

What is the main target: a clearer colon with a sennoside-based regime, or adequate bowel cleansing before colonoscopy with a PEG-EL-based regime?

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Received: 14.02.2014 • Accepted: 23.05.2014 • Published Online: 01.04.2015 • Printed: 30.04.2015

Background/aim: Even though polyethylene glycol-electrolyte lavage (PEG-EL)-based regimes have become the gold standard in recent years, to finish drinking 4 L of PEG-EL solution can be difficult. The quality of sennoside-based bowel-cleansing regimes used in Turkey has been known for some time. Therefore, we aimed to investigate the efficacy of both bowel-cleansing regimes.

Materials and methods: Patients over 18 years old undergoing elective colonoscopic procedures between January and March 2011 were included in the study. The patients were divided into 2 groups; in Group 1, 91 patients were given sennoside a + b calcium 500 mg/250 mL (X-M solution, Yenişehir Laboratuvarı, Ankara, Turkey), and in Group 2, 94 patients were given 4 L of PEG-EL (Golytely, Boston, MA, USA).

Results: The mean age of the patients and the male distribution were similar in the 2 groups. Both inadequate bowel cleansing and the best cleansed bowels were seen in Group 1. The number of inadequate colonoscopies declined when using a whole bowel-cleansing regime from 24.5% to 19.3% in Group 2, but it did not decline in Group 1.

Conclusion: The best bowel cleansing can be achieved with sennoside-based regimes, whereas a greater proportion of adequate results via colonoscopy were reached with the PEG-EL-based regimes.

Key words: Precolonoscopic bowel cleansing, polyethylene glycol regime, X-M solution

1. Introduction

Adequate bowel cleansing before a colonoscopic procedure is necessary in order not to miss small colonic lesions, leading to a proper diagnosis (1). Sodium phosphate (NaP)-based precolonoscopic preparation regimes were determined to have at least similar effectiveness in bowel cleansing as polyethylene glycol electrolyte lavage (PEG-EL)-based regimes, and they also have better patient tolerance than that observed with PEG-EL (2-4). PEG-EL has minimum side effects, while, in contrast, NaP-based regimes can be dangerous for patients with chronic systemic illness (5). On the other hand, inadequate bowel cleansing of patients is not infrequent under PEG-based regimes, probably because of its huge volume and unpleasant taste (2-5). For this reason, reducing the amount of PEG-EL, splitting the whole dose, and adding medications (such as prokinetics or laxatives) have been investigated by researchers in recent years (6-13). Besides NaP solutions and PEG-EL regimes, sennoside calcium a + b solutions (X-M solution, Yenişehir Laboratuvarı, Ankara, Turkey) have also been used in Turkey. However, there are

insufficient data to assess the utility of the X-M solution in the literature.

Data on the success of precolonoscopic preparation regimes are limited in the Turkish population. Inadequate bowel cleansing with PEG-EL and NaP solutions exists for approximately 88% of patients that undergo elective colonoscopic procedures (14). In this study, we aimed to investigate the effectiveness of 4 L of PEG-EL versus 2 bottles of 250 mL of X-M solution for bowel cleansing before colonoscopy in a Turkish population.

2. Materials and methods

Patients 18 years of age or older who were referred to our outpatient Endoscopy Unit (Dışkapı Yıldırım Beyazıt Education and Research Hospital) for elective colonoscopic procedures between January and March 2011 were included in the study retrospectively. Informed consent was obtained from all patients before the colonoscopic procedure. The patients were divided into 2 groups based on the prescribed precolonoscopic preparation regime as follows: sennoside a + b calcium 500 mg/250 mL (X-M

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solution), Group 1, N = 91; or 4 L of PEG-EL (Golytely, Boston, MA, USA), Group 2, N = 94. The exclusion criteria consisted of previous intestinal surgery or chronic heart, liver, or renal disease. The preparation regimes were planned to be finished in total the evening before the examination. All of the patients undergoing colonoscopic procedures were instructed to maintain a clear diet for 3 days before the examination in Group 1 and for 1 day in Group 2 according to the advice of the manufacturers.

The patients undergoing a colonoscopic procedure were asked to fill out a questionnaire, which had not been previously validated, that assessed the side effects of the regimes and the ease with which they completed each regime. The responsibility of collecting the questionnaire was given to the secretary of the Endoscopy Unit. The endoscopists (BY, BA, FE) scored the adequacy of the bowel preparation using the Ottawa Bowel Preparation Scale Score (15) (Table 1) and were blind to the prescribed preparation regimes.

Ethics committee approval was obtained before beginning the study from the local ethics committee of the Hacettepe Medical Faculty.

All statistical analysis was performed using SPSS 13.0 (SPSS Inc., Chicago, IL, USA). P < 0.05 was accepted as the cut-off value for statistical significance. Chi-square, Kruskal–Wallis, and Mann–Whitney U tests were the main statistical tests used.

Table 1. Scoring scale of colon cleansing (Ottawa Bowel Preparation Scale Score) (19).

Score	Explanation
0	Empty without fluid
1	Clear colon even without aspiration
2	Clear colon with aspiration
3	Clear colon with both washing and aspiration
4	Presence of solid feces

3. Results

A total of 185 patients were included in the study. The mean age of the patients was 53.4 ± 13.4 years (53.7 ± 15.0 in Group 1, 52.42 ± 11.8 in Group 2, P = 0.255), and 89.3% and 95.8% of the patients in the groups were male, respectively (P = 0.545).

Inadequate bowel cleansing, defined as a score of 3 or 4, was highest in Group 1 (Table 2). On the other hand, there were more patients scoring 0 or 1 in Group 1. Inadequate bowel cleansing varied from 24.5% to 40.2% on the right side of the colon under the different precolonoscopic preparation regimes (Table 2), whereas the inadequate bowel cleansing percentages of the transverse colon and the left side of the colon did not exceed 16.7% and 7.5% in Group 1 and Group 2, respectively (Table 2).

Table 2. Effectiveness of precolonoscopic preparation regimes in the different sides of the colon segments according to the Ottawa Bowel Preparation Scale Score.

	Score	Group 1, N (%)	Group 2, N (%)	P-value*
Right side of the colon segments	0 points	11 (13.3)	4 (4.4)	0.003
	1 point	16 (19.3)	14 (15.6)	
	2 points	25 (30.1)	50 (55.6)	
	3 points	20 (24.1)	16 (17.8)	
	4 points	11 (13.3)	6 (6.7)	
Transverse colon segments	0 points	28 (32.6)	9 (9.7)	<0.001
	1 point	19 (22.1)	17 (18.3)	
	2 points	27 (31.4)	60 (64.5)	
	3 points	8 (9.3)	7 (7.5)	
	4 points	4 (4.7)	0 (0)	
Left side of the colon segments	0 points	33 (36.7)	18 (19.1)	<0.001
	1 point	23 (25.6)	26 (27.7)	
	2 points	19 (21.1)	47 (50.0)	
	3 points	8 (8.9)	3 (3.2)	
	4 points	7 (7.8)	0 (0)	

*Cut-off value for statistical significance was accepted as <0.05 and P-values are for the analysis by Mann–Whitney U Test.

The patients who were unable to finish the whole regime in Group 2 declared that it was hard to finish the total regime because of its taste and large volume, with only 69.9% of the patients being able to finish the whole PEG-EL regime (Table 3). In contrast, only a small number of patients in Group 1 (13.2%) could only finish half of the prescribed regime. Besides the difficulty of drinking the solutions, the side effects observed in the evening and in

the night before the colonoscopic procedure were lower in Group 2 than in Group 1 (Table 3). The complaints about large volume were reduced to 6.1% in Group 1.

The number of inadequate colonoscopies declined in patients who could use the whole bowel-cleansing regime in Group 2 (from 24.5% to 19.3%), but the same observation was not noticed in Group 1 (from 37.4% to 38.4%) (Table 4).

Table 3. Results of the questionnaire filled out by patients who underwent elective colonoscopy.

		Group 1, N (%)	Group 2, N (%)	P-value*
What amount of the regime were you able to finish?	All of it	79 (86.8)	66 (69.9)	0.033
	Almost half of it	12 (13.2)	28 (30.1)	
Was the regime hard to finish?	Yes	12 (13.2)	14 (15.1)	0.013
	A little bit	38 (41.8)	15 (63.4)	
	No	41 (45.1)	10 (21.5)	
Did you face side effects during the night before the colonoscopy?	No	55 (61.1)	62 (68.1)	
If the answer to the above question was yes, which of the following problems did you face?	Nausea	2 (2.2)	1 (1.1)	0.070
	Abdominal cramps	14 (15.6)	9 (9.9)	

*Cut-off value for statistical significance was accepted as <0.05 and P-values are for the analysis by Mann–Whitney U Test.

Table 4. Effectiveness of the bowel-cleansing regimes in the different sides of the colon segments in patients who were able to finish all of the precolonoscopic preparation regime.

	Score	Group 1, N (%)	Group 2, N (%)	P-value*
Right side of the colon segments	0 points	10 (13.7)	4 (6.5)	0.005
	1 point	15 (20.5)	10 (16.1)	
	2 points	20 (27.4)	36 (58.1)	
	3 points	20 (27.4)	10 (16.1)	
	4 points	8 (11.0)	2 (3.2)	
Transverse colon segments	0 points	25 (33.8)	7 (10.9)	0.001
	1 point	18 (24.3)	13 (20.3)	
	2 points	21 (28.4)	42 (65.6)	
	3 points	7 (9.5)	2 (3.1)	
	4 points	3 (4.1)	0 (0.0)	
Left side of the colon segments	0 point	31 (39.7)	12 (18.5)	<0.001
	1 point	19 (24.4)	18 (27.7)	
	2 points	16 (19.2)	34 (52.3)	
	3 points	6 (7.7)	1 (1.5)	
	4 points	7 (9.0)	0 (0.0)	

*Cut-off value for statistical significance was accepted as <0.05 and P-values are for the analysis by Mann–Whitney U Test.

The patients were asked whether they would prefer the same precolonoscopic preparation regime if a second colonoscopic procedure had to be repeated in the future. A large proportion of patients (75.3%) in Group 1 and half the patients in Group 2 (46.2%) would agree to drink the same regime again.

4. Discussion

In the Ottawa Bowel Preparation Scale Score, scores of 0 or 1 show the best bowel cleansing and, in our study, the best results were mostly observed in patients using X-M solution rather than PEG-EL. On the other hand, the percentage of inadequate bowel cleansing was found to be lower with the PEG-EL-based regime than the X-M solution. In the literature, it was shown that the quality of cleansing was better using NaP-based regimes than PEG-EL (2–4,14). Interestingly, PEG-EL, which is the gold-standard agent for precolonoscopic bowel preparation, has an important problem to be overcome: its large volume. In accordance with the literature, only 70% of our patients were able to finish the whole PEG-EL solution before the colonoscopic procedure. For this reason, investigators have worked on how to reduce the PEG-EL solution volume in recent years (6,13,16,17); however, data about the quality of X-M solution alone as a bowel-cleansing regime is lacking in the literature.

The high risk of hypernatremia and hyperphosphatemia are the disadvantages of the NaP regime, and they can lead to severe problems in patients with chronic heart and renal disease (5). However, in the normal population, it has been shown that the risk of electrolyte imbalance is very low, and the disequilibrium does not persist for longer than a few days (18–20). Gumurdulu et al. showed that the risk of an increase in sodium and phosphate levels was mainly seen in older patients after taking oral phospho-soda as a precolonoscopic preparation regime (21). On the other

hand, studies did not show high levels of phosphate and sodium at the fifth day after taking oral Fleet phospho-soda as a colonoscopic preparation regime (18). Likewise, Unal et al. showed transient hyperphosphatemia and hypernatremia with the same regime (19). In order not to face similar risks in elderly patients or patients with chronic systemic diseases, we prefer to use PEG-EL for bowel cleansing before colonoscopy in our clinic. However, the problem of noncleansed bowels resulting in inadequate colonoscopic procedures and the necessity of repeating the examination could not be overcome in recent years. In accordance with the literature, in our study, the main reason for noncleansed bowels with PEG-EL was patient intolerance (2–4,6,7). When reducing the PEG-EL volume, the quality of bowel cleansing did not change and, moreover, adding ascorbic acid was shown to improve the cleansing (6,8–10).

Each population needs to establish its own data on bowel cleansing and patient tolerance after using precolonoscopic preparation regimes. However, the published data in the Turkish population is limited. Furthermore, the evaluations of bowel cleansing were performed using different scales in different studies. The system of Aronchick et al. was the most commonly used scoring system used in the Turkish population (22).

In conclusion, from these results we can claim that the best bowel cleansing before a colonoscopy can be achieved with sennoside-based regimes, whereas a greater proportion of adequate results in colonoscopy were reached with PEG-EL-based regimes. However, the percentage of inadequate bowel cleansing before colonoscopy was reduced in patients who were not able to finish the whole regime. Health professionals should note that inadequate bowel cleansing is not usually a problem related to patient compliance, and it would be better to focus on what exactly is ordered.

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