

Same-day colonoscopy preparation with *Senna* alkaloids and bisacodyl tablets: A pilot study

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Abstract

AIM: To evaluate the efficacy of same-day bowel preparation with *Senna* alkaloids combined with bisacodyl tablets in routine colonoscopy procedures.

METHODS: Between March and June 2013, a same-day bowel preparation was implemented in our endoscopy unit. The preparation consisted of a semi-liquid, fiber-free diet one day prior to the procedure, with two bisacodyl tablets after lunch and dinner, and 250 mL of *Senna* alkaloid with 1.5 L of drinking water at 6 am the day of the procedure. The quality control parameters of colonoscopy were evaluated and implemented according to the guidelines of the American Society for Gastrointestinal Endoscopy. The pre-procedure, during-procedure and post-procedure patient data were collected and analyzed: (1) pre-procedure (age, gender, comorbid diseases, colonoscopy indications, complete lack of compliance with the bowel preparation protocol); (2) during-procedure (sedation dose, duration of colonoscopy, withdrawal time, cecal intubation rate,

polyp detection rate, Boston Bowel Preparation Scores and presence of foam and clear liquid); and (3) post-procedure (visual analogue scale score, pain during the procedure, patient satisfaction and premature withdrawal due to the insufficient bowel preparation).

RESULTS: A total of 75 patients were included in this study with a mean age of 54.64 ± 13.29 years; 53.3% (40/75) were female and 46.7% (35/75) were male. A complete lack of compliance with the bowel preparation protocol was seen in 6.7% of patients (5/75). The mean total duration of colonoscopy was 16.12 ± 6.51 min, and the mean withdrawal time was 8.89 ± 4.07 min. The cecal intubation rate was 93.8% (61/64) and the polyp detection rate was 40% (30/75). The mean Boston Bowel Preparation Score was 7.38 ± 1.81 , with the following distribution: right colon, 2.34 ± 0.89 ; transverse colon, 2.52 ± 0.67 ; left colon, 2.52 ± 0.63 . The mean visual analogue scale score was 4.59 ± 1.57 . Due to insufficient bowel preparation, seven patients (7/75; 9.3%) were asked to repeat the procedure. Of these, five patients had poor or modest compliance with the protocol, and two patients reported constipation. Premature withdrawal due to insufficient bowel preparation was 2.7% (2/75). The overall satisfaction with the protocol was 86.7% (65/75), with patients reporting they would prefer the same protocol in a repeat procedure.

CONCLUSION: The same-day administration of *Senna* alkaloids appears to be a safe and effective bowel cleansing protocol for colonoscopy procedures.

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Key words: Bisacodyl; Bowel preparation; Colonoscopy; Same-day preparation; *Senna* alkaloid

Core tip: An efficient, simple, cost-effective and readily acceptable colonoscopy preparation is essential.

We aimed to evaluate the efficacy of same-day bowel preparation with *Senna* alkaloids combined with bisacodyl tablets in routine colonoscopy procedures. The same-day bowel preparation consisted of a semi-liquid, fiber-free diet one day prior to the procedure, with two bisacodyl tablets after lunch and dinner, and 250 mL of *Senna* alkaloid with 1.5 L of drinking water at 6 am the day of the procedure. The same-day administration of *Senna* alkaloids appears to be a safe and effective bowel cleansing protocol for colonoscopy procedures.

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INTRODUCTION

Colonoscopy is an important tool for the screening, diagnosis and treatment of colorectal cancers. According to the quality standards implemented by the American Society for Gastrointestinal Endoscopy/ACG Taskforce^[1], the most critical element for a successful colonoscopy is the complete cleansing of the colon to allow visualization of the entire colonic mucosa. Adequate preparation is also associated with the speed and completeness (*e.g.*, cecal intubation) of the procedure and the detection of precancerous lesions, such as polyps and sessile adenomas^[2]. Insufficient bowel cleansing necessitates a repeat procedure, which creates a heavy economic burden and loss of time for both the health professional and patient. Patient dissatisfaction is also a risk in repeat procedures and cancellation is common. Therefore, a safe and effective bowel preparation allows the examiner to detect adenomas, polyps and flat lesions more efficiently and avoids the costs of a repeat procedure.

Although colonoscopy is widely used all over the world, the ideal cleansing preparation and timing continue to be debated^[3]. Many preparations, such as stimulants, hyperosmotic laxatives, oral gastrointestinal lavage solutions and saline laxatives, have been used for cleansing^[4]. These preparations tend to be poorly tolerated. The unpalatable taste of the solutions, necessity of a high volume of fluid intake and adverse effects, such as renal failure, contribute to this problem. *Senna* alkaloids are stimulant laxatives that induce intestinal secretion by increasing the peristalsis. They were used effectively in the past, but have been replaced by polyethylene glycol (PEG) and sodium phosphate (NaP) preparations^[5]. Although *Senna* alkaloids are cost-effective, well-tolerated and have fewer adverse effects, their cleansing efficacy is controversial^[6,7].

The diet requirements and the timing of bowel cleansing have been heavily studied^[5]. Typically, a patient is instructed to take the bowel cleansing solutions the day before the procedure. Recently, split-dose bowel prepara-

tion (the administration of half of the preparation in the evening prior to the colonoscopy and the remainder the morning of the procedure) has been shown effective and more patient-friendly^[8]. Even more recently, same-day bowel preparation has been studied for its efficacy in afternoon colonoscopy. This method is effective and more patient-friendly because it does not interfere with the patient's sleep^[9,10]. Although the research on same-day bowel preparation using PEG or hyperosmotic preparations, such as sodium sulphate, sodium picosulphate and NaP are available, no studies using *Senna* alkaloids as a same-day preparation agent were found. Therefore, we aimed to evaluate the efficacy of same-day bowel preparation using *Senna* alkaloids combined with bisacodyl tablets in routine colonoscopy procedures.

MATERIALS AND METHODS

Patient population

Same-day single-dose bowel cleansing was implemented in our endoscopy department in March 2013. The data from the patients referred to the unit were collected and entered into a database prospectively. The data entries comprised the colonoscopies conducted from March-June 2013. The Ethical Committee of Gaziosmanpasa University Medical Faculty approved the study. Informed consent was obtained from each patient prior to the procedure.

Bowel preparation protocol

All patients were instructed to consume a low-fiber diet beginning one day before the procedure and to take two bisacodyl tablets (each containing 5 mg bisacodyl and 3 mg sennosid) (Bekunis®, Abdi İbrahim Pharmaceuticals, Turkey) with at least 1.5 L of water at each mealtime. The patients were instructed to take 250 mL of *Senna* alkaloids (containing 500 mg sennosid A + B calcium) (X-M Solusyon®, Yenisehir Pharmaceuticals, Turkey) with 1.5 L of water at 6 am on the day of the colonoscopy. All the colonoscopies were scheduled after 10 am. The instructions for bowel preparation were clearly explained to the patients, and written instructions were handed out.

Colonoscopy procedure and data collection

Two fellows (Akgul GG and Sansal M) evaluated the procedures in three phases: pre-procedure, during-procedure and post-procedure. The quality control parameters of colonoscopy were evaluated and implemented according to the guidelines of the American Society for Gastrointestinal Endoscopy. The collected demographic, clinical and endoscopic data were retrospectively evaluated. The colonoscopy was routinely performed under sedation with midazolam and pethidine in varying doses to obtain moderate sedation levels during the procedure. The bowel preparation was evaluated with the Boston Bowel Preparation Score (BBPS)^[11]. The fellows were accredited on the BBPS through an on-line training and questionnaire prepared by the Boston Medical Center

Table 1 Details of pre-procedural data

Characteristic	<i>n</i>
Gender	
Male	35 (46.7%)
Female	40 (53.3%)
Comorbid diseases	
None	44 (58.7%)
Diabetes mellitus	2 (2.7%)
Hypertension	15 (20.0%)
Diabetes mellitus + hypertension	7 (9.3%)
Depression	2 (2.7%)
Neurologic disease	2 (2.7%)
Others (dermatologic/urologic/gynecologic)	3 (4.0%)
Colonoscopy indication	
Constipation	13 (17.3%)
Abdominal pain	12 (16.0%)
Screening ¹	24 (32.0%)
Rectal bleeding	12 (16.0%)
Chronic diarrhea	8 (10.7%)
Postoperative control	6 (8.0%)
Complete lack of compliance with the bowel preparation protocol	5 (6.7%)

¹As there is no screening program in Turkey, vague indications for endoscopy were abdominal pain and bloating without any other symptoms, and patients > 50 years of age.

(<http://www.bmc.org/gastroenterology/research.htm>, access time: 05.03.2013). The following three sets of data were documented and statistically analyzed: (1) pre-procedure (age, gender, comorbid diseases, colonoscopy indications, complete lack of compliance with the bowel preparation protocol); (2) during-procedure (sedation dose, duration of colonoscopy, withdrawal time, cecal intubation rate, polyp detection rate, BBPS and presence of foam and clear liquid); and (3) post-procedure (visual analogue scale score, pain during the procedure, patient satisfaction and premature withdrawal due to insufficient bowel preparation). Data are presented as mean \pm SD or as a percentage.

RESULTS

The study included 75 patients with a mean age of 54.64 \pm 13.29 years. Pre-procedural data are presented in Table 1. The main indication for colonoscopy was screening, and the most common associated illness was hypertension. Only five patients showed complete lack of compliance with the bowel preparation protocol.

Data collected from during the procedure are presented in Table 2. Cecal intubation was achieved in 93.8% of patients (61/64; excluding three patients that had undergone right hemicolectomy and seven patients that had premature cessation of the procedure due to insufficient bowel preparation). The overall polyp detection rate was 40% (30/75). The presence of foam and clear liquid, which can be aspirated after irrigation, was detected in 70.7% of patients (53/75). The majority of patients required moderate sedation, and only one of the patients did not receive sedation and could not finish the procedure.

Table 2 Details of during-procedural data

Characteristic	Value
Duration of colonoscopy (min)	16.12 \pm 6.51
Withdrawal time (min)	8.89 \pm 4.07
Cecal intubation rate (<i>n</i> = 64)	61 (93.8%)
Premature withdrawal due to insufficient bowel preparation	7 (9.3%)
Premature withdrawal due to insufficient bowel preparation in protocol patients	2 (2.7%)
Polyp detection rate	
Overall	30 (40.0%)
Male (<i>n</i> = 35)	18 (51.4%)
Female (<i>n</i> = 40)	12 (30.0%)
Boston bowel preparation scores	
Overall	7.38 \pm 1.81
Right colon	2.34 \pm 0.89
Transvers colon	2.52 \pm 0.67
Left colon	2.52 \pm 0.63
Presence of foam and clear liquid	
Foam	1 (1.3%)
Clear liquid	32 (42.7%)
Foam + clear liquid	20 (26.7%)
Sedation dose	
No sedation	1 (1.3%)
Mild sedation	6 (8.0%)
Moderate sedation	59 (78.7%)
Deep sedation	9 (12.0%)

Values are expressed as mean \pm SD or *n* (%).

In the post-procedural questioning, 61.3% (46/75) of the patients reported pain, whereas the remaining 38.7% (29/75) did not. The mean visual analogue scale score was 4.59 \pm 1.57. Seven patients (7/75; 9.3%) were asked to repeat the procedure due to insufficient bowel preparation. Five of these patients had not followed the protocol and were expected to have unsatisfactory bowel preparation prior to the procedure and the colonoscopies were therefore abolished prematurely. The bowel preparation was insufficient in two additional patients (2/75; 2.7%), which was attributable to persistent constipation. The overall satisfaction with the protocol was 86.7% (65/75), with patients reporting that they would prefer the same protocol in a repeat procedure.

DISCUSSION

The results of our study show for the first time that same-day bowel preparation with *Senna* alkaloids is safe and effective. Bowel preparation is an essential part of colonic examinations, including colonoscopy, computed tomography colonography and large bowel radiologic series. It is a complex procedure that requires patient cooperation and strict compliance with diet modifications and bowel preparation protocols. The efficacy of the protocol must be balanced with the patient's compliance. An inefficient bowel preparation not only causes discomfort and inconvenience for the patient, but also affects the acceptance of future colonoscopic examinations. The repeat colonoscopy is costly and demanding for both the patient and institution. Therefore, the ideal bowel preparation

should be efficient, convenient, safe and cost-effective.

The most commonly used agents for bowel preparation are oral NaP, sodium picosulphate, magnesium sulphate, stimulant laxatives^[5], and PEG, which has been used successfully for nearly 30 years^[12]. Despite the efficacy of PEG, the necessity of consuming 4 L of liquid in a short time (2-3 h) makes the protocol unpalatable for many patients, who complain of abdominal discomfort, nausea and vomiting. NaP solutions have been widely used since their introduction in the 1990s because of their efficacy and patient compatibility^[13]. This preparation is more palatable and requires less liquid intake compared to PEG. However, recent reports of case series with renal failure raised concerns about the safety of the drug. As a result, some restrictions were implemented with its use in colonoscopic preparations. Recently, a mixture of sodium picosulphate, magnesium oxide and citric acid was introduced as an agent for bowel preparation. It is better tolerated and has a good safety profile with equivalent efficacy to sodium sulphate and PEG^[14]. However, due to unavailability of the drug in some countries, its use is not widespread.

Senna alkaloids are among the earliest drugs used for bowel preparation. Although they are cost-effective, easy-to-use herbal medicines with relatively few side effects, they have been abandoned in most centers without a clear reason. However, they are more easily tolerated than a high-volume PEG solution and have fewer side effects than the NaP solution^[7]. Although earlier studies claimed that *Senna* alkaloids could cause colicky abdominal pain due to a laxative irritation to the bowel wall, some recent studies showed no differences between NaP and *Senna*^[15]. Other studies showed increased abdominal pain; however, this pain did not affect bowel preparation due to poor tolerance^[7]. Our experience with *Senna* alkaloids also showed that it is well tolerated among patients, of whom the vast majority reported no side effects and expressed a willingness to use the same preparation in a repeat procedure.

Recent studies of variations in dosing have shown that split-dosing of bowel preparation is preferable^[5]. In a meta-analysis, split-dosing was more effective in cleanliness and patient compliance and had fewer side effects, such as nausea^[16]. Different same-day preparations for afternoon-scheduled colonoscopies have also been studied. The use of a PEG solution with either a 2 or 4 L volume plus ascorbate the morning of the procedure is safe, effective and preferable, as it allows better sleep quality^[10,17,18]. Similar patient satisfaction and cleanliness efficacy were seen with sodium magnesium citrate plus sodium picosulphate on the day of the colonoscopy^[9]. The main advantages of same-day solutions are better sleep quality, less impact on daily activities and less interference with the prior workday. However, in both the conventional and split-dose regimens, patients complained of sleep disturbance because bowel movements continued through the night.

Our study showed that the same-day preparation using *Senna* alkaloids enforced with bisacodyl tablets was safe and effective for bowel cleansing. The protocol was

palatable to patients, and only 5% were unable to complete the regimen. The overall failure of bowel preparation was 9.3%. The main reasons for the failures were lack of compliance with the protocol in five patients and constipation in two patients. It may be worthwhile to study the effect of constipation on bowel preparation in this regimen. The cleanliness efficacy was satisfactory, with a mean BBPS score of 7.38. The distribution of BBPS scores for the colonic segments was close, revealing that the same-day preparation was effective for all segments, including the proximal colon. We also found that the preparation was effective after 4 h without the need for afternoon scheduling. However, the high percentage of patients who required aspiration of liquid and foam during colonoscopy could be due to the early timing of the procedure. There were no reported side effects with the use of *Senna* alkaloids, thus, it seems to be a safe bowel preparation. Although we have not conducted a cost-effectiveness analysis, *Senna* alkaloids are inexpensive compared to PEG solutions.

In conclusion, the same-day administration of *Senna* alkaloids seems to be a safe, effective and economical bowel cleansing protocol for colonoscopy procedures. Despite our promising results, the small number of patients hinders any firm conclusions. Prospective, randomized controlled trials with an adequate number of patients are needed to compare the efficacy, safety, cost-effectiveness and patient acceptability of *Senna* within the same-day protocol.

COMMENTS

Background

An efficient, simple, cost-effective and readily acceptable colonoscopy preparation is essential. The authors aimed to evaluate the efficacy of same-day bowel preparation with *Senna* alkaloids combined with bisacodyl tablets in routine colonoscopy procedures. The same-day bowel preparation consisted of a semi-liquid, fiber-free diet one day prior to the procedure, with two bisacodyl tablets after lunch and dinner, and 250 mL of *Senna* alkaloid with 1.5 L of drinking water at 6 am the day of the procedure.

Research frontiers

Although colonoscopy is widely used all over the world, the ideal cleansing preparation and timing continue to be debated. In the area of bowel preparation, a safe and effective bowel preparation allows the examiner to detect adenomas, polyps and flat lesions more efficiently and avoids the costs of a repeat procedure.

Innovations and breakthroughs

A variety of agents have been investigated for use in bowel preparation. Additionally, the diet requirements and the timing of bowel cleansing have been studied. Recently, split-dose bowel preparation has been shown effective and more patient-friendly. Even more recently, same-day bowel preparation has been studied for its efficacy in afternoon colonoscopy. The present observational study investigated the efficacy of same-day bowel preparation with *Senna* alkaloids combined with bisacodyl tablets in routine colonoscopy procedures. The findings support the use of same-day administration of *Senna* alkaloids as a safe and effective bowel cleansing protocol for colonoscopy procedures.

Applications

The study results suggest that the same-day administration of *Senna* alkaloids is a safe, effective and economical bowel cleansing protocol for colonoscopy procedures.

Terminology

Bowel preparation is a procedure usually undertaken before a diagnostic procedure or treatment can be initiated for certain colorectal diseases. Bowel prepa-

ration is a cleansing of the intestines from fecal matter and secretions. *Senna* alkaloids are stimulant laxatives that induce intestinal secretion by increasing the peristalsism.

Peer review

This is a good observational study in which authors evaluate the efficacy of same-day bowel preparation with *Senna* alkaloids combined with bisacodyl tablets in routine colonoscopy procedures. The results are interesting and suggest that the same-day administration of *Senna* alkaloids is a safe, effective and economical bowel cleansing protocol for colonoscopy procedures.

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