Bowel preparation prior to colonoscopy: A continual search for excellence

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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[1] 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.
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 utilize 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 attempted 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.*\(^{[15]}\) 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.

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.

| Table 1 Common bowel preparations utilized prior to colonoscopy |
|---------------------------------------------------------------|
| **First tier**                                                 | **Second tier**                                           | **Third tier**                                           |
| Split-dose PEG                                                 | 2 L PEG + Adjunct Sodium phosphate                        | Miralax + Magnesium citrate Enemas                       |
| 2 L the night prior and 2 L morning of colonoscopy             | Bisacodyl (Tablet)                                        | Gatorade                                                 |
| 2 L PEG                                                        | Senna                                                     |                                                    |
| Sodium phosphate                                               | Magnesium                                                 |                                                    |
| Sulfate prep (Na, K, Mg)                                       | Mosapride                                                 |                                                    |
| 4 L the night prior                                            |                                                          |                                                    |
| 4 L PEG                                                        |                                                          |                                                    |
| 4 L the night prior and 2 L morning of colonoscopy             |                                                          |                                                    |

PEG: Polyethylene glycol.
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