 1. Point-of-care ultrasound rapidly diagnosed the presence of free fluid in Morison's pouch, which guided our further work-up and resuscitation by indicating acute blood loss from internal hemorrhage as the cause of our patient's hypotension.

DISCUSSION

Epidemiology

At least 172 cases of colonoscopy-associated splenic injury have been documented in the gastrointestinal and surgical literature, and it is plausible that additional cases have gone unreported given physicians' understandable hesitancy to publicize complications of procedures they have performed (4). Nevertheless, the phenomenon is very rare. Splenic injury is less common than other serious complications of colonoscopy such as perforation of the colon (estimated risk 1–3 in 1000) and major hemorrhage (estimated risk 1–6 in 1000) (3). Although rare, cases of splenic injury are life-threatening emergencies, with an estimated case fatality rate of 4.5–5% (4,5).

Colonoscopy-associated splenic injury has been most frequently reported in patients between ages 50 and 80 years, the population most exposed to colonoscopy

Figure 2. Contrast-enhanced computed tomography revealed splenic laceration (□) and hemoperitoneum (→). This delayed sequence image shows contrast blush with active arterial extraversion, confirming active bleeding.

(4). Analyses of previously published cases consistently find increased risk in women (4,5). The gender distribution is partially explained by increased utilization of colonoscopy and by an increased incidence of postsurgical adhesions, which is a risk factor for splenic injury (4,6). No significant correlation between procedural difficulty and risk of splenic injury has been demonstrated (7,8).

Pathophysiology

Several theoretical mechanisms have been proposed to explain how colonoscopy might cause splenic injury. Direct trauma to the spleen may occur as the endoscopist attempts to maneuver the colonoscope through the splenic flexure. External pressure on the left hypochondrium in an attempt to straighten the endoscope might rarely result in blunt traumatic injury. More frequently, however, capsular avulsion and laceration occurs due to traction on the splenocolic ligament while the colonoscope is maneuvered through the splenic flexure (6). Although not present in our patient, postsurgical adhesions between the colon and the spleen are believed to decrease mobility of the spleen and thereby increase the risk of laceration or rupture (6,7).

The most important physiological consequence of splenic injury is intraperitoneal hemorrhage, which in severe cases may lead to hypovolemia and hemorrhagic shock. Signs and symptoms of splenic injury are the result of loss of blood from circulation and accumulation of blood in the peritoneal cavity. The spleen is a highly vascular organ, and there is potential for massive bleeding.

Diagnosis

The initial presentation of splenic injury is highly variable, ranging from hemorrhagic shock to abdominal pain with normal vital signs and an unremarkable physical examination (4,5,13). The onset of pain is commonly within 24 h of the colonoscopy, but delayed presentations up to 14 days post procedure have been documented (4,5,7,9). Left upper quadrant pain and pain referred to the left shoulder (Kehr sign) are classic but not universally present (8). Laboratory findings are generally not helpful for diagnosis. Metabolic acidosis and elevated serum lactate suggest shock but are not specific. Although hemoglobin may initially be normal in the setting of significant acute blood loss, a decrease in hemoglobin of 3 mg/dL from the precolonoscopy level has been found to predict need for surgical intervention (5).

For our patient who presented with undifferentiated hypotension, RUSH played a critical role in narrowing our differential diagnosis for the identification of free intraperitoneal fluid (Figure 1). The trauma literature has demonstrated ultrasound to be nearly perfect at identifying intraperitoneal bleeding that is significant enough to cause shock and require surgical intervention (14–17).

The American Association for Surgery of Trauma (AAST) recommends intravenous contrast-enhanced CT as the preferred diagnostic test for suspected splenic injury in blunt trauma patients (10,13,16,18). Although this recommendation has not been validated specifically for patients with splenic trauma from colonoscopy, the anatomic detail shown by CT and the ability to demonstrate active bleeding are good reasons to suspect CT would be equally useful for identifying colonoscopy-associated splenic injury. The limited available literature on colonoscopy-associated splenic injury recommends CT as the diagnostic gold standard (11). Diagnosis is confirmed with identification of extrasplenic contrast-enhanced blood within the splenic parenchyma (Figure 2) (18,19). The AAST publishes a classification system for grading the severity of splenic injury based on radiographic findings (Table 1). Point-of-care ultrasound detects AAST Grade III or greater splenic injury with a sensitivity of 86% (sensitivity is 69% for detection of any grade of splenic injury) (14). Proponents of ultrasound have suggested contrast-enhanced ultrasound as an alternative to CT, and small studies of trauma patients have reported 96% sensitivity with skilled operators (20). The external validity of this study to patients who have recently undergone colonoscopy is uncertain, however, as these patients will have increased bowel gas, which often limits ability to visualize the abdominal contents with ultrasound.

Management

Initial resuscitative measures include large-bore vascular access and administration of an isotonic fluid bolus with assessment of hemodynamic response. Blood type and screen in anticipation of that transfusion may be required.

Table 1. American Association for Surgery of Trauma (AAST) Splenic Injury Scale

I	• Subcapsular hematoma < 10% surface area • Parenchymal laceration < 1 cm in depth • Capsular tear (<1 cm)
II	• Subcapsular hematoma 10–50% surface area • Intraparenchymal hematoma < 5 cm diameter • Parenchymal laceration 1–3 cm depth
III	• Subcapsular hematoma > 50% surface area or expanding • Ruptured subcapsular or parenchymal hematoma • Intraparenchymal hematoma ≥ 5 cm or expanding • Parenchymal laceration > 3 cm depth or involving parenchymal vessels
IV	• Any injury in the presence of a splenic vascular injury or active bleeding confined to the splenic capsule • Parenchymal laceration involving segmental or hilar vessels producing major devascularization (>25% of spleen)
V	• Shattered spleen • Any injury in the presence of vascular injury with active bleeding extending beyond the spleen into the peritoneum

Definitive treatment is to stop the hemorrhage. AAST recommends urgent laparotomy for hemodynamically unstable trauma patients with evidence of intraperitoneal hemorrhage or when peritoneal signs are present on physical examination (21). Historically, nearly all splenic injuries were treated with splenectomy. Since the early 2000s, however, there has been increased recognition that splenectomy is not always required (21,22). Although splenectomy offers definitive treatment, it is an invasive surgery and carries a small risk of overwhelming infection with postsplenectomy sepsis. Asplenic patients also have an increased lifetime risk for infection with encapsulated bacteria.

The most recent AAST guidelines recommend nonoperative management for hemodynamically stable patients regardless of the AAST grade of injury (21). Alternatives to splenectomy include surgical packing of the spleen and splenic artery embolization by interventional radiology. The ideal candidate for splenic artery embolization is a hemodynamically stable patient with evidence of active bleeding (contrast extravasation) on CT (21). Some patients can avoid intervention altogether and be carefully observed with serial abdominal examinations and monitoring of hemoglobin, though it is prudent they be transferred to a hospital with capability for emergent intervention should their condition deteriorate.

WHY SHOULD AN EMERGENCY PHYSICIAN BE AWARE OF THIS?

Emergency physicians are increasingly tasked with diagnosing and managing unexpected complications from procedures performed by other physicians. With the aging population, the number of patients experiencing complications is likely to increase in the near future. With a projected increase in the volume of colonoscopies performed and a trend toward the use of ambulatory surgical centers, the ED will likely continue to play an important role in the evaluation and treatment of iatrogenic injuries.

Emergency physicians are very familiar with the diagnosis and management of splenic injury resulting from external blunt or penetrating abdominal trauma. Emergency physicians should be aware that splenic injury can occur as a complication of colonoscopy and they should have a high level of suspicion of this diagnosis in patients presenting after a recent colonoscopy with left upper abdominal pain or hypotension. Given the high mortality associated with splenic injury, prompt accurate diagnosis can be lifesaving, but requires vigilance and careful clinical judgment.

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