

# Splenic Rupture After Colonoscopy

Peter F. Lalor, MD, Barry D. Mann, MD

## ABSTRACT

Colonoscopy is a familiar and well-tolerated procedure and is widely used as a diagnostic and therapeutic modality by both gastroenterologists and surgeons. Although perforation and hemorrhage are the most common complications, splenic injury or rupture is a rare but potentially lethal complication. We report a case of splenic rupture diagnosed 18 hours after colonoscopy, which required emergent splenectomy. We also reviewed over 39 other cases of splenic rupture or injury after colonoscopy reported in the English literature. Despite being an infrequent complication, splenic rupture warrants a high degree of clinical suspicion critical to prompt diagnosis. Most patients present with symptoms within 24 hours after colonoscopy, although delayed presentation days later has been described. CT scan of the abdomen is the radiological study of choice to evaluate colonoscopic complications. Splenic injury can be managed conservatively or with arterial embolization depending on the extent of trauma, but splenectomy remains definitive management. Clinical criteria are the primary determinants in choosing operative therapy over observation. Herein, possible risk factors for splenic trauma during colonoscopy are identified, and clinical outcomes are evaluated.

**Key Words:** Splenic injury, Splenic rupture, Colonoscopy, Complications, Splenectomy.

## INTRODUCTION

Colonoscopy is an excellent diagnostic and therapeutic tool, but not without serious complications. Hemorrhage and perforation are the most common complications after colonoscopy occurring in less than 1% of patients and often associated with biopsy or polypectomy. Many other rare complications have been described.<sup>1</sup> Splenic injury or rupture is also an infrequent complication that is often forgotten and may require urgent surgical intervention. The first case of splenic trauma after colonoscopy was described by Wherry and Zehner in 1974, but the true incidence of this dreadful complication is probably underestimated.<sup>2,3</sup> There are 39 case reports in the English literature and at least 9 more in foreign publications<sup>1-42</sup> (**Table 1**). We report a similar case of splenic rupture diagnosed 18 hours after colonoscopy, which required emergent splenectomy. Presentation, diagnosis, treatment, and potential risk factors are evaluated herein, as is a thorough review of the literature.

## CASE REPORT

An 82-year-old woman was admitted to the hospital for mild congestive heart failure and pneumonia. Her past history was significant for myocardial infarction and a left nephrectomy for transitional cell carcinoma via a left flank incision. After a week of intravenous antibiotics for left lower lobe pneumonia and bacteremia, she began having diarrhea. Tests for *Clostridium difficile* were negative, and the patient was diagnosed with antibiotic-associated diarrhea. During this period, her diarrhea became blood tinged, and her hemoglobin dropped by 3 g/dL. A colonoscopy was recommended and performed without difficulty to the caput cecum. No acute origin of bleeding was identified, and findings included severe diverticulosis in the left colon and internal hemorrhoids. No biopsies or polypectomies were performed.

The postprocedure period was complicated by the onset of left upper quadrant abdominal pain accompanied by hypotension. The patient did not complain of left shoulder pain. Her abdominal examination was significant for left-sided tenderness without peritoneal signs. Laboratory tests revealed an acute drop in hemoglobin from 9.6 g/dL

Department of Surgery, Department of Minimally Invasive Surgery, Cleveland Clinic Florida, Weston, Florida, USA (Dr Lalor).

Department of Surgery, Lankenau Hospital, Wynnewood, Pennsylvania, USA (Dr Mann).

Address reprint requests to: Peter F. Lalor, MD, Department of Surgery, Department of Minimally Invasive Surgery, Cleveland Clinic Florida, 2950 Cleveland Clinic Blvd, Weston, FL 33331, USA. Telephone: 954 659 5239, Fax: 954 659 5256, E-mail: petelalor@hotmail.com, lalorp@ccf.org

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**Table 1.**  
Summary of 42 Cases of Splenic Injury After Colonoscopy

Reference*	Age	Sex	Anemia	Leucocytosis	Symptom Onset >24 hrs	Kehr's Sign	Diagnosis†	Treatment	Outcome
1	72	F	-	+	+	+	CT	Splenectomy	
3	57	F	+	-	-	-	CT	Splenectomy	
3	60	F	+		-	+	CT	Splenectomy	
4	53	F	+	+	-	+	Angiogram	Splenectomy	
5	33	F	-	+	-	+	Laparotomy	Splenectomy	
6	71	F	+	+	-	+	Laparotomy	Splenectomy	
7	76	M			-		Laparotomy	Splenectomy	Mortality
8	45	F	+	+	-	-	Laparotomy	Splenectomy	
9	70	F	-	-	Asx	-	Laparotomy	Splenectomy	
10	62	F	+		-	-	CT	Splenectomy	
11	60	F	+	+	-	+	Laparotomy	Splenectomy	
12	62	F	+	+	-	+	CT	Conservative	
13	66	M	+	+	+	-	CT	Splenectomy	
14	90	M	+		-	-	CT	Conservative	
14	74	F	+		-	+	CT	Conservative	
15	82	M	-	+	-	-	Autopsy	ACLS	Mortality
16	59	F	+		-		US	Splenectomy	
17	63	M	+		-		Laparotomy	Splenectomy	
18	70	F	+		-		Laparotomy	Splenectomy	
19	66	M	+	+	+	+	CT	Conservative	
20	57	F	+		-		CT	Splenectomy	
21	70	M	+	+	+		CT	Splenectomy	
22	52	F			-		US/CT	Conservative	
23	65	F	+		-	+	US/CT	Conservative	
24	63	M	+		+		CT	Embolization	
25	47	F	+		+	+	CT	Splenectomy	
26							Laparotomy	Splenectomy	Mortality
27	75	F	+		-		Laparotomy	Splenectomy	
28	73	F	+	-	-	+	CT	Conservative	
29	55	F	+	-	+	+	CT	Splenectomy	
30							Laparotomy	Splenectomy	
31	57	F	-		-	+	CT	Splenectomy	
31	80	M	-	+	-	-	Laparotomy	Splenectomy	
31	52	F	-	-	-	+	CT	Conservative	
31	29	F	+	-	+	-	CT	Splenectomy	
32	73	F	+		-		CT	Splenectomy	
33	39	F	+	+	-	-	US	Splenectomy	
34	69	M	-	+	-	-	US	Splenectomy	
35	68	M	+	+	-	-	CT	Conservative	
36	58	F	-	+	-	+	CT	Splenectomy	
37	75	F	+		+		CT	Conservative	
44‡	82	F	+	+	-	-	CT	Splenectomy	

\*Details were not provided in some cases.

†CT = computed tomography; US = ultrasound; ACLS = advanced cardiac life support.

‡Reference <sup>44</sup> refers to current case.

to 6.8 g/dL. White blood cell count was significantly increased as well. The patient was transfused appropriately, and a computed tomographic scan (CT) of the abdomen and pelvis was ordered. The CT confirmed a large left upper quadrant hematoma, consistent with a splenic rupture and associated hemoperitoneum. A surgery consult was obtained. The patient had persistent hypotension and acute anemia and therefore was taken to surgery for exploration.

A midline laparotomy was performed, and a large amount of intraabdominal blood was encountered from the left upper quadrant. A moderate number of adhesions were present at the splenic flexure associated with a large splenic capsular tear. The spleen was easily mobilized and splenectomy was performed. Subsequent pathology detailed an unremarkable ruptured spleen. The postoperative course was uneventful, and the patient made a full recovery.

## DISCUSSION

Splenic injury after colonoscopy is a serious complication, yet its true incidence is unknown. Numerous large series over the last 3 decades have demonstrated splenic trauma as a rare entity. Smith mentioned 1 case in 20,139 colonoscopies.<sup>26</sup> Ong reported 1 case in 6387 patients.<sup>16</sup> Jentschura had no splenic complications in 29,695 cases.<sup>43</sup> The true incidence of splenic injury may actually be higher. Reluctance to publish morbidity information, the absence of complication codes for splenic injury after colonoscopy, and the fact that the procedure is infrequently followed by routine surgical exploration all contribute to its unknown incidence. Despite this uncommon complication, knowledge of this serious consequence is the best aide to early diagnosis because outcomes can be fatal.<sup>7,15,26</sup>

The cause of splenic complications after colonoscopy have not definitively been established, yet many risk factors have been proposed (**Table 2**). The most common theory involves tension of the splenocolic ligament from either excessive manipulative traction or decreased mobility of the spleen or colon from adhesions. Specific maneuvers like the slide by advancement, alpha maneuver, hooking the flexure, and straightening the sigmoid loop have all been implicated in excessive traction and splenic capsule avulsion.<sup>12</sup> Any prior surgery, inflammation, or intraabdominal infection may lead to adhesions and decreased mobility leaving the left upper quadrant susceptible to splenic insult during colonoscopy. It has been suggested that positioning the patient and minimizing external pressure may prevent splenic complica-

**Table 2.**  
Proposed Risk Factors for Splenic Injury During Colonoscopy<sup>1-42</sup>

Endoscopist Dependent	
	Excessive traction on the splenocolic "criminal" ligament
	Direct injury
	Technical difficulties
	Maneuvers
	Slide By advancement
	Hooking the flexure
	Alpha maneuver
	Straightening the sigmoid loop
	External pressure
	Biopsy
	Polypectomy
	Supine position
	Operator inexperience
Patient Dependent	
	Decreased mobility of spleen and colon from adhesions
	Splenomegaly
	Inflammation
	Inflammatory Bowel Disease
	Diverticular disease
	Pancreatitis
	Infection
	Malaria
	Typhoid fever
	Epstein-Barr virus-induced mononucleosis
	Multiple colonoscopies
	Prior surgery
	Cancer
	Anticoagulation

tions in higher risk cases. The left lateral position may allow the spleen and flexure to fall left and lax, preventing the tension of the spleen that occurs when it falls back in the supine position.<sup>30</sup> Despite precautions, it seems injury can occur whether the procedure is technically difficult or not.<sup>15</sup> Age does not appear to be a risk factor, because the age range for reported cases was 33 years to 90 years with a median age of 63 years. However, a higher risk of splenic complications does appear to exist in women. In reported cases that included gender, 72% (29/40) of cases occurred in women. It is unclear why there is a predominance of this complication in the female population (**Table 3**).

**Table 3.**

Case Characteristics of Splenic Injury After Colonoscopy

Characteristics*	#	N	%
<b>Sex</b>			
Male	11	40	27.5
Female	29	40	72.5
<b>Anemia (&gt;2 g/dL)</b>			
Present	29	38	76
Not present	9	38	24
<b>Leucocytosis</b>			
Present	17	23	74
Not present	6	23	26
<b>Onset of symptoms</b>			
<24 hrs	31	39	79
>24 hrs	8	39	21
<b>Kehr's sign</b>			
Present	16	29	55
Not present	13	29	45
<b>Biopsy/Polypectomy</b>			
Performed	16	35	46
Not done	19	35	54
<b>Prior surgery</b>			
Yes	17	29	59
No	12	29	41
<b>Diagnosis</b>			
US	3	42	7
US/CT	2	42	5
CT	23	42	55
Angiogram	1	42	2
Laparotomy	12	42	29
Autopsy	1	42	2
<b>Treatment</b>			
Conservative	10	42	24
Splenectomy	30	42	71
Embolization	1	42	2
ACLS	1	42	2

\*US = ultrasound; CT = computed tomography; ACLS = advanced cardiac life support.

The presentation of splenic injury from colonoscopy can be difficult to diagnose. Often early symptoms are attributed to postpolypectomy serositis, colonic distension, analgesia, sedation, old age, or impaired mental status.<sup>1,11,33</sup>

The differential diagnosis for significant pain within 24 hours after colonoscopy includes retained gas, perforation, and splenic injury. Rare complications causing abdominal pain include mesenteric tears, volvulus and gas explosions.<sup>3</sup> Pain less than 12 hours postprocedure will warrant observation in most cases. In 39 patients with recorded symptoms, 31 (79%) presented with the onset of symptoms in less than 24 hours. Most patients present with abdominal pain, often in the left upper quadrant, that may radiate to the left shoulder. Historically, Kehr's sign is pain at the tip of the left shoulder after bimanual palpation of the left upper quadrant with the patient in the Trendelenburg position.<sup>24</sup> It is not a reliable sign, and a positive Kehr's sign or left shoulder pain was only recorded in 55% (16/29) of patients. Hypotension, anemia, or an elevated white blood cell count can also suggest a splenic injury. Any patients with peritoneal signs or hemodynamic instability should be treated with a high index of suspicion for surgical perforation or splenic injury. Although early onset of symptoms is common, delayed diagnosis even up to 10 days has been described as has a patient with serious splenic injury who was entirely asymptomatic.<sup>9,12</sup>

The diagnosis of a surgical abdomen should be made on clinical grounds, yet the advancement of imaging technology can elucidate the equivocal or suspicious case. A CT scan provides a definitive diagnosis and delineates the degree of injury that can often determine operative versus nonoperative management. CT was included in the diagnostic algorithm in 62% (25/42) of cases, and 11 of these scanned patients avoided a laparotomy and improved with nonoperative management. One of these patients even underwent splenic embolization successfully after a CT scan.<sup>24</sup> The use of ultrasound has been described in 5 cases, but 2 of these cases also included CT scans.<sup>16,22,23,33,34</sup> CT remains the best diagnostic tool to aid in management, because all patients (11/11) treated nonoperatively were scanned in their evaluation.

The goal of management in splenic injury after colonoscopy is nonoperative; however, splenectomy may be difficult to avoid. Thirty cases (70%) required splenectomy, including half diagnosed by CT, but these numbers benefit from publication bias and the pre-CT era. Conservative management usually includes hospital monitoring, serial hemoglobin checks, and serial examinations. Janes<sup>25</sup> suggested that predictors of failed conservative treatment include hemodynamic instability, underlying splenic disease, a grade III traumatized spleen by CT, old age, and hemoperitoneum. One case of splenic artery embolization has been reported,<sup>24</sup> but the definitive interventional treatment remains splenectomy. The prognosis of splenic injury after colonoscopy is excellent if recognized early.

Three deaths have been reported secondary to splenic rupture after colonoscopy. Two cases were diagnosed during emergent laparotomy, and one case was found during autopsy after the patient underwent severe shock.<sup>7,15,26</sup> All other patients had successful outcomes including those patients undergoing splenectomy and expectant management.

## CONCLUSION

Splenic injury and rupture are rare complications of colonoscopy that must not be forgotten in the differential for postprocedural pain. Numerous endoscopist and patient factors may increase a patient's risk for splenic trauma. The onset of symptoms usually occurs in the first 24 hours after a procedure. Early recognition will lead to successful outcomes. CT criteria are helpful in determining operative versus nonoperative management. Treatment may include close observation, embolization, or splenectomy. Not using excessive maneuvers in high risk patients and having a high index of suspicion postprocedure will optimize outcomes.

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