

Bowel Cleansing Quality in Morning Versus Evening Preparation Regimens for colonoscopy; a Prospective Study

Abstract

Background : Evening preparation for colonoscopy is often unsatisfactory and inconvenient. This study was performed to compare the efficacy of bowel preparation at two different timings: night before and morning of endoscopy and to compare the cecal intubation rate and disturbance of sleep hours between these two groups.

Methods: In this prospective randomized endoscopist-blinded trial, 150 patients were enrolled between March 2010 and August 2011. Patients aged between 18 to 80 years needing colonoscopy were included. Patients with prior bowel surgery, suspected bowel obstruction or those who didn't completely fulfill the preparation instructions were excluded. Patients received polyethylen glycol electrolyte preparation in a morning and evening regimen. Bowel cleansing was scored using the Ottawa Bowel Preparation Quality Scale. Loss of sleep and cecal intubation rate was evaluated.

Results: Seventy five patients received morning regimen and 75 patients received evening regimen.

There was significant difference in total scores of bowel preparation for the two groups favoring the morning group ($p < 0.0001$). Bowel cleansing for right and mid colon were significantly better in the morning group ($p < 0.001$), while the difference for the left colon was not significant. The cecal intubation rate was comparable for both groups (p NS). Sleep was disturbed in 15 patients in morning group and in 42 patients in evening group ($p = 0.003$).

Conclusion: In conclusion, this study suggests that morning preparation provide better quality of bowel preparation for colonoscopy than evening preparation. Right and mid sided colonic preparation is superior in the patients who take the morning preparation than left sided preparation. Evening preparation is associated with a significant sleep disturbance. This would translate to considerable financial losses and patient discomfort.

Key words: Colonoscopy; Bowel Preparation; Polyethylene glycol

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Introduction

Colonoscopy is currently considered the gold standard for the investigation of large bowel pathology. Bowel preparation prior to colonoscopy is mandatory to provide an adequately visualized clean colon, which is essential to achieve effective diagnostic and potentially therapeutic objectives⁽¹⁾. Incomplete or failed colonoscopies, missed lesions, increased procedural time and potentially increased complication rates have been reported as a consequence of poor bowel preparation^(2, 3). Several factors have been reported to be predictors of inadequate bowel preparation for colonoscopy includes patient factors such as female gender, old age, diabetes, constipation, bowel preparation type, compliance with preparation instructions, and the timing of the colonoscopic procedure^(4, 5).

There is little literature concerning the actual timing of bowel preparation, and with no standard guideline regarding timing of bowel preparation prior to colonoscopy, patients are traditionally given the preparation the evening before colonoscopy⁽⁶⁾. Recently Siddiqui *et al.*⁽⁷⁾ reported that the length of the interval between the completion of bowel preparation and the start of colonoscopy is a better predictor of bowel preparation quality than the timing of colonoscopy. More recently, Chang *et al.*⁽⁸⁾ stated that the time of day at which colonoscopy is performed, whether during the morning or the

afternoon, does not have a significant impact on the quality of bowel preparation, however, they found that patients with intervals of 7 h or less between the initiation of polyethylene glycol electrolyte solution (PEGELS) intake and the start of colonoscopy had a better quality of bowel preparation than those with intervals of more than 7 h. In addition, patients with intervals of 4 h or less between the end of PEGELS intake and the start of colonoscopy had a better quality of bowel preparation than those with intervals of more than 4 h⁽⁸⁾.

The present study was designed to compare the efficacy of two time-dependant bowel preparation regimens: a single dose 3 liters PEGELS in the morning of the day of colonoscopy; and a single dose 4 liters on the evening before the day of colonoscopy. Assessment was done in terms of quality of bowel preparation, rate of caecal intubation and sleep disturbance.

Methods

In this prospective randomized endoscopist-blinded trial, outpatients aged between 18 and 80 years who were scheduled for elective colonoscopy at Al Kindy teaching Hospital, Baghdad, Iraq, between March 2010 and August 2011 were enrolled in a consecutive manner. Exclusion criteria involves prior bowel surgery and suspected bowel obstruction and known allergy to polyethylene

glycol. Written informed consent was obtained from each patient.

Patients were randomly and evenly allocated to one of the two different time-dependant bowel preparation regimens. Both regimens involved PEGELS (Alfares Pharm., Syria; {59 g polyethylene glycol, 5.68 g Na₂SO₄, 1.68 g NaHCO₃, 1.46 g NaCl, and 0.75 g KCl} per sachet) as the preparation agent. Detailed instructions of bowel preparation regimens were provided to each patient as follow:

Evening Regime: Four sachets were ingested the day prior to the procedure starting at 15.00 hour, which should be completed before bed time.

Morning Regimen Three sachets were ingested on the morning of the day of colonoscopy, starting at 05:00 hour, which should be completed before 8:00. Patients in both groups were allowed to consume clear liquids as desired in the preceding 12 hours, while solids were ceased after 08.00 hour the day prior to the procedure. Patients who didn't completely fulfill the above mentioned instructions were excluded from the study.

Time of colonoscopy for both regimens were started from 10:00 to 12:00.

No sedation was used in all patients. Pulse Blood pressure, and oxygen saturation were measured for all patients both intra and peri procedure.

Bowel preparation was independently rated, using the Ottawa Bowel Preparation Quality Scale usage guide ⁽⁹⁾, which assesses cleanliness in the right colon (cecum, ascending), mid colon (transverse, descending), and left colon (rectosigmoid) separately, and allows the observer to globally rate the volume of colonic fluid. A summary score is then obtained from the individual parameters ⁽⁹⁾ (Table-1).

After the procedure, and just prior to discharge from the endoscopy unite, the patients and accompanying relatives were asked about sleep disturbance.

Bowel preparation scores measured by the Ottawa Scale for the two regimes were, reported as mean (SD), and compared using two-tail t tests. While rate of cecal intubation and sleep disturbance in both groups were, reported as percentage, and compared using the chi square test. A value of P < 0.05 was considered to be statistically significant.

Results

A total of 150 patients were enrolled in the present study, 75 patients were randomly allocated to either morning or evening regimens. Both groups were comparable in terms of demographic data (table 2)

and indications for colonoscopy (table 3). The cecal intubation rate was comparable for both groups (97% vs 98%; ρ NS).

Total scores were significantly lower for morning group as compared to the evening group (4.93 ± 2.14 vs 6.26 ± 2.49 ; $\rho < 0.001$) (table 4)

Significant differences in bowel preparation quality were observed for the right (1.35 ± 1.14 vs 2.13 ± 1.36 ; $\rho < 0.001$) and mid colon (1.35 ± 0.91 vs 2.01 ± 1.32 ; $\rho < 0.001$), while for the left colon the difference was not statistically significant (1.29 ± 1.01 vs 1.11 ± 1.17 ; ρ NS). (table 4)

Sleep was reported to be disturbed in 15 patients in the morning regimen and in 42 patients in the evening regimen (figure 1) ($\rho = 0.0003$) (Table 4).

Discussion

Achieving quality in colonoscopy has become a significant issue. Many studies have been published attempting to identify the more important factors in achieving quality in colonoscopy (10, 11). Caecal intubation rates and times, adenoma detection rates and withdrawal times have been suggested as factors which may allow determination of the quality of colonoscopy (10, 12–15). The quality of cleansing may influence all these three factors and may therefore be an important determinant of the quality of the colonoscopy. There is no standard recommendation regarding the timing of colonoscopy preparation.

The significantly lower Ottawa total scores observed in the morning regimen patients of the present study as compared to the evening regimen indicates a better efficacy of the morning regimen. These results are in accordance with other studies ^(16, 17), and can be attributed to the shorter interval between bowel preparation and colonoscopy in the morning regimen which is less than 4 hours from the completion of preparation regimen. In addition intervals from the beginning of the regimen was less than 7 hours. This notion is supported by the previous observation of chung et al. ⁽⁵⁾

Assessment of individual colon segments reveals a more efficient cleansing in the right and mid colon, but a comparable efficacy in the left colon. This could be attributed to the longer time between preparation and procedure in the evening regimen, and hence, solid stool may be present on the right and mid segments at the time of colonoscopy.

The mean duration of onset of action of polyethylene glycol preparation is 0.7- 1.6 hours and duration of action is up to 4.6 hours (6) , so it

should be taken early in the morning at about 0500 hours in order to finish the preparation before travel to the endoscopy center. This would mean that the colonoscopy would be scheduled for after 10:00 hours for bowel preparation to be optimum.

Rates of cecal intubation were not affected by the regimen used, an observation similar to that reported by Chung et al⁽⁵⁾. However the different regimen used in our study may affect the time of cecal intubation which was not estimated in our study.

One of the common problems with evening preparation is that patients may experience sleep disturbance at previous night of colonoscopy. Despite the early start of preparation (15:00) which was aimed to reduce the sleep disturbance as recommended by El Sayed *et al* (18) the highly reported sleep disturbance in the evening regimen patients in the present study, may favor the morning regimen as the preferred method of preparation.

In conclusion, this study suggests that morning preparation provide better quality of bowel cleansing for colonoscopy than evening preparation. Right and mid sided colonic preparation is superior in the patients who take the morning preparation than left sided preparation and thus, morning regimen could be recommended as the regimen of choice, especially if right or mid sided colonic pathology is suspected. Evening preparation is associated with a significant sleep disturbance. This would translate to considerable financial losses and patient discomfort.

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Tables

Table 1 Ottawa bowel preparation quality scale. Total score (0-14) is obtained by adding the scores for individual evaluation of right, mid, and left colon with the score of overall fluid in the entire colon

Quality of preparation	Score
Individual evaluation of right, mid, and left colon:	
No liquid	0
Minimal liquid, no suctioning required	1
Suction required to see mucosa	2
Wash and suction	3
Solid stool, not washable	4
Evaluation of the entire colon: Overall quantity of fluid	0 - 2*
* 0 =minimal, 1 =moderate, 2 = large	

Table 2 Demographic data of the studied groups

	Morning regime	Evening regime	p value
Patients (n)	75	75	NS
Gender ratio (M/F)	73: 2	72:3	NS
Age (yr) (mean ± SD)	60.0 ± 15.9	54.4 ± 16.7	NS

Table 3 Indications for colonoscopy

	Morning regime		Evening regime	
	No.	(%)	No.	%
Surveillance	21	28	22	29.33
Family history	10	13.34	9	12
Symptoms	38	50.66	37	49.33
Family history and symptoms	6	8	7	9.34
Total	75		75	

Table 4 Comparison of right, middle, and left colon following morning or evening preparation

	Morning group n=75	evening group n=75	P value
Cecal intubation rate	73(97%)	74(98%)	NS
Sleep disturbance	15(20%)	42(56%)	P=0.0003
Ottawa bowel preparation scale			
Right colon	1.35±1.14	2.13±1.36	<0.001
Mid colon	1.35±0.91	2.01±1.32	<0.001
Left colon	1.29±1.01	1.11±1.17	NS
Fluid volume	0.94 ± 0.56	1.01 ± 0.60	NS
Total score	4.93±2.14	6.26±2.49	<0.001
Data are expressed as means ± SD or total numbers (percentages)			

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