Lesson 234: Preanesthetic Assessment of the Outpatient for Colonoscopy

**WRITTEN BY:**
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**Indications and Contraindications for Colonoscopy**

The decision to perform a colonoscopy must take into account the cost, risk, and accuracy of the diagnostic alternatives. In the United States, the criteria may differ from those in foreign countries because the resources for colonoscopy and/or perceptions of the procedure vary among populations. The indications for colonoscopy can be classified as diagnostic or therapeutic, high-risk or low-risk, and high-yield or low-yield.

**Indications**

Colonoscopy is used as a diagnostic procedure mainly to obtain material via biopsy because the procedure allows optimal access to the mucosal tissue from the anal canal to obtain material via biopsy because the procedure allows optimal access to the mucosal tissue from the anal canal to colon cancer. A coordinated effort is essential to maximize efficiency and patient safety.

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The indications for colonoscopy should also be classified as diagnostic or therapeutic, high-risk or low-risk, and high-yield or low-yield.

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**Target Audience**

Anesthesiologists

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**NEEDS STATEMENT**

Colonoscopy has become a common procedure used as a screening tool or for therapeutic intervention in a number of pathologic processes. Many anesthesiologists work in endoscopy suite settings, and it has been estimated that up to 10% of anesthesiologists administered in the US are for gastrointestinal examinations. While the majority of these procedures are not associated with morbidity or mortality, complications can arise. Many patients undergoing endoscopy are elderly and/or take multiple medications and it is important that anesthesiologists be aware of the requirements of the procedure and the risks and advantages of sedation versus general anesthesia.

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**CASE HISTORY**

A 66-year-old man presented to an outpatient clinic for routine, biannual colonoscopy. He reported a history of hypertension and type 2 diabetes. His medications included furosemide, simvastatin, glitazone, and insulin. He admitted to being nervous on this occasion because he had recently taken a mild sedative and his pulse rate was 74 per minute. His blood pressure was 178/105 mm Hg. A colonoscopy was performed, and a large polyp was removed.

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**CALL FOR CONTRIBUTIONS**

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To Colonoscopy

Perforated viscus
Pulmonary embolism
Fulminant colitis
Recent myocardial infarction
Toxic megacolon
Acute diverticulitis

Absolute
Relative

Table 1. Yield of Colonoscopy

<table>
<thead>
<tr>
<th>Indication</th>
<th>No. of Procedures Required</th>
</tr>
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<tbody>
<tr>
<td>Two consecutive positive FOBTs, neither rehydrated</td>
<td>2.7</td>
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<tr>
<td>Rectal bleed, nonemergency</td>
<td>8.9</td>
</tr>
<tr>
<td>Acute lower GI hemorrhage</td>
<td>11.8</td>
</tr>
<tr>
<td>Iron deficiency anemia</td>
<td>13</td>
</tr>
<tr>
<td>Positive FOBT, rehydrated</td>
<td>45</td>
</tr>
<tr>
<td>Screening average-risk men ≥60 y old</td>
<td>64</td>
</tr>
<tr>
<td>Surveillance after cancer resection, anastomotic recurrence</td>
<td>74</td>
</tr>
<tr>
<td>Surveillance after cancer resection, metachronous cancer</td>
<td>82</td>
</tr>
<tr>
<td>Screening average-risk people ≥50 y old</td>
<td>143</td>
</tr>
<tr>
<td>Screening people with positive family history, prospective studies only</td>
<td>286</td>
</tr>
<tr>
<td>Postpolypectomy surveillance</td>
<td>317</td>
</tr>
</tbody>
</table>

FOBT, fecal occult blood test; GI, gastrointestinal

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pain is usually not associated with colorectal cancer. However, colonoscopy is indicated in a patient who has both abdominal pain and chronic diarrhea in order to exclude Crohn’s disease. Moreover, positive findings on radiography and sigmoidoscopy can be an indication for the diagnostic use of colonoscopy. Examples of such findings include filling defects seen with barium enema and virtual colonoscopy, colonic strictures seen on radiographic imaging, and colonic thickening viewed on abdominopelvic CT scans (which can signify a tumor).

As mentioned previously, one of the major uses of colonoscopy in the United States is to screen for colorectal cancer. In the 2000 guidelines released by The American College of Gastroenterology, colonoscopy is listed as the most effective screening tool for colorectal cancer, provided the proper resources and professional expertise are available to perform the procedure correctly. Colonoscopy appears to be highly sensitive for detecting early signs of colon cancer. A study published recently in The New England Journal of Medicine found that barium enema detected polyps in only 39% of cases that were detected by colonoscopy.33

Contraindications

Before performing a colonoscopy, the health professional must verify that the patient has no contraindications to the procedure. Contraindications to colonoscopy can be classified as either absolute or relative. Toxic megacolon, fulminant colitis, and a perforated viscus open to the peritoneal cavity are absolute contraindications, and these should preclude the performance of colonoscopy. In general, contraindications to colonoscopy are those in which risk to the patient is significantly increased. Examples of relative contraindications are acute diverticulitis, recent myocardial infarction or pulmonary embolism, and pregnancy (Table 2).

Preparation

Bowel Cleansing

The colon must be adequately cleansed before a colonoscopy can be performed in order to improve the accuracy of diagnosis and reduce the risk for complications.16-18 Efficient colon cleansing is also cost-effective, according to a recent study of 400 colonoscopies by Rex et al.19 This report concluded that the extra time required to suction, wash, and satisfactorily expose the mucosa of patients with inadequate bowel preparation was associated with a greater number of aborted examinations and earlier repeated surveillance. In monetary terms, the average cost was increased by 12% and 22% in the university and public hospitals studied, respectively.

Early methods of colon preparation for colonoscopy were modeled after those used for barium enema and modified. Currently, 3 major options are available for colon preparation: diet and cathartic regimens, gut lavage, and phosphate formulations. Regardless of the method used, the patient must be thoroughly instructed about the cleansing procedure and must adhere precisely to the guidelines if the preparation is to be effective.

Dietary methods for colon cleansing include a 48- to 72-hour regimen of clear liquids, laxatives, and enemas. In a 1984 study, this regimen was compared with another regimen consisting of a minimum-residue diet that the patient undertook 24 to 72 hours before the examination.20 The study showed that the cleansing efficacy of the minimum-residue diet was better than that of the regimen of clear liquids, laxatives, and enemas, and it has since become standard. Concerning cathartic methods of cleansing, a solution of magnesium citrate and senna X-prep was shown to have good cleansing efficacy and was acceptable to most patients.21 The combination of magnesium citrate and bisacodyl has also been found to be more effective in cleansing than castor oil.22

The solution most often used for the gut lavage method of colon preparation is a polyethylene glycol electrolyte lavage solution (PEG-ELS). The benefit of this solution is that it does not significantly alter fluid and electrolyte balance in comparison with saline solution or electrolyte preparations.23 Although the efficacy of PEG-ELS reaches a high level, there is still scientific debate concerning its benefit relative to the third type of preparation, sodium phosphate.24,25 A recent study comparing the cleansing efficacy of 2 types of PEG solution with that of a sodium phosphate preparation showed that the sodium phosphate solution was slightly less effective than one of the PEG solutions.26 However, other studies comparing sodium phosphate with PEG27 and a PEG–bisacodyl solution28 indicated opposite results, concluding that the sodium phosphate solution was superior to the PEG solutions in cleansing efficacy and patient tolerance. Furthermore, before a regimen of sodium phosphate is administered for colon cleansing, certain contraindications must be taken into account. The most serious contraindication is pregnancy, as PEG can cross the placenta.29

Table 2. Contraindications To Colonoscopy

<table>
<thead>
<tr>
<th>Absolute</th>
<th>Relative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Toxic megacolon</td>
<td>Acute diverticulitis</td>
</tr>
<tr>
<td>Fulminant colitis</td>
<td>Recent myocardial infarction</td>
</tr>
<tr>
<td>Perforated viscus</td>
<td>Pulmonary embolism</td>
</tr>
<tr>
<td>Pregnancy</td>
<td></td>
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</table>

Infection Control

Although rare, incidents of bacterial infection caused by colonoscopy have been reported. The main concern regarding infection during the procedure is the development of bacteremia from endogenous bacteria and the transmission of infection to the patient through contaminated equipment. Bacterial infections transmitted by endoscopes are extremely rare if proper procedures for disinfection are followed before and after use.30 Postprocedural bacteremia caused by endogenous bacteria or other factors is also uncommon. In fact, the type of infection has been recorded in only 2.2% of colonoscopies, and even if an infection does develop, complications are seldom observed.31

Although infections are considered uncommon, data on the risk for infection associated with colonoscopy are sparse, and the ambiguity surrounding this issue has prompted the American Heart Association to create guidelines for antibiotic prophylaxis to be given to patients with specific indications to prevent bacterial endocarditis.32 In addition to preventative measures, a careful cost–benefit analysis should be performed for each case before the decision to use antibiotic prophylaxis is made.

Anticoagulant Considerations

The management of anticoagulants and antiplatelet agents during colonoscopy must be emphasized. Decisions must be made about when to stop and resume anticoagulation therapy during the procedure. The risks associated with discontinuing the therapy include thromboembolic complications, and these must be weighed against the risk for gastrointestinal hemorrhage related to the procedure. Before any guidelines were published, a 1996 survey of 1,269 members...
Discontinue warfarin 3-5 d before colonoscopy, and reinstitute after procedure.

Delay elective procedures while INR is above therapeutic range, no change in anticoagulation therapy.

Discontinue warfarin 3-5 d before colonoscopy, Consider heparin while INR is below therapeutic level.

Delay elective procedures while INR is above therapeutic range, no change in anticoagulation therapy.

ASGE, American Society of Gastrointestinal Endoscopy; INR, international normalized ratio.
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photosensors capture the light reflected back from the bowel tissue and send integrated signals to a video screen on which the image is displayed. To produce color images, special CCDs called color chips are used. These contain a multicolored filter that resolves the image into its component primary colors.

In addition to finger controls that regulate the illumination system of the colonoscope, the user has access to controls for the air, water, and suction systems. By manipulating a valve, which tonically releases air from the colonoscope, the endoscopist can insufflate the colon for better viewing. The colonoscope also contains a tube that can expel water from an external source when a valve is depressed. Furthermore, the endoscopist can take advantage of a valve that is used to suction air or water from the lumen.

A recent innovation, which is used to accurately determine the position of the colonoscope during colonoscopy and to locate problematic loops of bowel, is the magnetic 3-dimensional imaging system. This innovation was introduced in 1993 by 2 groups of British researchers. The colonoscope is equipped with internal sensor coils that detect low-frequency magnetic pulses from a special table on which the patient is positioned. The pulses induce electrical signals within the coils that are transmitted to a computer. The computer then deciphers the signals to produce a 3-dimensional image on a video monitor.

The colonoscope is equipped with many accessories that are used for specific functions, such as polypectomy, biopsy, image enhancement, and ablation. These include polypectomy snare, which consists of a wire loop within a polymer sheath. The snare is positioned. The pulses induce electrical signals within the coils that are transmitted to a computer. The computer then deciphers the signals to produce a 3-dimensional image on a video monitor.

During colonoscopy, an endoscope is inserted into the anal canal and passed through the bowel from the rectum to the ileocecal junction. The endoscope contains a camera lens, so that the whole procedure can be visualized in detail on a video monitor. Although specific techniques may vary depending on institutional standards or physician preference, some general principles should be followed.

Once the patient is placed either on the left side or in a supine position, the physician lubricates the anal canal and relaxes the anal sphincters. The distal 10 cm of the colonoscope is lubricated and inserted obliquely into the anus while the physician supports the bending section with a forefinger. Once the colonoscope is inside the rectum, the physician rotates and changes angles it to clearly visualize the rectal lumen. Fluid and residue can be aspirated at this stage or any other stage of the procedure to empty the lumen. Once the rectum has been clearly visualized, the physician slowly maneuvers the endoscope through the following sections of the gut: sigmoid colon, descending colon, transverse colon, ascending colon, and cecum. When it becomes necessary to improve vision, the physician can insert a lighted cannula and use additional lighting, using the controls at the end of the colonoscope. Navigation should be slow and exact, and the physician may move the endoscope in a retrograde direction to review specific areas.

Furthermore, caution must be exercised as the junction of the transverse and ascending colon, the splenic and hepatic flexures, and the ileocecal junction are traversed. After the examiner has viewed the entire length of the colon, the endoscope is withdrawn, whereupon the colon may be inspected further.

Complications

Being an invasive procedure, colonoscopy is associated with a variety of complications. However, when it is performed by expert physicians in a clinical setting, the frequency of any significant complications is extremely low. Recent advances in colonoscopy equipment and technique are some of the factors to which such low rates can be attributed. Recently, it has been suggested that quality assurance programs, that highlight core quality indicators developed by the ASGE, can be implemented in endoscopy units to address the complications associated with colonoscopy.

The mortality rates attributed to colonoscopy are low, and death occurs only when serious complications are associated with the procedure. Local studies have put the mortality rate at approximately 0.01%. Careful selection of patients is critical to ensuring survival after the procedure. The physician must take into account the patient’s physical state and any contraindications.

Bowel perforation caused by endoscope puncture is one of the more obvious complications of colonoscopy. This complication is not considered to be serious in an otherwise healthy patient. Data have consistently put the incidence of perforation at between 0.1% and 0.3%. However, the relative safety of diagnostic versus therapeutic colonoscopy in regard to perforation is disputed.

Bleeding, another common problem, occurs with about the same frequency as perforation. It can be a consequence of either tissue perforation or polypectomy. Medication must be taken into account in predicting the effects of bleeding on a patient. If the patient is taking anticoagulant or antiplatelet therapy, decisions about whether to discontinue the therapy and for how long must be made according to the healthcare system and thereby may exacerbate cardiovascular events. Furthermore, this study could not identify a better method for deciding when to discharge a patient than the ones already established at individual institutions.

Discharge Criteria

Currently, no standardized discharge criteria are available for healthcare professionals dealing with colonoscopy candidates. It can be assumed, however, that each institution determines a minimum length of stay for patients who have just undergone a colonoscopy or uses other criteria to determine when to discharge these patients. Only a 1996 study at Beth Israel Medical Center in New York City sought to determine whether patient risk factors, intraoperative occurrences, and medications administered during endoscopy could be used to predict a minimum stay after conscious sedation. In a study of 405 adult patients who underwent upper GI endoscopy or colonoscopy, preprocedural data (demographic and risk factor data), intraprocedural data (medications and intraoperative occurrences), and postprocedural data (time of recovery and postprocedural occurrences) were obtained. The results concluded that “age predicted length of time in recovery, but only 2% of the variation in recovery time was predicted by study variables.” Furthermore, this study could not identify a better method for deciding when to discharge a patient than the ones already established at individual institutions.

Patient discharge can be affected by the type of anesthetic used during the colonoscopy. In a study comparing propofol with midazolam/fentanyl, the patients receiving propofol recovered faster and were discharged about 10 minutes earlier than the patients sedated with midazolam/fentanyl. In another study, which compared remifentanil/propofol with I.V. anesthesia with fentanyl/midazolam/propofol, the remifentanil/propofol combination provided sufficient sedation and allowed patients to be discharged about 15 minutes after the procedure.

Another study compared totally I.V. anesthesia with inhalational anesthesia. A group of 69 patients were randomly assigned to receive either I.V. fentanyl, midazolam, and propofol or an inhaled combination of sevoflurane and nitrous oxide. Recovery of psychomotor abilities was 30 to 90 minutes faster in the patients given inhalation anesthesia than in those given I.V. anesthesia. These studies show that certain types of sedation may be more suitable and should be examined in an effort to reduce patient discharge times after colonoscopy.

Follow-up and Surveillance

Cancer reemerges in approximately 33% of patients initially treated by surgery with curative purpose. Furthermore, many of these patients die of a disseminated form of the disease. The risk of postoperative recurrence in colon patients is to reduce these numbers. There is no consensus on the type of strategy to implement; however, any strategy is justifiable so long as it improves quality of life and prolongs the disease-free period and overall global survival. For noncancer

The CME lesson is available online at anesthesiologynews.com.
patients, the value of follow-up is controversial. The published literature reveals that more intensive and frequent follow-up leads to increased numbers of reoperations and an overall more aggressive oncologic approach in nonresectable cases. The benefits of intensive follow-up however, have not been determined; additional, requiring all patients to undergo intensive surveillance is neither cost-effective nor support-

The individual characteristics of each case must be taken into consideration before a follow-up plan is set. It has been suggested that physicians should lean toward more intensive follow-up of patients at high risk for treat-

able recurrence and willingness to undergo reoperation. Along the same lines, low-risk cases could be followed with a few tests, such as colonoscopy, history, physical examination, monitoring of carcinomogenic immunity, antigen, and rectoscopy. Recent studies have shown that new diagnostic tests, such as CT colonography, can be used to identify patients who need more frequent colonoscopy. Therefore, the role of colonoscopy will become even more important in the future, as it is the most effective procedure for detecting colorectal cancer. The published studies have shown that colonoscopy is a valuable tool with which gastroenterologists can investi-


17. Mandel JS, Church TR, Ederer F, Bond JH. Colorectal cancer mortality: effective-


15. Winslow SJ, Stewart ET, Zabor AG, et al. A comparison of colonoscopy and dou-


10. Jorgensen OD, Kronborg O, Fenger C. A randomised study of screening for col-

9. Mandel JS, Church TR, Ederer F, Bond JH. Colorectal cancer mortality: effective-


5. Winslow SJ, Stewart ET, Zabor AG, et al. A comparison of colonoscopy and dou-


Continuing Medical Education

Lesson 234

Reference


Winslow SJ, Stewart ET, Zabor AG, et al. A comparison of colonoscopy and dou-

Janzon O, Gomer G, Bengtsson C, et al. Randomized study of screening for col-

Mayes AC, Church TR, Garewal H, Chejfec G. Use of October 2004 Anesthesiology News 75


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Post-test

1. An absolute contraindication to colonoscopy is ____________.
   a. pregnancy
   b. toxic megacolon
   c. recurrent polyps suspected of being malignant
   d. diverticulitis

2. In regard to preparation before colonoscopy, ____________.
   a. the cleansing efficacy of PEG-ELS is considered to be definitively better than that of sodium phosphate
   b. the cleansing efficacy of sodium phosphate is considered to be definitively better than that of PEG-ELS
   c. results of studies are conflicting
   d. neither PEG-ELS nor sodium phosphate is an effective preparation for colonoscopy

3. The frequency of postprocedural bacteremia is approximately ____________.
   a. 0.0%
   b. 2.2%
   c. 5%
   d. unknown

4. Which one of these functions of the colonoscope is not manually controlled by the endoscopist? a. Transmission of light through the lens aperture
   b. Insufflation of bowel with air
   c. Suction of fluid, air
   d. Angulation of lens

5. The approximate frequency of bowel perforation during colonoscopy is ____________.
   a. much higher than the frequency of bleeding during colonoscopy
   b. much lower than the frequency of bleeding during colonoscopy
   c. about the same as the frequency of bleeding during colonoscopy
   d. troubling because perforation is considered to be a serious complication, even in a healthy individual

6. Side effects commonly seen during colonoscopy include ____________.
   a. lowered blood pressure
   b. lowered heart rate
   c. oxygen desaturation
   d. all of the above

7. According to the results of controlled studies analyzing the risk of continuing or discontinuing preprocedural anticoagulation therapy, ____________.
   a. in cases of ulcerative colitis, anticoagulation must be discontinued
   b. in cases of Crohn’s disease, anticoagulation must be discontinued
   c. in cases of Crohn’s disease and ulcerative colitis, anticoagulation must be discontinued
   d. No controlled studies have assessed the risk of continuing or discontinuing anticoagulation therapy.

8. Recent studies of the effect of music therapy on patients have concluded that it decreases ____________.
   a. heart rate and risk for bleeding
   b. anxiety only
   c. anxiety, heart rate, and blood pressure
   d. blood pressure and risk for bleeding

9. For children undergoing colonoscopy, the most efficacious and safe sedating combination is ____________.
   a. midazolam and ketamine
   b. ketamine and meperidine
   c. nitrous oxide and meperidine
   d. meperidine and midazolam

10. According to a 2003 study of sedation plans, ____________.
    a. midazolam/fentanyl anesthesia was associated with faster and deeper sedation, as well as faster recovery and earlier discharge, in comparison with propofol anesthesia
    b. propofol anesthesia was associated with faster and deeper sedation, as well as faster recovery and earlier discharge, in comparison with midazolam/fentanyl anesthesia
    c. both propofol and midazolam/fentanyl were associated with the same level of sedation and with similar discharge and recovery times
    d. The study results were inconclusive.

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