



# The results of the same day and appointment colonoscopy in inadequate bowel cleansing; a randomized controlled trial

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## ABSTRACT

**Objective:** The aim of this study is to compare the results of repeat colonoscopies performed on the same day and by appointment in patients with inadequate bowel cleansing.

**Material and Methods:** The study was designed as a prospective randomized controlled study. Eighty patients with inadequate bowel cleansing detected in elective colonoscopies were included in the study. Patients were randomly divided into 2 groups: Group I: Same day group and Group II: Appointment day group. Same day colonoscopy group was given day hospitalization, sennoside A+B calcium was given and colonoscopy procedure was repeated. Patients in Group II were rescheduled and standard colonoscopy preparation protocol was applied. Boston bowel preparation scale (BBPS) was used for bowel preparation quality. Cecal intubation time, cecal intubation rate, procedure time, BBPS score and polyp detection rate were compared between the groups.

**Results:** In the same-day group, 52.5% of the patients were female while 45.9% were female in the appointment group. There was no significant difference between the two groups in terms of age or gender ( $p>0.05$ ). The rate of cecum intubation was higher in the same-day group than it was in the appointment group ( $p=0.022$ ). The total BBPS score was  $7.9\pm 1.79$  in the same-day group and  $6.89\pm 2.23$  in the appointment group, and the difference was statistically significant ( $p=0.03$ ). When the two groups were compared in terms of tolerability of the procedure, no difference was detected ( $p>0.05$ ).

**Conclusion:** Same-day colonoscopy is an effective method and can be performed safely in patients with inadequate bowel cleansing.

**Keywords:** Inadequate bowel preparation, same-day colonoscopy, repeat colonoscopy

## INTRODUCTION

Colorectal cancer is an important cause of morbidity and mortality worldwide. Approximately 550,000 deaths occur worldwide every year due to this cancer type (1). Screening colonoscopies performed to reduce the incidence of colorectal cancer aim to detect adenomatous lesions at an early stage (2).

Colonoscopy is an invasive imaging method used in the diagnosis of colon cancer. Apart from its role in diagnosis, it is widely used because of its curative properties in cases such as the removal of colon polyps, treatment of lower gastrointestinal system (GIS) bleeding, stenting for stenotic lesions, and volvulus detorsion (3).

Although colonoscopy is considered the gold standard for evaluating the colonic mucosa, its diagnostic accuracy depends on the quality of the bowel preparation (4). However, insufficient bowel preparation is a common problem in colonoscopy practice. It has been reported in approximately 20-25% of all colonoscopies (5). This causes pathological lesions to be overlooked, increases costs, decreases patient satisfaction, and wastes workforce and time (6). In addition, recurrent bowel cleansing may cause fluid, protein and calorie malnutrition in elderly patients (7). Because of all these negative results, the feasibility of same-day colonoscopy has come to the fore, instead of scheduled colonoscopy in patients with inadequate bowel preparation. In their latest guideline, the European Society of Gastrointestinal Endoscopy (ESGE) and the American Society of Gastrointestinal Endoscopy reported, albeit with inconclusive evidence and cautious recommendation, that colonoscopies

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performed on the same day or the next day yield better results compared to delayed colonoscopies (8,9).

In this study, we aimed to evaluate the effectiveness and tolerability of repeat colonoscopies, both those performed on the same day and those scheduled at a later time, in patients with insufficient bowel preparation. To the best of our knowledge, our study is the first prospective randomized controlled study on this subject.

## MATERIAL and METHODS

This prospective randomized controlled study was conducted at the Department of General Surgery of Tokat Gaziosmanpaşa University. Approval for the study was obtained from the Tokat Gaziosmanpaşa University Ethics Committee (approval no: 20-KAEK-089). Patients who had insufficient bowel cleansing in the colonoscopies performed by the General Surgery Clinic under elective conditions between 19 April 2020 and 19 April 2021, and who agreed to participate in the study, were included. During this period, 826 patients underwent colonoscopy in our clinic. Adequate bowel cleansing was achieved in 730 of these patients. Inadequate bowel cleansing was found in 104 patients. Those who were using antipsychotics or antidepressants, those under the age of 18, those who had previous stomach, colon or rectal surgery, those who underwent emergency colonoscopy, those who red-flag signs and symptoms for cancer and those who did not want to participate in the study were excluded from the study. In addition, since appropriate randomization could not be performed for colonoscopies performed after 13:00, these patients were also excluded from the study. After applying these exclusion criteria, the remaining 80 people were equally divided into groups (Figure 1).

Patients who met the inclusion criteria and gave written informed consent were randomized equally into two groups, a same-day group and an appointment group, using sealed envelopes. Randomization was performed by a blinded physician who was not present during the study. Eighty pre-prepared and mixed sealed envelopes were used. The patient's envelope selection was determined by re-mixing each time under the supervision of the same faculty member. Demographic data of the patients, height, weight, body mass index (BMI), and presence of morbidity were recorded. Additional bowel cleansing medication was given to the same-day group and the colonoscopy was repeated for this group. The group was scheduled for a new appointment according to the standard procedure. Colonoscopy is performed on an average of 2,000 patients annually at our department. Colonoscopy appointments are made during outpatient examinations. The patients were informed by the endoscopy nurse verbally and in writing about how bowel preparation would be performed during the colonoscopy appointment. The colonoscopy procedure was carried out by an endoscopist who

performs more than 250 colonoscopy procedures per year in the clinic. All patients underwent colonoscopy using the same Olympus device (serial number: CF-H170L).

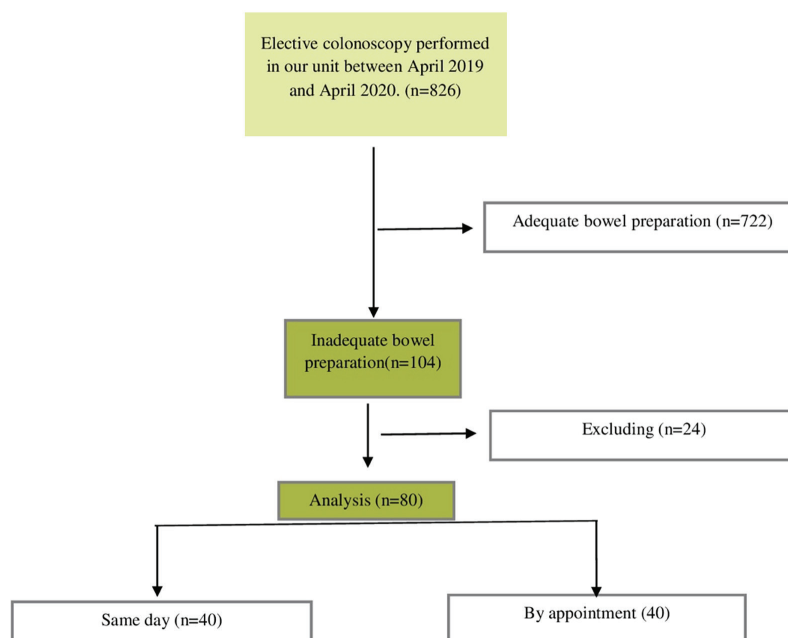
A low fiber diet was recommended 72 hours before the procedure for bowel cleansing. A sample written form was provided for the recommended diet. As in our routine practice, 2 solutions (150 mL, 300 mg) containing sennoside A+B calcium were prescribed. A written form containing instructions for using the drug was also given. Sennozid A+B calcium should be taken with at least 1.5 liters of water at 6 o'clock in the evening and again at 5 o'clock in the morning, one night before the procedure. The patients with inadequate bowel cleansing in the same-day colonoscopy group were admitted to the clinic. One dose of sennoside A+B calcium, 150 mL (300 mg), was given to be swallowed with 1.5 liters of water after the procedure. The procedure was repeated 4 hours after the last dose (10). In the second group, appointments were scheduled and standard colonoscopy preparation protocol was applied.

The decision of whether the initial colonoscopy could be continued due to inadequate bowel cleansing was made by the physician performing the colonoscopy. The internationally proven Boston bowel preparation scale (BBPS), which has been used in many studies, informed this decision. According to this scale, the right, middle, and left colon segments are scored between 0 and 3. BBPS takes values between 0 and 9. A total value of less than 5 means insufficient colon cleansing, as it affects the polyp detection rate. In our study, re-colonoscopy was recommended for patients with a BBPS less than five. Patients who could not complete the colonoscopy due to difficult anatomy or excessive looping, and those who could not tolerate anesthesia due to comorbidities, were excluded from the study.

Patients who underwent colonoscopy were sedated with 0.05 mg/kg midazolam and 0.5 mg/kg pethidine hydrochloride. In both groups, pulse, blood pressure, and blood glucose levels were measured before the second colonoscopy. In both groups, the indication of the procedure, information about the physician performing the procedure, the drugs used for sedation, the duration of the procedure, the duration of cecum intubation, the location of the detected lesions, and the presence of complications were recorded. Additionally, BBPS, and whether the procedure was incomplete (due to complications, pain, etc.) were noted. Procedure time, cecum intubation rate, adenoma or lesion detection rate, quality of bowel cleansing, and patients' tolerability of the procedure were evaluated for both groups.

## Statistical Analysis

Statistical analyses of the data obtained in our study were performed using the SPSS (Version 22.0, SPSS Inc. Chicago, IL, USA) package program. Descriptive statistics were presented



**Figure 1.** Patient flow diagram.

as numbers (n) and percentages (%) for categorical variables. The quantitative variables that were obtained by measurement were presented as mean ± standard deviation or median (minimum-maximum) values depending on whether the data were normally distributed or not. For the comparison of two independent group data, the Student’s t-test was performed. A cross-table and Pearson’s chi-square test were used to compare qualitative variables between groups. In the comparison of quantitative data between the groups, a t-test was used when parametric assumptions were met. Inadequate bowel cleansing is seen in from 5% to 30% of studies. Based on the assumption that 10% of patients would have inadequate bowel preparation, we calculated that we needed to include at least 80 patients in the study with 80% power, 5% margin of error, and an effect size of 0.3 (type I error, 5%). P<0.05 was considered statistically significant.

**RESULTS**

In his study, 80 patients who underwent colonoscopy were found to have inadequate bowel cleansing were included. Patients were divided into two groups, with 40 patients in the same-day group and 40 patients in the appointment group. Since three patients in the appointment group did not attend the control colonoscopy procedure, the second group consisted of 37 patients. Of the patients, 38 (49.4%) were male and 39 (50.6%) were female. The mean age was 57.6±12.99 (20-81). The frequency distributions and descriptive statistics of quantitative variables regarding the age, additional diseases, BMI, education level, and pre-procedure diet compliance status of the participants are given in Table 1.

**Table 1. Descriptive statistics of quantitative variables**

	Same day n=40	By appointment n=37	p-value
<b>Age (avrg. ± SD)</b>	53.13±14.31	60.7±10.98	0.083
<b>Gender (%)</b>			
Female	21 (52.5%)	17 (45.9%)	0.740
Male	19 (47.5%)	20 (54.1%)	
<b>BMI (avrg. ± SD)</b>	29.10±5.34	26.63±6.12	0.063
<b>Education level (%)</b>			
Not literate	5 (12.5%)	2 (5.4%)	0.129
Primary school	31 (77.5%)	29 (79.3%)	
Middle -high school	1 (2.5%)	4 (10.3%)	
University	3 (7.5%)	4 (10.3%)	
<b>Comorbidity (%)</b>			
Coronary artery disease	5 (12.5%)	12 (32.4%)	0.411
Hypertension	11 (27.5%)	10 (27%)	
Diabetes mellitus	11 (27.5%)	7 (18.9%)	
Asthma/COPD	2 (5%)	1 (2.7%)	
Neurological	2 (5%)	1 (2.7%)	
<b>Diet compliance</b>			
One day	9 (22.5%)	7 (18.1%)	0.919
Two days	5 (12.5%)	9 (24.3%)	
Three days	26 (65%)	21 (56.7%)	

SD: Standard deviation, BMI: Body mass index, COPD: Chronic obstructive pulmonary disease

Of the 40 patients in the same day group, 21 (52.5%) were female, and of the 37 patients in the appointment group, 18 (48.6%) were female. The mean age of the patients was 53.13±14.31 in the same-day group and 60.7±10.98 in the appointment group. BMI was 29.1±5.34 in the same-day group and 26.63±6.12 in the appointment group.

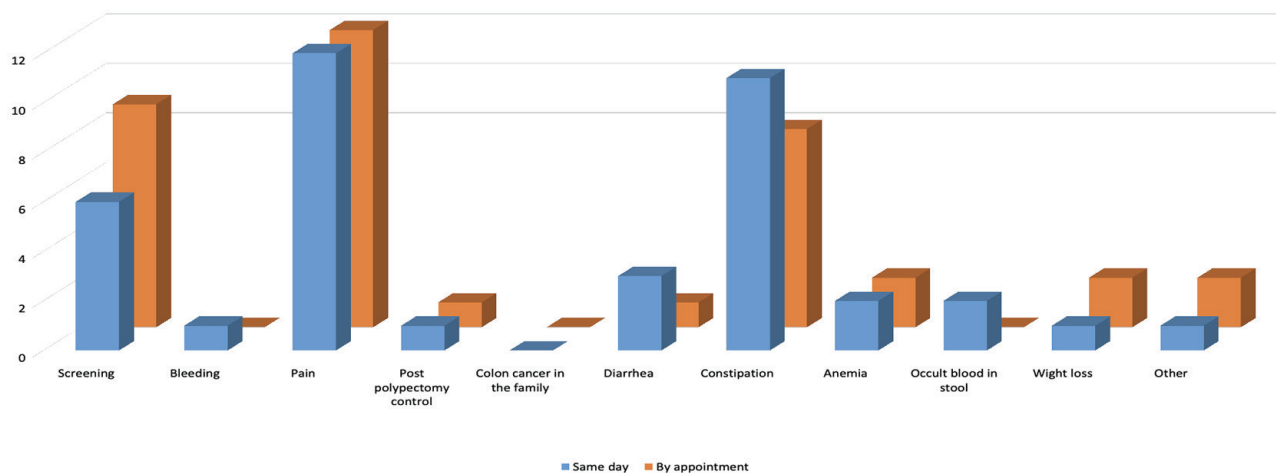
When evaluated in terms of the presence of chronic disease, 20 (50%) of 40 patients in the same-day group and 21 (56.7%) of 37 patients in the appointment group had at least one chronic disease. In the same-day group, 5 patients (12.5%) had coronary artery disease, 11 patients (27.5%) had diabetes mellitus, 11 patients (27.5%) had hypertension, 2 patients (5%) had asthma-chronic obstructive pulmonary disease (COPD), and 2 patients (5%) had neurological disease. In the appointment group, 12 patients (32.4%) had coronary artery disease, 7 patients (18.9%) had diabetes mellitus, 10 patients (27%) had hypertension, 1 patient (2.7%) had asthma-COPD, 1 patient (2.7%) had neurological disease.

In the same-day group, 9 patients (22.5%) followed a low fiber diet for one day, 5 patients (12.5%) for two days, and 26 patients (65%) for three days. In the appointment group, 7 patients (18.1%) followed a low-fiber diet for one day, 9 patients (24.3%) for two days, and 21 patients (56.5%) for three days. There was no statistically significant difference between the two groups in terms of age, gender, BMI, educational status, chronic disease presence, and dietary compliance ( $p>0.05$ ).

When the groups were examined in terms of procedure indications, in the same-day group, 12 patients (30%) underwent colonoscopy for abdominal pain, 11 (27.5%) for constipation, 6 (15%) for screening, 3 (7.5%) for diarrhea, 2 (5%) for occult blood in the stool, 2 (5%) for anemia, 1 (2.5%) for weight loss, 1 (2.5%) for rectal bleeding, 1 (2.5%) for post-polypectomy follow-up, and 1 (2.5%) for other reasons. In the appointment group, 12 patients (32.4%) underwent colonoscopy for abdominal pain, 9 patients (24.3%) for screening, 8 patients (21.6%) for constipation, 2 patients (5.4%) for anemia, 2 patients (5.4%) for weight loss, 1 patient (2.7%) for post-polypectomy follow-up, 1 patient (2.7%) for diarrhea, and 2 patients (5.4%) for other reasons (Figure 2). There was no statistically significant difference between the two groups in terms of procedure indications ( $p>0.05$ ).

When the two groups were examined in terms of colonoscopy quality indicators, the cecum was intubated in 37 of 40 patients in the same-day group. In the appointment group, 27 of 37 patients were intubated. There was a statistically significant difference between the two groups in terms of cecum intubation (Table 2,  $p=0.022$ ). The rate of adenoma detection was 20% in

**Colonoscopy indications**



**Figure 2.** Procedure indications of the patients in the study groups.

Colonoscopy procedure quality parameters n (%)		Same day n (%)	By appointment	p-value
<b>Cecal intubation status</b>	Yes	37 (92.5%)	27 (72.9)	
	No	3 (7.5%)	10 (27.1)	
<b>Causes of unsuccessful cecal intubation</b>	Pain	1 (33.3%)	0 (0%)	
	Inadequate bowel preparation	2 (66.6%)	10 (100%)	
<b>Polyp detection status</b>	Yes	8 (20%)	5 (13.5%)	0.448
	No	32 (80%)	32 (86.5%)	

the same-day group and 13.5% in the appointment group, and no statistically significant difference was found between the two groups ( $p>0.05$ ).

Cecum intubation times were calculated in the patients. Its time was  $9.24\pm 3.35$  minutes in the same-day group and  $9.78\pm 3.26$  minutes in the appointment group. There was no statistically significant difference between the two groups in terms of cecum intubation time (Table 3,  $p>0.05$ ).

Total processing times were calculated. It was  $16.22 \pm 4.83$  minutes in the same-day group and  $14.62\pm 5.81$  minutes in the appointment group. There was no statistically significant difference between the two groups in terms of total processing time (Table 3,  $p>0.05$ ).

The BBPS score was calculated for the total, right colon, transverse colon, and left colon in both groups. The total BBPS score was  $7.9\pm 1.79$  in the same-day group, and  $6.89\pm 2.23$  in the appointment group; a statistically significant difference was found ( $p=0.032$ ). The right colon BBPS score was calculated as  $2.6\pm 0.77$  in the same-day group and  $2.14\pm 1.08$  in the appointment group. A statistically significant difference was found ( $p=0.033$ ). Transverse colon BBPS score was calculated as  $2.6\pm 0.74$  in the same-day group and  $2.32\pm 0.88$  in the appointment group, and no statistically significant difference was found between them ( $p>0.05$ ). The left colon BBPS score was calculated as  $2.7\pm 0.56$  in the same-day group and  $2.42\pm 0.72$  in the appointment group; a statistically significant difference was found ( $p=0.049$ ); Table 4.

The two groups were compared in terms of tolerability of the reintroduced bowel cleansing drug. In the same-day group, 6 (15%) of 49 patients experienced nausea, vomiting, and abdominal pain after the intake. In the appointment group, these symptoms were detected in 5 (13.5%) of 37 patients. When the two groups were compared, no statistically significant difference was found ( $p>0.05$ ). While 37 (92.5%) of 40 patients in the same-day group could take the full dose, 36 (97.3%) of 37 patients in the appointment group could take all of it. When the two groups were compared, no statistically significant difference was found ( $p>0.05$ ) as shown in Table 5.

Colonoscopy findings were normal in 25 (62.5%) of the patients in the same-day group. Polyps were detected in 8 patients (20%), diverticula in 4 patients (10%), IBD in 2 patients (5%), and cancer

in 1 patient (2.5%). Colonoscopy results were normal in 21 (56.7%) of all 37 patients in the appointment group. Polyps were detected in 5 patients (13.5%), diverticula in 4 patients (10.8%), tumors in 1 patient (2.7%), and intestinal parasites in 1 patient (2.7%) (Figure 3).

**DISCUSSION**

There are many studies on planning a second colonoscopy in patients with inadequate bowel cleansing (11,12). However, there is no consensus on an ideal bowel preparation method and timing to be recommended for those patients (13). In the split-dose regimen, the morning dose is thought to promote clearance of gastrointestinal and pancreatobiliary secretions that enter the colon in the interim (14). In a retrospective study of Ben-Horin et al. (15), 6,990 colonoscopy procedures were examined. Repeat colonoscopy was planned for 307 patients

**Table 4.** BBPS scores for colon segments

BBPS (Avrg ± SD)	Same day	By appointment	p-value
Total	7.90±1.79	6.89±2.23	0.032
Right colon	2.60±0.77	2.14±1.08	0.033
Transverse colon	2.60±0.74	2.32±0.88	0.142
Left colon	2.70±0.56	2.42±0.72	0.049

BBPS: Boston bowel preparation scale, SD: Standard deviation

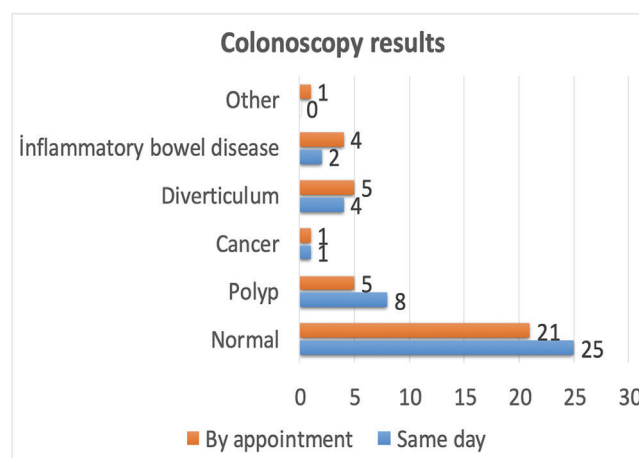
**Table 5.** Evaluation of study groups in terms of drug tolerability

Tolerance to medicine		Same day n (%)	By appointment n (%)	p-value
Nausea, vomiting, pain after medication	Yes	6 (15%)	5 (13.5%)	0.852
	No	34 (85%)	32 (86.5%)	
Took all the medicine	Yes	37 (92.5%)	36 (97.3%)	0.343
	No	3 (7.5)	1 (2.7)	

**Table 3.** Procedure and cecum intubation times of the patients in the study groups

Durations (minutes)	Same day (mean ± SD)	By appointment (mean ± SD)	p-value
Cecum intubation time	9.24±3.35	9.78±3.26	0.526
Processing time	16.22±4.83	14.62±5.81	0.191

SD: Standard deviation



**Figure 3.** Colonoscopy result.



due to insufficient bowel cleansing. Examination of repeat colonoscopies showed that the success rate of the procedure decreased as it was repeated. When the patients were examined according to the time of the second colonoscopy, the success rate appeared higher in the colonoscopies performed the next day; however, no statistically significant difference was found. As a result of the study, it was recommended to plan a colonoscopy the next day for the patients at risk due to inadequate colon cleansing. In addition, it has been suggested that a randomized controlled study is required to demonstrate the efficacy of next-day colonoscopy in patients with inadequate bowel cleansing (15). In a study by Murphy et al. (16), patients with insufficient bowel cleansing were divided into two groups: The next-day group and the non-next-day group. The rate of unsuccessful control colonoscopy was found to be 29.8% in the next-day group and 23.3% in the non-next-day group, while no statistically significant difference was found between them.

In a prospective study by Akgul et al. (17), 60 patients with inadequate bowel cleansing were given additional bowel laxatives on the same day. The cecum intubation rate was 83.3%. In addition, no complications were observed in 60 patients who were given additional laxative. In the study, it was shown that the second colonoscopy, performed on the same day with additional medication in patients with inadequate bowel cleansing, was effective and safe. However, since there was no control group in the study, no comparison was made with non-same-day colonoscopy results (16).

The two key quality indicators of colonoscopy are cecal intubation rate and polyp detection rate (17). In its guide published in 2017, ESGE reported that the cecum intubation rate should be at least 90% as a colonoscopy quality indicator (18). In our study, the cecum intubation rate was 92.5% in the same-day group and 72.9% in the appointment group. When the two groups were compared in terms of cecum intubation rate, a significant difference was found in favor of the same-day group. We think that the higher-quality preparation and the higher rate of cecum intubation in the same-day group are significant. Furthermore, the administration of additional bowel cleansing agent on the same day to patients who have partial bowel cleansing, therefore, affects the quality of the preparation positively.

Another important colonoscopy quality indicator is the adenoma detection rate. Polyp detection rate has been reported to be more than 25% in many studies (19,20). In the ESGE 2017 guideline, it is suggested that the ADR should be at least 25% (18). The polyp detection rate in our study was found to be lower than it is in these studies. It was 20% in the same-day group and 13.5% in the appointment group. However, there was no significant difference between the two groups in terms of this rate. The polyp detection rate was found to be 19.1% in

the study of Park et al. (21) which is similar to the results of our study. In a study conducted by reviewing 10,420 patients in our clinic, a repeat colonoscopy was planned for 522 patients due to insufficient bowel cleansing. Polyp detection rate in the second colonoscopy performed due to insufficient bowel cleansing was 17.8%, which is similar to our study's findings (22).

When the histopathology results of the lesions detected in the colonoscopy were evaluated, one patient in each group was diagnosed with colon cancer. The second colonoscopy procedure was performed on the patient in the appointment group, 74 days after the first procedure. This caused a delay in the diagnosis of the patient's tumor. In addition, it can be assumed that this period may increase due to infectious diseases such as the Coronavirus disease-2019 (COVID-19) pandemic. In our study, 3 patients in the second group could not attend the control colonoscopy procedure because one had a diagnosis of COVID-19, and the others had difficulty visiting the hospital due to pandemic restrictions or long distance. Therefore, we suggest that various factors, such as the distance of patients' homes to the hospital and pandemic conditions, should be taken into consideration when rescheduling colonoscopy for patients with insufficient bowel cleansing. Same-day colonoscopy should be performed on these patients.

In the current study, the BBPS score in the same-day group was found to be higher in all colon segments. When the BBPS scores of both groups were compared, a significant difference was found in favor of the same-day group for the total, right, and left colon. The BBPS score can be used to determine the time of surveillance colonoscopy. A 10-year follow-up is recommended if all segment scores are  $>2$ . If inadequate bowel preparation is detected (total BBPS score  $\leq 2$ ), repeat colonoscopy is recommended within the next 1 year (23). Higher BBPS is observed in patients with inadequate bowel cleansing in the same-day group, which increases the rate of polyp detection. Therefore, we recommend rescheduling colonoscopy on the same day for these patients.

When both groups were compared in terms of cecum intubation time and procedure time, there was no significant difference between them. The reason for this, was that control colonoscopy was performed by the same endoscopist in both groups. Better bowel preparation has been known to have shortened the processing time (24). However, the rate of inadequate bowel cleansing was higher in the appointment group. Although the procedure time is very short in patients with completely contaminated bowel, it is thought that there is no significant difference in procedure times between the two groups

When the two groups were compared in terms of tolerability of the procedure, no significant difference was found. In our study, patients were asked whether they had nausea, vomiting, and

abdominal pain, and that the results were found to be similar in both groups. In our study, nausea and vomiting were seen in 15% of the same-day group and 13.5% of the appointment group. In a study, there was no difference in tolerability between the divided-dose regimen administered the same morning and the bowel cleansing regimen spread over two days. In addition, when both groups were evaluated in terms of adherence to the complete drug regimen, the results were found to be similar (25). Before the second colonoscopy procedure, the patients' pulse, blood pressure, and saturation values were measured. The Aldrete score was calculated for discharge. No serious complications were observed in any of the patients. The patients were discharged from the unit on the same day after the procedure. When the regimens using senna and sodium phosphate were compared, senna was better tolerated and had fewer side effects (26). In this study, we used senna in both groups and found that the drug was tolerable. As a result, we recommend using senna as an additional laxative on the same day, but further studies are needed to compare the efficacy of different drugs.

The strength of our study is that it is a randomized controlled prospective study. One limitation of our study is that the higher success rate in the same-day colonoscopy group may have been due to overzealous endoscopists.

### Study Limitations

However, this limitation is not unique to our study because, in the absence of widely accepted criteria, even experienced endoscopists often disagree on what constitutes a disqualifying preparation. However, we believe that we have eliminated this bias by using the BBPS to define a dirty colon in our study. It is recommended that the study be supported by multi-center, randomized controlled studies with larger patient numbers.

### Conclusion

Today, most of the repeat colonoscopy cases consist of patients with inadequate bowel cleansing. Since colonoscopy is a hardly accessible, and an invasive procedure that requires serious preparation, repeat colonoscopies related to inadequate bowel cleansing should be reduced. In our study, comparing same-day colonoscopies with scheduled colonoscopies in patients with insufficient bowel cleansing, we showed that the quality of bowel preparation and the success rate of the procedure are higher when colonoscopies are performed with additional bowel cleansing medication on the same day, which can be tolerated. We believe this study is a valuable contribution to the literature, as it is the first prospective randomized controlled study on this subject.

### Ethics

**Ethics Committee Approval:** This prospective randomized controlled study was conducted at the Department of General Surgery of Tokat

Gaziosmanpaşa University. Approval for the study was obtained from the Tokat Gaziosmanpaşa University Ethics Committee (approval no: 20-KAEK-089).

**Informed Consent:** Informed consent was obtained.

### Footnotes

#### Author Contributions

Concept - U.Ö., M.Y.; Design - U.Ö., M.Y., E.D.; Supervision - İ.Ö., N.Ö.; Fundings - A.İ.S., S.C.G.; Materials - S.Y., N.Ö., B.K.; Data Collection or Processing - B.K., M.Y.; Analysis or Interpretation - U.Ö., M.Y.; Literature Search - U.Ö., İ.O.; Critical Review - U.Ö., M.Y., E.D., İ.O.; Writing - N.Ö., A.İ.S.

**Conflict of Interest:** No conflict of interest was declared by the authors.

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### REFERENCES

1. Siegel RL, Miller KD, Goding Sauer A, Fedewa SA, Butterly LF, Anderson JC, et al. Colorectal cancer statistics, 2020. *CA Cancer J Clin.* 2020;70:145-164.
2. Nishihara R, Wu K, Lochhead P, Morikawa T, Liao X, Qian ZR, et al. Long-term colorectal-cancer incidence and mortality after lower endoscopy. *N Engl J Med.* 2013;369:1095-1105.
3. Lieberman DA, Weiss DG, Bond JH, Ahnen DJ, Garewal H, Chejfec G. Use of colonoscopy to screen asymptomatic adults for colorectal cancer. Veterans Affairs Cooperative Study Group 380. *N Engl J Med.* 2000;343:162-168. Erratum in: *N Engl J Med* 2000;343:1204.
4. Kastenber D, Bertiger G, Brogadir S. Bowel preparation quality scales for colonoscopy. *World J Gastroenterol.* 2018;24:2833-2843.
5. Lorenzo-Zúñiga V, Moreno de Vega V, Marín I, Barberá M, Boix J. Improving the quality of colonoscopy bowel preparation using a smart phone application: a randomized trial. *Dig Endosc.* 2015;27:590-595.
6. Gardezi SA, Tibbatts C. Improving bowel preparation for colonoscopy in a cost effective manner. *BMJ Qual Improv Rep.* 2017;6:u204560.w5376.
7. Senore C, Ederle A, Fantin A, Andreoni B, Bisanti L, Grazzini G, et al. Acceptability and side-effects of colonoscopy and sigmoidoscopy in a screening setting. *J Med Screen.* 2011;18:128-134.
8. Hassan C, Bretthauer M, Kaminski MF, Polkowski M, Rembacken B, Saunders B, et al. Bowel preparation for colonoscopy: European Society of Gastrointestinal Endoscopy (ESGE) guideline. *Endoscopy.* 2013;45:142-150.
9. Johnson DA, Barkun AN, Cohen LB, Dominitz JA, Kaltenbach T, Martel M, et al. Optimizing adequacy of bowel cleansing for colonoscopy: recommendations from the US multi-society task force on colorectal cancer. *Gastroenterology.* 2014;147:903-924.
10. Yenidogan E, Okan I, Kayaoglu HA, Akgul GG, Sansal M, Tali S, et al. Same-day colonoscopy preparation with Senna alkaloids and bisacodyl tablets: a pilot study. *World J Gastroenterol.* 2014;20:15382-15386.
11. Menees SB, Kim HM, Elliott EE, Mickevicius JL, Graustein BB, Schoenfeld PS. The impact of fair colonoscopy preparation on colonoscopy use and adenoma miss rates in patients undergoing outpatient colonoscopy. *Gastrointest Endosc.* 2013;78:510-516.
12. Rex DK, Imperiale TF, Latinovich DR, Bratcher LL. Impact of bowel preparation on efficiency and cost of colonoscopy. *Am J Gastroenterol.* 2002;97:1696-1700.
13. Ibáñez M, Parra-Blanco A, Zaballa P, Jiménez A, Fernández-Velázquez R, Fernández-Sordo JO, et al. Usefulness of an intensive bowel cleansing strategy for repeat colonoscopy after preparation failure. *Dis Colon Rectum.* 2011;54:1578-1584.

14. Frommer D. Cleansing ability and tolerance of three bowel preparations for colonoscopy. *Dis Colon Rectum*. 1997;40:100-104.
15. Ben-Horin S, Bar-Meir S, Avidan B. The outcome of a second preparation for colonoscopy after preparation failure in the first procedure. *Gastrointest Endosc*. 2009;69:626-630.
16. Murphy CJ, Jewel Samadder N, Cox K, Iqbal R, So B, Croxford D, et al. Outcomes of Next-day versus non-next-day colonoscopy after an initial inadequate bowel preparation. *Dig Dis Sci*. 2016;61:46-52.
17. Akgul G, Ozgur Yeniova A, Ozsoy Z, Yenidogan E, Kefeli A, Dasiran MF, et al. Effect and tolerability of same-day repeat colonoscopy. *J Invest Surg*. 2020;33:459-465.
18. Froehlich F, Wietlisbach V, Gonvers JJ, Burnand B, Vader JP. Impact of colonic cleansing on quality and diagnostic yield of colonoscopy: the European Panel of Appropriateness of Gastrointestinal Endoscopy European multicenter study. *Gastrointest Endosc*. 2005;61:378-384.
19. Kaminski MF, Thomas-Gibson S, Bugajski M, Bretthauer M, Rees CJ, Dekker E, et al. Performance measures for lower gastrointestinal endoscopy: a European Society of Gastrointestinal Endoscopy (ESGE) quality improvement initiative. *United European Gastroenterol J*. 2017;5:309-334.
20. Calderwood AH, Lai EJ, Fix OK, Jacobson BC. An endoscopist-blinded, randomized, controlled trial of a simple visual aid to improve bowel preparation for screening colonoscopy. *Gastrointest Endosc*. 2011;73:307-314. of adequate for describing bowel cleanliness. *Gastrointest Endosc*. 2014;80:269-276.
21. Liu X, Luo H, Zhang L, Leung FW, Liu Z, Wang X, et al. Telephone-based re-education on the day before colonoscopy improves the quality of bowel preparation and the polyp detection rate: a prospective, colonoscopist-blinded, randomised, controlled study. *Gut*. 2014;63:125-130.
22. Park JS, Kim MS, Kim H, Kim SI, Shin CH, Lee HJ, et al. A randomized controlled trial of an educational video to improve quality of bowel preparation for colonoscopy. *BMC Gastroenterol*. 2016;16:64.
23. Yildirim, M, Özsoy U, Uğurlu C, Koca B, Yeniova AÖ, Okan İ. Repeated colonoscopy results after an unsuccessful procedure due to inadequate bowel cleansing. *Laparosc Endosc Surg Sci*. 2021;28:36-43.
24. Calderwood AH, Schroy PC 3rd, Lieberman DA, Logan JR, Zurfluh M, Jacobson BC. Boston bowel preparation scale scores provide a standardized definition of adequate for describing bowel cleanliness. *Gastrointest Endosc*. 2014;80:269-276.
25. Lee HL, Eun CS, Lee OY, Jeon YC, Han DS, Sohn JH, et al. Significance of colonoscope length in cecal insertion time. *Gastrointest Endosc*. 2009;69:503-508.
26. Longcroft-Wheaton G, Bhandari P. Same-day bowel cleansing regimen is superior to a split-dose regimen over 2 days for afternoon colonoscopy: results from a large prospective series. *J Clin Gastroenterol*. 2012;46:57-61.
27. Unal S, Doğan UB, Oztürk Z, Cindoruk M. A randomized prospective trial comparing 45 and 90-ml oral sodium phosphate with X-Prep in the preparation of patients for colonoscopy. *Acta Gastroenterol Belg*. 1998;61:281-284.