Communication from the ASGE Standards of Practice Committee

GUIDELINE

# Complications of colonoscopy

*This is one of a series of position statements discussing the use of GI endoscopy in common clinical situations. The Standards of Practice Committee of the American Society for Gastrointestinal Endoscopy prepared this text. In preparing this document, the authors performed a search of the medical literature by using PubMed. Additional references were obtained from the bibliographies of the identified articles and from recommendations of expert consultants. When limited or no data existed from well-designed prospective trials, emphasis was given to results from large series and reports from recognized experts. Position statements are based on a critical review of the available data and expert consensus at the time the documents are drafted. Further controlled clinical studies may be needed to clarify aspects of this document, which may be revised as necessary to account for changes in technology, new data, or other aspects of clinical practice.*

*This document is intended to be an educational device to provide information that may assist endoscopists in providing care to patients. This position statement is not a rule and should not be construed as establishing a legal standard of care or as encouraging, advocating, requiring, or discouraging any particular treatment. Clinical decisions in any particular case involve a complex analysis of the patient's condition and available courses of action. Therefore, clinical considerations may lead an endoscopist to take a course of action that varies from this position statement. This document is an update of the 2003 ASGE document entitled "Complications of colonoscopy."*[1]

Colonoscopy is a commonly performed procedure for the diagnosis and treatment of a wide range of conditions and symptoms and for the screening and surveillance of colorectal neoplasia. Although up to 33% of patients report at least one minor, transient GI symptom after colonoscopy,[2] serious complications are uncommon. In a 2008 systematic review of 12 studies totaling 57,742 colonoscopies performed for average risk screening, the pooled overall serious adverse event rate was 2.8 per 1000 procedures.[3] The risk of some complications may be higher if the colonoscopy is performed for an indication other than screening.[4] The colorectal cancer miss rate of colonoscopy has been reported to be as high as 6%,[5] and the miss rate for adenomas larger than 1 cm is 12% to 17%.[6-7] Although missed lesions are considered a poor outcome of colonoscopy, they are not a complication of the procedure per se and will not be discussed further in this document. Complications of bowel preparations are discussed in the American Society for Gastrointestinal Endoscopy Technology Status Evaluation Report for Colonoscopy Preparation.[8]

Over 85% of the serious colonoscopy complications are reported in patients undergoing colonoscopy with polypectomy.[3] An analysis of Canadian administrative data, including over 97,000 colonoscopies, found that polypectomy was associated with a 7-fold increase in the risk of bleeding or perforation.[9] However, complication data are often not stratified by whether or not polypectomy was performed. Therefore, complications of polypectomy are discussed with those of diagnostic colonoscopy. A discussion of the diagnosis and management of all complications of colonoscopy is beyond the scope of this document, although general principles are reviewed.

## CARDIOPULMONARY COMPLICATIONS

Cardiovascular and pulmonary complications related to sedation are reviewed in detail in the 2008 American Society for Gastrointestinal Endoscopy Guideline for Sedation and Anesthesia in GI Endoscopy.[10] Intraprocedural cardiopulmonary complications have been variably defined to include events of unclear clinical significance, such as minor fluctuations in oxygen saturation or heart rate, to significant complications including respiratory arrest, cardiac arrhythmias, myocardial infarction, and shock.[11] In a study that used the Clinical Outcomes Research Initiative (CORI) database, cardiopulmonary complications occurred in 0.9% of procedures and made up 67% of the unplanned events during or after endoscopic procedures with sedation.[12] Transient hypoxemia occurred in 230 per 100,000 colonoscopies, but prolonged hypoxemia was reported in only 0.78 per 100,000 colonoscopies. Hypotension occurred in 480 per 100,000 colonoscopies. CORI data may underestimate acute complications because of missing data and underreporting. A 2008 systematic review of randomized, controlled trials of patients undergoing colonoscopy and/or EGD reported much higher cardiopulmonary event rates with a weighted rate of 6% to 11% for hypoxemia and 5% to 7% for hypotension, depending on the specific drug regimen used.[13]


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In addition to acute complications, colonoscopy is associated with an increased incidence of cardiovascular events in the 30-day postprocedure period. A study of Medicare beneficiaries reported an unadjusted rate of cardiovascular events requiring hospitalization or emergency department visits of 1030 per 100,000 procedures, which was significantly higher compared with matched controls (885/100,000 procedures).[4] In a prospective study of patients undergoing colonoscopy at CORI sites, the event rate at 30 days was 1.4 per 1000 for angina, myocardial infarction, stroke, or transient ischemic attack.[14]

It is known that the risk of cardiopulmonary events associated with colonoscopy is increased with advanced age,[4] higher American Society of Anesthesiologists Physical Status Classification System scores,[15-16] and the presence of comorbidities.[4] Appropriate assessment of anesthesia risk prior to colonoscopy may reduce cardiopulmonary complications by ensuring that high-risk patients are co-managed with other specialists (eg, cardiology, anesthesiology). Appropriate monitoring before, during, and after the procedure also may reduce the risk of complications. Unstable patients should have non-emergent colonoscopy delayed as appropriate. In addition, continuing aspirin and other antiplatelet agents in the peri-endoscopic period may reduce the risk of cardiovascular events. The current American Society for Gastrointestinal Endoscopy Guideline for Management of Antithrombotic Agents for Endoscopic Procedures stresses that the risks of bleeding while receiving antithrombotic therapy must be weighed against the risks of a thrombotic event if that therapy is withheld.[17] Although many thrombotic events may be devastating, procedure-related GI bleeding is usually manageable and infrequently associated with significant morbidity or mortality.[17]

## PERFORATION

Colonic perforation during colonoscopy may result from mechanical forces against the bowel wall, barotrauma, or as a direct result of therapeutic procedures. Early symptoms of perforation include persistent abdominal pain and abdominal distention. Later, patients may develop peritonitis. Plain radiographs of the chest and abdomen may demonstrate free air, although CT scans have been shown to be superior to the upright chest film.[18] Therefore, an abdominal CT scan should be considered for patients with an unrevealing plain film in whom there is a high suspicion of perforation.

The rate of perforation reported in large studies is 0.3% or less and is generally less than 0.1%.[2] In a large study of screening colonoscopy, perforation was reported in 13 of 84,412 procedures (0.01%).[19] In a case-controlled study of 277,434 Medicaid beneficiaries undergoing colonoscopy, the rate of perforation was 8.2 per 10,000 procedures (0.08%) compared with 0.3 per 10,000 matched controls (0.003%).[20] In a study analyzing over 50,000 colonoscopies and using Medicare claims data, the rate of perforation was 5 to 7 per 10,000 procedures (0.05%-0.07%) and not significantly different for procedures coded as screening without polypectomy, diagnostic without polypectomy, or with polypectomy (regardless of indication).[4] Finally, in a large study of 116,000 patients undergoing colonoscopy at ambulatory endoscopy centers, there were 37 perforations (0.3%).[21]

Surgical consultation should be obtained in all cases of perforation. Although perforation often requires surgical repair, nonsurgical management may be appropriate in select individuals.[22] There is an increasing number of case reports demonstrating the feasibility of using endoscopic clipping devices to repair perforations.[23]

There is evidence that performance of colonoscopy by an endoscopist with low procedure volume is associated with increased risk of perforation and bleeding.[9] Creating a fluid cushion at the base or under large polyps in order to increase the degree of separation of the mucosal layers has been described as a technique to potentially reduce the risk of postpolypectomy perforation.[24] It has been suggested that perforation rates greater than 1 in 500 for all colonoscopies or 1 in 1000 for screening colonoscopies should prompt evaluation of whether inappropriate practices are being used.[24]

## HEMORRHAGE

Hemorrhage is most often associated with polypectomy, although it can occur during diagnostic colonoscopy. When associated with polypectomy, hemorrhage may occur immediately or can be delayed for several weeks after the procedure.[25] A number of large studies have reported hemorrhage in 1 to 6 per 1000 colonoscopies (0.1%-0.6%).[2] A study analyzing over 50,000 colonoscopies by using Medicare claims found that the rate of GI hemorrhage was significantly different with or without polypectomy: 2.1 per 1000 procedures coded as screening without polypectomy and 3.7 per 1000 for procedures coded as diagnostic without polypectomy, compared with 8.7 per 1000 for any procedures with polypectomy.[4]

Polyp size has been reported as a risk factor for postpolypectomy bleeding in several studies.[26-30] Additional risk factors may include the number of polyps removed,[31-32] recent warfarin therapy,[28,33-34] and polyp histology.[26,35] Patient comorbidities, such as cardiovascular disease,[4,26,28] may increase the risk for bleeding but also may be markers for anticoagulation use.[34] Multiple, large studies did not find aspirin use associated with postpolypectomy bleeding.[33-34,36] Another retrospective study found that concomitant use of either aspirin or nonsteroidal anti-inflammatory drugs and clopidogrel was an independent risk factor for bleeding, but aspirin or clopidogrel use alone was not.[31] Recommendations for the management of antithrombotic therapy in the peri-endoscopic period are discussed in detail in another ASGE document.[17]