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AGA SECTION

Optimizing Adequacy of Bowel Cleansing for Colonoscopy: Recommendations From the US Multi-Society Task Force on Colorectal Cancer

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Colorectal cancer (CRC) is the second leading cause of cancer-related deaths in the United States.[1] Colonoscopy can prevent CRC by the detection and removal of precancerous lesions. In addition to CRC screening and surveillance, colonoscopy is used widely for the diagnostic evaluation of symptoms and other positive CRC screening tests. Regardless of indication, the success of colonoscopy is linked closely to the adequacy of preprocedure bowel cleansing.

Unfortunately, up to 20%–25% of all colonoscopies are reported to have an inadequate bowel preparation.[2,3] The reasons for this range from patient-related variables such as compliance with preparation instructions and a variety of medical conditions that make bowel cleansing more difficult to unit-specific factors (eg, extended wait times after scheduling of colonoscopy).[4] Adverse consequences of ineffective bowel preparation include lower adenoma detection rates, longer procedural time, lower cecal intubation rates, increased electrocautery risk, and shorter intervals between examinations.[3,5–7]

Bowel preparation formulations intended for precolonoscopy cleansing are assessed based on their efficacy, safety, and tolerability. Lack of specific organ toxicity is considered to be a prerequisite for bowel preparations. Between cleansing efficacy and tolerability, however, the consequences of inadequate cleansing suggest that efficacy should be a higher priority than tolerability. Consequently, the choice of a bowel cleansing regimen should be based on cleansing efficacy first and patient tolerability second. However, efficacy and tolerability are closely interrelated. For example, a cleansing agent that is poorly tolerated and thus not fully ingested may not achieve an adequate cleansing.

The goals of this consensus document are to provide expert, evidence-based recommendations for clinicians to optimize colonoscopy preparation quality and patient safety. Recommendations are provided using the Grades of Recommendation Assessment, Development and Evaluation (GRADE) scoring system, which weighs the strength of the recommendation and the quality of the evidence.[8]

Methods

Search Strategy

Computerized medical literature searches were conducted from January 1980 (first year of approval of polyethylene glycol–electrolyte lavage solution [PEG-ELS]–based preparation by the Food and Drug Administration [FDA]) up to August 2013 using MEDLINE, PubMed EMBASE, Scopus, CENTRAL, and ISI Web of knowledge. We used a highly sensitive search strategy to identify reports of randomized controlled trials[9] with a combination of medical subject headings adapted to each database and text words related to colonoscopy and gastrointestinal agents, bowel preparation, generic name, and brand name. The complete search terms are available in Appendix A. Recursive searches and cross-referencing also were performed using a "similar articles" function; hand searches of articles were identified after an initial search. We included all fully published adult human studies in English or French.

A systematic review of published articles and abstracts presented at national meetings was performed to collect and select the evidence. A meta-analysis and consensus agreement were used to analyze the evidence. Expert

Abbreviations used in this paper: **ADR, adenoma detection rate; CI, confidence interval; CRC, colorectal cancer; FDA, Food and Drug Administration; ITT, intention-to-treat; NaP, sodium phosphate; NDA, New Drug Application; OR, odds ratio; OSS, oral sulfate solution; OTC, over-the-counter; PEG-ELS, polyethylene glycol–electrolyte lavage solution; PICO, sodium picosulfate; USMSTF, US Multi-Society Task Force.**

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consensus was used to formulate the recommendations. The GRADE system was used to rate the strength of the recommendations. The guideline was reviewed by committees of and approved by the governing boards of the member societies of the Multi-Society Task Force on Colorectal Cancer (American College of Gastroenterology, American Gastroenterological Association, and American Society of Gastrointestinal Endoscopy).

Effect of Inadequate Preparation on Polyp/Adenoma Detection and Recommended Follow-up Intervals

Recommendations

1. Preliminary assessment of preparation quality should be made in the rectosigmoid colon, and if the indication is screening or surveillance and the preparation clearly is inadequate to allow polyp detection greater than 5 mm, the procedure should be either terminated and rescheduled or an attempt should be made at additional bowel cleansing strategies that can be delivered without cancelling the procedure that day (***Strong recommendation, low-quality evidence***)
2. If the colonoscopy is complete to cecum, and the preparation ultimately is deemed inadequate, then the examination should be repeated, generally with a more aggressive preparation regimen, within 1 year; intervals shorter than 1 year are indicated when advanced neoplasia is detected and there is inadequate preparation (***Strong recommendation, low-quality evidence***)
3. If the preparation is deemed adequate and the colonoscopy is completed then the guideline recommendations for screening or surveillance should be followed (***Strong recommendation, high-quality evidence***)

Inadequate colonic preparation is associated with reduced adenoma detection rates (ADRs). A large prospective European study of 5832 patients enrolled in 21 centers across 11 countries examined the association of preparation quality and polyp identification during colonoscopy performed for a range of common indications. High-quality preparation was associated with identification of polyps of all sizes (odds ratio [OR], 1.73; 95% confidence interval [CI], 1.28–2.36), and with polyps greater than 10 mm in size (OR, 1.72; 95% CI, 1.11–2.67).[2] An analysis of a national endoscopic database examined the association of preparation quality and polyp identification in 93,004 colonoscopies.[3] Colon preparation (as entered by the endoscopist at the time of the procedure) was dichotomized into adequate (excellent, good, and fair/adequate) and inadequate (fair, inadequate, and poor). In adjusted models, adequate preparation was predictive of detection of all polyps (OR, 1.21; 95% CI, 1.16–1.25), but not polyps greater than 9 mm and/or suspected cancer (OR, 1.5; 95% CI, 0.98–1.11). Similarly, a single-center study based at a US Veterans Affairs Medical Center examined preparation quality and ADRs in 8800 colonoscopies performed between 2001 and 2010.[10] When comparing those examinations with an inadequate/poor preparation (n = 829) with those with an adequate preparation (n = 5162), overall polyp detection was reduced (OR, 0.66; 95% CI, 0.56–0.83).

Two retrospective single-center studies examined the association of preparation quality and adenoma miss rates when the preparation was considered inadequate and the examination was repeated within a short interval.[11,12] Miss rates were the total adenomas found on the second examination divided by the total adenomas found on both examinations. In 1 study[11] there were 12,787 colonoscopies with 3047 (24%) suboptimal preparations (fair or poor). Repeat colonoscopy within 3 years in 216 individuals who achieved adequate preparation showed an overall adenoma miss rate of 42%, and a miss rate of 27% for lesions 10 mm or larger in size. The other study identified 373 average-risk screening patients with poor or inadequate preparation.[12] Repeat colonoscopy in 133 patients (77% achieved excellent or good preparation) showed a 47% overall adenoma miss rate.

A single prospective Korean study evaluated 277 individuals after a complete colonoscopy and then a per-protocol repeat "tandem" colonoscopy within 3 months of the initial examination.[13] The patient adenoma miss rate increased as baseline preparation quality decreased on the Aronchick scale. In the 19 patients with poor preparation the adenoma and advanced adenoma miss rates were 47% and 37%, respectively, compared with 21% and 9% in those with excellent preparation ($P = .024$).

Surveys report that in the setting of a poor preparation, endoscopists' recommendations for follow-up evaluation vary and err on shorter return intervals.[14,15] In 1 study 65 board-certified gastroenterologists and 13 gastroenterology fellows[14] were shown images of preparations of "excellent to intermediate quality." With a "nearly perfect" preparation, a 10-year interval generally was recommended for a normal screening colonoscopy. However, recommendations were quite variable for the lower-quality preparations, ranging from more than 5 years to an immediate repeat procedure. A survey of gastroenterologists (n = 116) preparing for board certification found that 83% would recommend follow-up evaluation in 3 years or less for 1–2 small adenomas and a suboptimal preparation.[15]

Several studies have examined actual recommendations for follow-up evaluation within the framework of clinical practice. One study abstracted charts from 152 physicians in 55 North Carolina practices on 125 consecutive persons in each practice.[16] Preparation quality was not reported in 32% of the examinations. Bowel preparations rated less than excellent were associated with more aggressive surveillance for those found with no polyps or small and/or