



Bowel preparation prior to colonoscopy: A continual search for excellence

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INVITED COMMENTARY ON HOT ARTICLES

As clinical gastroenterologists, we read the recent article by Tajika *et al*^[1] describing a new lower volume bowel preparation prior to colonoscopy with considerable interest. This article examined the use of mosapride and only 1.5 L of polyethylene glycol (PEG) for bowel preparation prior to colonoscopy. Given the continued need and search for more options for bowel preparation, we recommend reading and possibly implementing the information in this article.

Colorectal cancer is a common and devastating disease which affects many patients worldwide. Being in top three of cancers and cancer-related deaths in the United States, colorectal cancer has become a focus of gastroenterology, with much of our practice being significantly impacted by colorectal cancer screening and surveillance^[2].

Over the past 10 years, colonoscopy has become the screening test of choice for colorectal cancer. Unlike other non-invasive colorectal cancer screening tools, such as fecal occult blood testing and computed tomographic (CT) colonography, colonoscopy is the only modality which encompasses both diagnostic and therapeutic potential. However, colonoscopy is dependent on adequacy of bowel preparation for complete visualization of the

Abstract

Bowel preparation prior to colonoscopy is essential to maximize the benefits of colonoscopy. Numerous bowel preparations have been studied, ranging from 4 L polyethylene glycol (PEG) to split-dose regimens to 2 L PEG with an adjunct laxative (senna, bisacodyl, ascorbic acid). Due to the large volume of PEG required for adequate bowel preparation, many studies have focused on reducing this large volume to only 2 L PEG with the addition of an adjunct. Recently, a randomized controlled trial by Tajika *et al* showed that the addition of mosapride to only 1.5 L PEG was non-inferior to mosapride and 2 L PEG for bowel cleansing but did provide improvements in patient tolerance. This study offers yet another potential bowel preparation for patients undergoing colonoscopy and may trigger further studies with 1.5 L PEG with an adjunct. In this letter, we discuss the current state of bowel preparation prior to colonoscopy and offer information to guide clinicians on choosing the appropriate bowel preparation for their patients.

Table 1 Common bowel preparations utilized prior to colonoscopy

First tier			
Split-dose PEG			
2 L the night prior and 2 L morning of colonoscopy			
Second tier			
Full-dose PEG	2 L PEG + Adjunct	Sodium phosphate	Sulfate prep
4 L the night prior	Ascorbic acid Bisacodyl Senna Magnesium Mosapride	(Tablet)	(Na, K, Mg)
Third tier			
Miralax + Gatorade	Magnesium citrate	Enemas	1.5 L + Adjunct Mosapride

PEG: Polyethylene glycol.

colonic mucosa. If visualization is compromised, missed lesions, prolonged procedure time, and increased patient discomfort become increasingly possible, significantly impacting patients and healthcare costs^[3,4]. Therefore, bowel preparation prior to colonoscopy is extremely important for an adequate colonoscopic examination.

The optimal bowel preparation prior to colonoscopy must adequately clear the fecal material to visualize the underlying mucosa but also must be tolerable to the patient. Even if the bowel preparation is exceptional at clearing the colon of feces, if it is not palatable, the patients will likely not complete the full preparation. Over the past few years, many studies have been performed with varying uses of PEG, such as split-dose PEG and PEG with adjuncts, in an effort to improve patient tolerability without decreasing the efficacy of the bowel preparation. A meta-analysis in *Gastrointestinal Endoscopy* in 2011 demonstrated that split-dose PEG (consisting of 2 L PEG the night prior and 2 L PEG the morning of the procedure), improved both the cleansing of the colon and patient tolerability as compared to full-dose PEG (4 L the night prior to colonoscopy)^[5]. Subsequently, the split-dose PEG has become a very common bowel preparation and is the preferred bowel preparation of the American College of Gastroenterology. However, patients are still required to consume a large volume of PEG. Therefore, many studies have elected to reduce the volume of PEG to 2 L and add a laxative adjunct (ascorbic acid, bisacodyl, senna, magnesium, *etc.*) and monitor for bowel cleansing and patient tolerability^[6-12]. However, these studies resulted in conflicting results.

In 2011, two meta-analyses were published as abstracts in the *American Journal of Gastroenterology* showing that 2 L PEG with ascorbic acid cleansed the colon as well as 4L PEG but was equally tolerated^[13]; however, 2 L PEG with bisacodyl demonstrated equal bowel cleansing and improved patient tolerability^[14]. Despite the results, limitations have been placed on using bisacodyl with PEG due to risk of ischemic colitis. Therefore, the search continues for an adequate low-dose PEG bowel preparation.

In the randomized controlled trial by Tajika *et al*^[1] mosapride (15 mg) was utilized as an adjunct laxative to low-dose PEG (1.5 L *vs* 2 L). The study revealed that mosapride with 1.5 L PEG resulted in equal bowel cleansing and increased tolerability as compared to mosapride with 2 L PEG. Given these results, mosapride with 1.5 L PEG appears promising as an alternative bowel preparation prior to colonoscopy. However, given a few limitations within this study, the results need to be interpreted cautiously.

First, this study utilized a non-inferiority model for analysis. Most bowel preparation studies are performed using a superiority model due to limitations of the non-inferiority model. The non-inferiority model is dependent upon the margin at which non-inferiority is defined. If the margin is not accurate, the results may be significantly affected. In this study, mosapride with 1.5 L PEG was non-inferior to mosapride with 2 L PEG; however, it appears that 2 L PEG with mosapride group has many more excellent and good preparations as compared to 1.5 L PEG with mosapride group (right colon: 88 *vs* 60; left colon: 97 *vs* 82). Given this difference, especially in the right colon, it is difficult for us to believe that equality of cleansing exists for these two regimens. Therefore, this leads us to believe that the sample size estimation and the non-inferiority margin may not be as accurate as hoped. Second, although the Aronchick scale has been shown to be a valuable tool in assessing bowel preparation, it is designed for the entire colon^[15]. This study used the Aronchick scale but divided it among right and left colon. Ideally, the Ottawa or Boston bowel preparation scales which utilize different segments of the colon with numerical scores may have been a better choice for bowel preparation assessment^[16,17].

At this point, based upon the available literature, we believe the ideal bowel preparation prior to colonoscopy is the split-dose PEG given 2 L the night prior and 2 L the day of the colonoscopy (Table 1). However, given its large volume, it may not be suited for all patients. Furthermore, given the number of other potential options including the preparation described in this study, alternative bowel preparations are readily available and may be utilized in certain cases without adversely affecting bowel cleansing.

The choice of bowel preparation is extremely important for patients and practices. Adequate bowel preparation which is tolerable to patients will likely enhance satisfaction among patients, who would be more likely to return for another colonoscopy. It will also likely reduce the need for early repeat procedures due to poor prep quality and overall costs. Given the number of preparations available, bowel preparation prior to colonoscopy in the future may be tailored to the needs and desires of the patients. Although split-dose PEG seems to be the gold-standard at this time, other preparations may be utilized to enhance patient satisfaction without adversely affecting overall preparation quality. The choice is up to you and your patient.

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