Complications of Optical Colonoscopy: CT Findings

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KEYWORDS

• Optical colonoscopy • Computed tomography • Complications

KEY POINTS

- The development of colorectal cancer screening programs in many countries has led to increasingly large numbers of patients undergoing optical colonoscopy.
- Although acute complications from screening optical colonoscopy are uncommon, they may occur in up to 5% or more of cases where biopsy or therapeutic procedures are performed.
- Abdominal radiographs are of value only for the detection of intraperitoneal perforation, in patients suspected of complications following optical colonoscopy.
- A wide spectrum of other important potential complications of optical colonoscopy includes extraperitoneal perforation, splenic injury, postpolypectomy syndrome, bowel obstruction, mesenteric hemorrhage, diverticulitis, appendicitis, cathartic or chemical colitis, and other less frequently encountered problems.
- Such complications are most reliably identified using abdominal and pelvic CT, which also can guide appropriate conservative, interventional, or surgical management.

INTRODUCTION

Optical colonoscopy is a common and routine procedure for screening and detection of colorectal cancer, the second leading cause of cancer-related death in the United States.[1] The expansion of federally backed colon cancer screening programs and the health needs of an aging population are contributing to a rapid increase in the number of procedures, with more than 14 million colonoscopies performed annually in the United States.[2] Similar programs are being developed in many other countries worldwide. The sheer volume of optical colonoscopy procedures means that the low overall rate of serious complications (0.1%–0.3%) still affects a considerable number of individuals and constitutes an ongoing challenge.[3,4] Moreover, acute complications may occur in up to 5% or more of those colonoscopies where biopsy or therapeutic procedures, such as stricture dilation and stent placement, are performed.[4] The most common complications of optical colonoscopy are hemorrhage and large bowel perforation, with the incidence of hemorrhage up to 2.7%, whereas the overall incidence of perforation is 0.01% to 0.7%.[5] Less commonly occurring complications include splenic injury, postpolypectomy syndrome, and acute diverticulitis. Additional rare complications are listed in **Box 1**. The clinical spectrum and management of such complications has been well described in the gastrointestinal literature[4–7] but, to the authors'

The authors have nothing to disclose.

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Radiol Clin N Am 52 (2014) 1087–1099

http://dx.doi.org/10.1016/j.rcl.2014.05.012

0033-8389/14/$ – see front matter

Box 1
Observed complications on CT (in approximate descending order from more common to uncommon)

- Colonic perforation (intraperitoneal/extraperitoneal)
- Postpolypectomy syndrome
- Acute colonic diverticulitis
- Splenic injury/hemorrhage
- Mesenteric/retroperitoneal hemorrhage
- Large bowel obstruction
- Acute appendicitis
- Cathartic or chemical colitis
- Acute pancreatitis
- Small bowel obstruction
- Pneumomediastinum/pericardium, pneumothorax, subcutaneous emphysema
- Ureteral obstruction
- Liver abscess
- Omental infarction

knowledge, only in a few studies has the spectrum of optical colonoscopy-related complications detectable on CT[8,9] been reported, as well as in a few focused articles on splenic injuries associated with optical colonoscopy.[10,11]

CASE MATERIAL AND IMAGING MODALITIES

This review is based on the authors' collective personal experiences of the clinical and CT imaging findings associated with complications of optical colonoscopy gathered at 5 medical institutions over a multiple-year period. Some of the observed cases have been previously contributed to publications[8,10] and/or presentations at major radiology conferences.[12] All of the cases included in the authors' experience had major or relatively major abdominal complications either after optical colonoscopy or associated with bowel preparation prior to the procedure. A few patients were known to have synchronous abdominal radiographs and CT at the time of presentation. The range of optical colonoscopy-related complications included is listed in **Box 1**.

Supine abdominal radiographs, obtained alone or with erect views, often comprise the imaging test of first choice in symptomatic patients with acute abdominal pain after optical colonoscopy. Arguably the only purpose of radiographs in this setting is the detection of free intraperitoneal gas signifying perforation of the colon. In contrast, CT of the abdomen and pelvis is of considerably greater value, even where radiographs demonstrate free gas. In such cases, CT often provides additional information about the location and underlying cause of perforation, allowing for more informed surgical or other interventional planning. In cases of suspected complication where colon perforation is considered clinically unlikely, CT is the most appropriate initial imaging examination. This review describes the spectrum and diagnostic value of positive findings on CT in patients who have acute abdominal complications either after optical colonoscopy or associated with bowel preparation prior to the procedure.

COMPLICATIONS

Perforation

Although postbiopsy or therapy bleeding is the most widely recognized complication of optical colonoscopy, perforation of the colon is the most frequently encountered adverse event of radiologic importance. The incidence of perforation ranges from 0.01% to 0.6% after diagnostic colonoscopies and 5% or higher in colonoscopies performed for more challenging therapeutic purposes, such as metal stent placement and colon stricture dilation.[6,7,13–15] Perforation of the colon may be intraperitoneal and/or extraperitoneal and can be related to mechanical trauma from abrasion by the tip or shaft of the colonoscope, pneumatic insufflation, perforation of a diverticulum or area of stricture, traction injury from connecting ligaments, or therapeutic procedures. Perforation most commonly occurs in the sigmoid colon due to the acute angulation at the rectosigmoid junction, and is associated with direct mechanical forces from a slide-by or alpha maneuver of the endoscope. Intraperitoneal air often results from perforation of the transverse colon, sigmoid colon, or cecum. In some cases, perforation in these colonic segments results in atypical gas leakage confined to the mesocolon, a location typically not identified on radiographs but easily identified on CT. Signs and symptoms of free perforation into the peritoneal cavity at optical colonoscopy include persistent abdominal distention or pain, subcutaneous emphysema, fever, and leukocytosis. Perforation of the ascending colon, descending colon, or rectum is more likely to give rise to extraperitoneal air accumulation due to the retroperitoneal location of these colonic segments. In some cases, both intra- and extraperitoneal leak of gas from the colon is evident, making localization of the site of perforation more difficult (**Fig. 1**). Larger extraperitoneal gas leaks may spread to the subcutaneous tissues, leading to