

## Management of Suspected Perforation Following Colonoscopy: A Case Report

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Early detection of colon cancer is imperative for a good prognosis. Family physicians are therefore becoming the front line of defense in the fight against colorectal malignancy.

Many family physicians are incorporating colonoscopy into their practices in an attempt to avoid costly referrals and loss of continuity of care. While the com-

plication rate for colonoscopy is extremely low, any physician who performs colonoscopy must be fully aware of all possible complications and their management.

*Key words.* Colonoscopy; intestinal perforation.  
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In an attempt to reduce the mortality of colorectal cancer, the American Cancer Society has published recommendations for screening average-risk individuals. These include occult blood testing and sigmoidoscopic examinations beginning at 50 years of age.<sup>1</sup> These screening tests are designed to identify persons with adenomatous polyps who can then have more extensive workup and treatment to eradicate malignant and premalignant lesions before metastasis occurs. Patients with positive findings on screening examination are frequently referred for full-length colonoscopic evaluation and, if warranted, polypectomy. Polypectomy saves considerable morbidity and expense compared with operative management, and has been a major advancement in the treatment of colon cancer. Some family physicians are now performing colonoscopy as well as polypectomy.<sup>2-4</sup>

It is widely accepted that the sensitivity of the fecal occult blood test is quite low, with false-negative results given in up to 50% of the tests performed on patients with known colon malignancies.<sup>5,6</sup> The sensitivity of the 65-cm sigmoidoscope is limited as well. Recognizing these limitations as early as 1986, Derwin<sup>3</sup> stated that "An opportunity exists for family physicians to screen patients

more thoroughly for colon polyps and cancers using the 105-cm flexible sigmoidoscope." Recently, data published by several authors have shown that 65-cm flexible fiber-optic sigmoidoscopy has limited sensitivity.<sup>7-10</sup> Lieberman<sup>7</sup> performed colonoscopy on 105 healthy, asymptomatic male patients and showed that only 19 of 43 polyps detected by colonoscopy would have been found using the 65-cm scope, a sensitivity of only 44%.<sup>7</sup>

Family physicians may have the central role in promoting and implementing diagnostic colonoscopy for their patients. Although some have continued to refer patients to surgeons, gastroenterologists, and other specialists for this procedure, other family physicians have chosen to expand their endoscopy skills to include colonoscopy and polypectomy. The potential advantages of performing these procedures themselves include lower costs, better patient compliance, and improved continuity of care.<sup>2</sup> With videoendoscopic technology and newer endoscopes, physicians who possess endoscopic skills usually have no difficulty in mastering colonoscopy. Derwin<sup>3</sup> showed that the 105-cm endoscope was considered even easier to use than the 65-cm endoscope, with the most difficult part of the procedure being the navigation of the scope through the sigmoid colon. The family physician should be familiar with the potential complications associated with full-length colonoscopy and polypectomy. Fortunately, these complications are rare and most can be managed nonsurgically without long-term morbidity to the patient.

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## Case Report

A 62-year-old man with a history of guaiac-positive stools underwent diagnostic colonoscopy at the University of Tennessee Family Practice Center. His medical history showed only a pilonidal cyst removal in 1951 and hepatitis in 1962. He was not taking any medication on a regular basis, had no allergies, and had never used illicit drugs. He had smoked one pack of cigarettes per day and had drunk wine sporadically for most of his adult life.

On colonoscopy, two polyps, both greater than 1 cm in diameter, were found at 5 cm and 40 cm. The cecum was easily reached in this examination, the colonoscope was inserted to a depth of 130 cm, and the total time for examination was 50 minutes. Before the insertion of the colonoscope, 5 mg of diazepam and 75 mg of meperidine were administered intravenously. The patient tolerated the procedure well and was scheduled for polypectomy.

Two weeks later, the patient was admitted to one of our teaching hospitals where the same family physician colonoscopist (W.M.R.) removed both polyps using loop diathermy. Diazepam and meperidine were again used intravenously for sedation. Total procedure time was 50 minutes.

No unusual bleeding, pain, or difficulty in inserting the scope was associated with the procedure and the patient was discharged 2 hours later in excellent condition. That evening the patient reported left lower quadrant pain and nausea without vomiting. The next day his pain increased and he was unable to eat. He was examined in the office 2 days after the polypectomy, at which time he reported having fever, chills, severe left lower quadrant abdominal pain, and no bowel movements. His vital signs were temperature 98.0°F, blood pressure 110/78 mm Hg, and pulse 76 beats per minute. He appeared ill, ashen, and in moderate distress. He was transferred to the emergency department for admission to the hospital.

At the hospital the patient was noted to have a temperature of 99.3°F, blood pressure of 98/54 mm Hg without orthostatic changes, a regular pulse of 72 beats per minute, and respirations of 16 breaths per minute. Examination of the chest and heart revealed no abnormalities. The abdomen was soft with moderate tenderness and focal rebound tenderness in the left lower quadrant. Bowel sounds were absent. There was no involuntary guarding, and stool was negative for fecal occult blood. The remainder of the examination revealed that all findings were within normal limits. Admission laboratory results included a white blood count (WBC) of 6100 with 70% segmented neutrophils and no bands, and a hemoglobin of 14.4 g%. Urinalysis was negative;

Table 1. Complications of Colonoscopy: Frequency of Perforations

Literature Cited	No. of Procedures	Perforation Rate, %
Silva <sup>11</sup>	25,298	0.2
MacRae <sup>12</sup>	5,000	0.1
Nivatvongs <sup>10*</sup>	1,555	0
ASGE <sup>13</sup>	N/A	0.22/1.9†

\*Polypectomy only. Nivatvongs reported nine transmural burns in his study that were similar to this case report.

†Diagnostic/therapeutic (ie, rate in diagnostic only procedures as compared with therapeutic procedures requiring electrocautery).

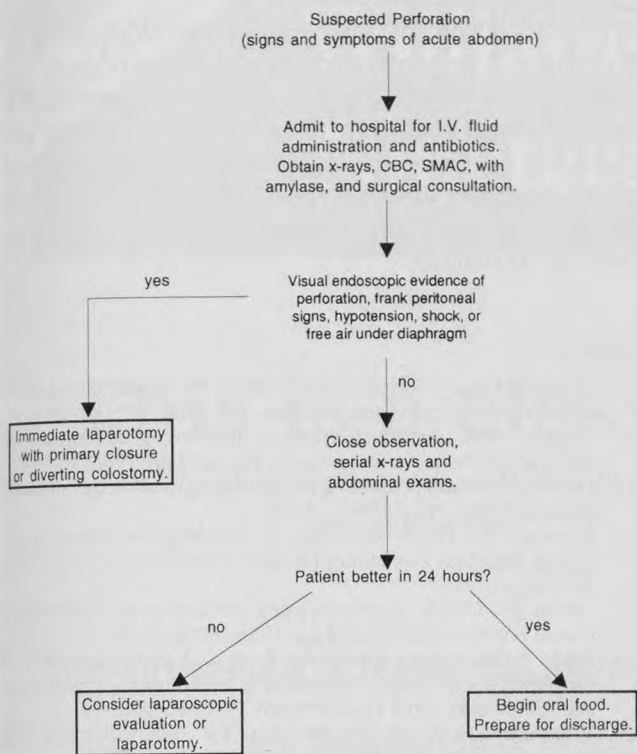
ASGE denotes American Society of Gastrointestinal Endoscopy.

the alanine aminotransferase was 29 U/L, and aspartate aminotransferase 28 U/L. An abdominal radiograph revealed no free air under the diaphragm, no intestinal ileus, and no other notable abnormalities. Surgical consultation was obtained, and the surgeon's impression was "probable perforation of colon." The patient was admitted to the family practice inpatient service with the diagnosis of suspected colonic perforation.

Following the surgeon's recommendation, the patient was started on 2 g of ampicillin every 6 hours, 80 mg of gentamicin every 8 hours, and 900 mg of clindamycin every 8 hours administered intravenously, and given nothing to eat or drink orally. By the next day his symptoms had improved somewhat, and he complained of being hungry. Repeat laboratory studies showed a WBC of 5800 with 56% segmented neutrophils. Findings on repeat abdominal x-ray studies remained normal. By the third hospital day the patient was pain free, afebrile, tolerating a regular diet, and having normal bowel movements. He was discharged from the hospital with the diagnosis of idiopathic abdominal pain and possible microperforation of the colon. After 12 months of follow-up, there were no sequelae from the event.

## Discussion

Although the complication rate for both diagnostic and therapeutic colonoscopy is low, complications do occur (Table 1).<sup>10-13</sup> Perforation of the colonic wall is the most common serious complication and can lead to peritonitis, shock, sepsis, and death. The suspicion of perforation in the above case was based on clinical findings, as the radiograph failed to show free air under the diaphragm. In his study of 1555 polypectomies in which equipment similar to ours was used, Nivatvongs<sup>10</sup> reported six cases in which patients experienced similar complications. He treated each with triple therapy antibiotics and intravenously administered fluids, and withheld oral feedings. All six patients recovered uneventfully. He attributed the complications to transmural burns caused by using ex-



Management flow chart for suspected colon perforation.

cessive heat during polypectomy. Whether a small amount of air escapes through a microperforation before it seals is not known, but these patients generally recover quickly and uneventfully.

Clinical decision-making steps to take in cases of suspected perforation are described in a flow chart (Figure). One should suspect a perforation when the patient reports severe pain immediately following colonoscopy. The mild to moderate pain of distention and cramping is normal following colonoscopy and usually passes in 15 minutes. Pain radiating to the shoulder, however, suggests perforation has occurred and free air is trapped under the diaphragm. If the patient continues to have abdominal pain 1 hour after the procedure, abdominal radiographs taken with the patient in an upright position should be ordered. Follow-up after the procedure should be individualized according to the patient's psychosocial situation, health status before colonoscopy and the presence of comorbid conditions.

Frank perforation occurred only once in the 1555 polypectomies performed by Nivatvongs.<sup>10</sup> Others have reported perforation rates ranging from 0.14% to 2.14%. While complete analysis of all causes of complications of diagnostic and therapeutic colonoscopy are beyond the scope of this paper, the detailed discussion by Ghazi and Grossman,<sup>14</sup> which we have summarized in Table 2, is an excellent reference and should be studied

Table 2. Types of Bowel Perforations During Endoscopy

Mechanism of Perforation	Recognition	Tips for Avoidance
Rupture of diverticulum	Pain, hypotension, visualization of mesenteric fat	Recognize diverticulum and avoid Never obstruct mouth of diverticulum
Perforation of narrow lumen	Anticipate in diseased state (ie, Crohn's disease)	Avoid forceful insertion
Perforation of healthy bowel	Occurs in slide-by maneuver; Watch for disappearance of submucosal vessels and blanching of mucosa; Occurs when sigmoid colon bound down with adhesions	Extreme care when using slide-by maneuver Expect difficulty when patient has had previous pelvic surgery; Avoid oversedation
Transection of pedicle too close to bowel wall	More common on polyps with short, fat bases	Use repeated bursts rather than one long application of coagulation
Accidental grasping of normal mucosa		Check and re-check snare loop before applying electrocautery
Tip of coagulation wire touching opposite wall	Extra care with poor preparation	Tent wire to middle of lumen

Adapted from Ghazi and Grossman.<sup>14</sup>

by all colonoscopists. Loggan and Moeller<sup>15</sup> reported a case of cecal perforation they believed occurred because of thinness of the cecal wall resulting from quiescent ulcerative colitis. In the study of perforation due to colonoscopy by Vincent and Lee,<sup>16</sup> 6 of 1547 patients required laparotomy for perforation of the colon that occurred during colonoscopy. All perforations occurred in the sigmoid colon, and use of excessive force to navigate the scope through the lumen was blamed as the cause in four of the six. In one of these cases, inadequate suction led to electrocoagulation of the nonvisualized bowel. None of these patients died.

Special note should be made of the case report by Magill and Weiss,<sup>17</sup> which describes a case of frank perforation that occurred during flexible sigmoidoscopy in a 79-year-old woman without any known disease of the colon. Interestingly, the perforation did not cause pain or distress to the patient. On laparotomy, the surgeon described the colonic tissue as being as "thin as paper." The patient had had a hysterectomy 30 years previously. The patient did not die, but she suffered great



hardship. She underwent surgery twice and had a hospital bill that exceeded \$30,000. This case illustrates the need for extreme caution when negotiating a scope through the sigmoid colon, especially in a patient with a history of prior pelvic surgery. It also emphasizes that most perforations occur in the sigmoid region of the colon.

Macrae et al<sup>12</sup> describe a series of 5000 colonoscopies in which the incidence of perforation was 0.1%. All patients recovered. The authors carefully analyzed each perforation and offered recommendations for avoiding this complication. They recommended that the colonoscopist be extremely vigilant and be willing to abandon the procedure should difficulty arise. They pointed out that a fixed loop of bowel is a dangerous situation, and explained that judicious use of insufflation, particularly in the presence of inflammatory bowel disease, is to be avoided. As stated by Rodney,<sup>2</sup> the correct balance in the amount of air is achieved when one touch of the suction button obliterates the lumen. Another safe rule is to discontinue insufflation if the patient becomes uncomfortable. Macrae strongly recommends that all patients undergoing polypectomy of lesions greater than 2 cm be admitted to the hospital. We do not agree with this recommendation as a universal standard. Patients should be assessed individually.

## Conclusions

There is an ongoing debate as to whether or not colonoscopy will become the colon cancer screening examination of choice. Neugut and Forde<sup>9</sup> give a basic cost analysis in favor of this, but leave open the question of who will be performing the thousands of screening colonoscopies mandated by this recommendation. They suggest "special facilities for rapid screening colonoscopies, leading to economies of scale." Some family physicians are currently performing colonoscopies with excellent statistics and low morbidity results.<sup>18-21</sup> Furthermore, the ability of family physicians to safely and proficiently perform colonoscopy will determine the success of any screening program involving colonoscopy. Knowing the potential complications and their management is a vital cognitive skill that must accompany the psychomotor skills of endoscope insertion and withdrawal. Among potential complications, perforation is the most catastrophic.

For full colonoscopy, rates of reaching the cecum range from 30% to 80%, to as high as 93% among family physicians with experience in flexible sigmoidoscopy.<sup>4,22</sup> With the availability of videoendoscopy, the procedure has become easier to learn and master. Currently additional research is underway to examine the family physician's experience using colonoscopy. More studies are

needed to document ability and competence of family physicians in performing this important service for patients. In addition to psychomotor skills, however, it is imperative that the family physician endoscopist be prepared for cognitive challenges such as the unexpected perforation. The scenario reported here may therefore be a helpful addition to the family physician's endoscopic training curriculum.

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