Sapporo Medical Journal
Volume 56, Issue 09, September 2022

Poor Colon PreparationPredisposes to Anxiety and Patient Unwilling's to Repeat Colonoscopy

Yasser A. Abdelghani[1], and Al Shimaa Ismael Roushdy[2]

[1]MD, Tropical Medicine and Gastroenterology, Minia University, Minia, Egypt.
[2] MD, Department of Anaesthesiology, Minia University, Minia, Egypt.

Abstract— Background: Critical component of a successful colonoscopy is adequate bowel preparation. Inadequate preparation has negative effects on both the community as a whole and individuals.**Aim and objective:**We aimed todetermine the effect of poor bowel preparation on patient willing's to repeat colonoscopy.**Patients and methods:** A prospective study, of 122 patients undergoing colonoscopy in Minia university hospital was conducted between June 1, 2021, and June 1, 2022. Cases were divided into two groups according to the degree of bowel preparation; group 1 (96 cases) including good and very good bowel preparation, group 2 (26 cases) involving poor bowel preparation. **Results:**Of the 122 colonoscopies, cecal intubation failed in 7 cases of 96 of (group 1) (7.3%) and failed in 23 cases of 26 of (group 2) (88.5%); with a significant difference. Pain severity and anxiety score was significantly higher in group 2 than group 1. There is a statistically significant difference in the mean score for willingness to accept to repeat colonoscopy between groups 1 and 2 (6.29±1.44 vs 2.7± 1.3). **Conclusion:**Poor bowel preparation not only had a significant association with cecal intubation failure rate but also it decreases the patient willingness to repeat the examination.

Keywords: Colonoscopy, Bowel preparation; Patient willing.

Introduction

The general population and those at high risk are screened and diagnosed for colorectal adenoma and carcinoma using colonoscopy as the standard procedure **(1)**. The rate of colorectal adenoma finding is highly correlated with the degree of bowel preparation **(2-4)**. Inadequate bowel preparation makes the colonoscopy technically more difficult, impairs the endoscopist's assessment, and makes it harder to identify lesions. Endoscopists must have the best bowel preparation possible to observe the intestinal mucosa clearly **(5)**. Poor patient compliance frequently results in poor bowel preparation. Age, sex, education levels, individual preferences, and socioeconomic standing were found to be responsible for the level of bowel preparation by Mahmood et al. **(6)**. This conclusion emphasises the value of patient education and motivation to increase compliance and achieve improved bowel preparation **(7,8)**.

Complete colonoscopy up to cecal intubation is mandatory for adenoma detection & colorectal cancer screening. Even with extensive training and expertise, doing a colonoscopy safely and to the best of one's ability is challenging. A colonoscopy's major quality indicator is whether the cecum can be successfully intubated**(9)**. Various patient-related factors related

to colonoscopy outcomes have been reported in past studies. Age, gender, a high or low BMI, bowel preparation, and a history of abdominal surgery and/or peritonitis were among these contributing factors **(10-13)**. However, there is little information on how bowel preparation affects colonoscopy outcomes, and the patient willing'sto repeatcolonoscopywithin the same other patient related factors such as age, gender and BMI.

The goal of this study was to determine the effect of poor bowel preparation on patient willing's to repeat colonoscopy within the same patient related demographic characteristics and by the same endoscopist.

Patients and methods

From June 1, 2021, and June 1, 2022, a single-center prospective,study carried out at Minia university hospital for1year. The sample size was calculated taking as a universe the total of 960 colonoscopies per year, with a confidence interval of 95% and a margin of error of 5%, which corresponds to a sample size of 122 patients. For the groups to be equivalent, a stratified sampling was carried out for the 2 results of bowel preparation, corresponding to a total of 61 patients in each group.

Colonoscopic indications included positive fecal occult blood test (FOBT) screening, and/orassessment of symptoms such as abdominal pain, discomfort, or rectal bleeding. A total of 122 colonoscopies were included & that were performed by one endoscopist and the allowed cecal insertion time was 20 minutes.

The following factors led to the exclusion of patients: 1) urgent colonoscopy, 2)planned therapeutic colonoscopy, 3) colon obstruction, 4) past history of colorectal or gastric surgery, and 5) Patient opposition,6) severe co-morbidities, such as ascites, congestive heart failure, chronic renal failure, and coronary artery disease within the previous six months, 7) constipation, usually requiring the use of laxatives and characterised by fewer than three bowel movements per week with hard stools, a sense of incomplete evacuation, or abdominal discomfort; 8) Findings of pregnancy or lactation; and 9) IBD diagnosis; Informed consent was obtained before the procedure. The Ethical Committee at Minia university Hospital approved this study protocol.

Colonoscopy:

Following a preparatory bowel cleanse, every colonoscopy was carried out using an Olympus CF-260 video colonoscope (Olympus Optical Co, Ltd, Tokyo, Japan), with a 2-L of (Macrogol 3350+sodium sulphate+sodiumchloride+potassiumchloride+ascorbicacid+sodium ascorbateSolution). We used the Boston-Bowel-Preparation-Scale(BBPS) assessment scale. The BBPS is a standardized 9-point assessment scale for the colon. The structure of the colon is divided into its three segments: right colon, transverse colon, and left colon. Each segment is classified from 0 to 3 depending on the degree of soiling.

The colon segment would receive a score of 0 if the mucosa could not be seen due to food or faeces residue; a score of 3 indicates that the colon segment's whole mucosa can be seen clearly without residual discoloration, minor stool pieces, or opaque fluids. The sum total of

the three segments represents the degree of soiling, so that a total ≤ 5 points shows poor bowel preparation, while 6–7 shows good bowel preparation, and ≥ 8 very good bowel preparation**(14)**.The bowel preparation was categorized by the endoscopist at the time of the procedure.The patient received an on-demand bolus of diluted midazolam.

Data collection

A few of variables were monitored and included age, sex, body mass index (BMI), comorbidities, bowel preparation scale, indication for colonoscopy, air/water nozzle blockage, abdominal pain during colonoscopy, and cecal intubation rate.BMI was divided into three categories: thin (BMI < 18.5), normal (BMI: 18.5-24.9), overweight (BMI ≥ 25) **(15)**.

To evaluate patient anxiety, the State-Trait Anxiety Inventory (STAI) was utilised, while the Numerical Rating Scale (NRS) was used to evaluate pain intensity (0-10). Heart rate (HR) and oxygen saturation were monitored for all patients. Monitoring wasdone before, during, and after the colonoscopy.Patients were taken to the recovery room after the endoscopy, where the Aldrete score was used to evaluate how well they were recovering **(16)**. When Aldrete score was ≥9, patients were re-evaluated by STAI and NRS. A self-rated score from 0 to 10 points was used in a questionnaire to assess feelings to undergo another colonoscopy if indicated (where 0 indicates great hesitancy to undergo colonoscopy again and 10 indicates inclination to undergo colonoscopyagain if necessary).Complications was recorded such as respiratory depression, bowel perforation and/ or bleeding.

Statistical analysis

Data were analyzed using SPSS, version 18.0 (SPSS Inc., Chicago, IL, USA).Chi-square tests compared categorical variables, and an independent t-test was used to compare the mean valueat baseline to assess homogeneity of the groups. To examine the difference between the two groups, independent t-tests compared mean scores of pains,anxiety, and other outcome variables. A p-value < 0.05 was considered significant.

Results

1. Demographic data

The study included 122 subjects undergoing colonoscopy in the endoscopy unit of the Minia university hospital fromJune 2021 to June 2022. They were divided into two equal groups based on how well their bowels had been prepared: good and very good bowel preparation (group 1, n= 96), and poor bowel preparation (group 2, n=26). Only 21.3% of the patients had poor bowel preparation, whereas 78.7% of the patients had good or very good bowel preparation. The most common indication for colonoscopy was symptomatic 68.8 %& 65.3% in group 1 & group 2 respectively.

The average age was 51.5 years for patients with good & very good preparation (group 1) and 53.6 years for patients with poor bowel preparation (group 2), this being statistically

insignificant. Among the patients with poor preparation, 53.8% were male and 46.2% were female, without finding statistical significance (Table 1). The body mass index (BMI), smoking and comorbidities of the 2 groups were almost the same. Baseline characteristics of patients are summarized in (Table 1).

2. *Intubation of the caecum and colonoscopy outcomes*

Of the 122 colonoscopies, cecal intubation failed in 7 cases of 96of(group1) (7.3%) and failed in 23 cases of 26 of(group2) (88.5%); with a significant difference (p= 0.001). Interestingly,Air/ water nozzle blockage was significantly higher in group 2 than group 1 (p= 0.001).

Pain severity was significantly higher in group 2 than group 1 (p=0.0001). Additionally, anxiety score was significantly higherin group 2 thangroup 1 (p=0.0001). The mean (SD) score for willingness to accept to repeat colonoscopy has statistically significantly different between the group 1 and group 2. (6.29±1.44 vs 2.7± 1.3; P = 0.001) (Table 2).The respiratory depression was never recorded. No perforation, bleeding, and other complications due to colonoscopy were observed.

Discussion

The success of a colonoscopy is influenced by a number of factors. Complete colonoscopic assessment is the goal of all colonoscopies performed, and effective bowel preparation is a vital component of colonoscopic examination. According to Barrison IG et al.; 20% of cases of incomplete colonoscopy are attributed to inadequate bowel preparation**(17)**. For the colonoscopist, an inadequately prepared bowel has a number of negative effects, including a longer procedure time **(18)**and a higher risk of missing pathology **(19)**.

When bowel preparation quality is poor (any colon segment BBPS score 2), current standards further suggest that colonoscopic procedure be repeated as soon as possible**(20, 21)**. However, some endoscopists when face the situation of poor bowel preparation tries to continue the colonoscopy procedure.In this study we focused on investigating the effect of bowel preparation on colonoscopy outcome and the patient willing's to repeat examination. Colonoscopy was done by single endoscopist to fix the experience variable.

Colonic cleaning can be measured with several scales, one of the most validated being the Boston scale, in which an adequate preparation is considered when the score is equal to or greater than 6 **(22)**. Within this prospective series of colonoscopies, 96 patients assessed as good and very good bowel preparation while 26 patients assessedas poorly prepared. There are no significant differences in each patient group's characteristics, including sex, age, BMI, smoking, comorbidities, and indication.

Only when cecal landmarks, such as the ileocecal valve and the cecal strap fold, were clearly photographed in our study did we consider cecal intubation successful. The results in this study showed that cecal intubation failed in 7.3% of group one and failed in 88.5% of group

twoof poor bowel preparation. Unfavorable outcomes from unsuccessful cecal intubation include discomfort for the patient, barotrauma, and subsequent cecal reinsertion **(23)**.

Studies have reported poor bowel preparation increase the time of washing and requests much suctioning of debris**(24)**. In the present study, the air/water nozzle blockage times were significantly higher in group two of poor bowel preparation. A much stool in this group is the cause of clogged nozzle. This finding suggests that frequent blockage will increase the patient pain, prolong the time of procedure, and predispose to damage of endoscope channels.In addition to high repair costs of damaged endoscope, there are negative impacts on clinical practice where inadequate bowel preparation precludes complete colonoscopic examination.

Pain severity score and patients' anxiety score was significantly higher in group of poor bowel preparation. Finding that significant association of pain severity and anxiety score in poorly prepared bowel implies that it is a prominent aspect of psychological distress in this group. One of the golden rules in colonoscopy is to use air as little as you can. In this study we used excess air insufflation to expand the lumen, in poorly prepared bowel. Additionally, we used large volumes of water irrigation for the same reason. All these events are suggested to increased pain severity.Our findings further support the idea that when patients feel severe pain during colonoscopy then he knows about failure of cecal intubation, their anxiety could be markedly increased pain severity, cecal intubation failures and anxiety of patient, all predisposed to patient unwilling to repeat colonoscopy.

According to the BBPS, an adequate bowel cleansing is accomplished when the overall score is ≥ 6 points along with a score ≥ 2 in each segment of the colon. Our findings suggest that if left colon BBPS standardized 9-point assessment scale is zero or one, the endoscopist should not insist to complete the colonoscopy. This is because your patient may suffer from severe pain and more anxiety and his willing's to repeat colonoscopy will be decreased.

Our study has a set of limitations. Being a single-center study, it may be challenging to extend these findings to inadequate bowel preparation. Additionally, we did not take into account aspects like the endoscopist's tiredness or the assistants' experience; instead, we focused solely on the patient's factors. Additionally, because the majority of procedures were indicated by symptoms, the study participants may represent a selected group.

Conclusion

Poor bowel preparation not only had a significant association with cecal intubation failure rate but also it decreases the patient willingness to repeat the examination, and thus the negative patient feelings will be transmitted to the community; and accordingly, the patient acceptance for screening and follow up programs will be suppressed. In addition, the frequent blockage of water / air nozzle may affect the endoscopy function and increases the cost of repair.

Authors' contributions:

All authors had 1. Substantial contributions to the conception or design of the work; or the acquisition, analysis, or interpretation of data for the work; AND 2. Drafting the work or revising it critically for important intellectual content; AND 3. Final approval of the version to be published; AND 4. Agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Conflict of interest: None.

Acknowledgments: We acknowledge all participants included in this investigation.

References

1. **Urban G, Tripathi P, Alkayali T, et al. Deep learning localizes and identifies polyps in real time with 96% accuracy in screening colonoscopy.** Gastroenterology. 2018; 155(4):1069-1078.
2. **Kim JS, Kang SH, Moon HS, et al. Impact of bowel preparation quality on adenoma identification during colonoscopy and optimal timing of surveillance.** Dig Dis Sci. 2015; 60(10):3092-3099.
3. **Cavicchi M, Tharsis G, Burtin P, et al. Difference in physician- and patient-dependent factors contributing to adenoma detection rate and serrated polyp detection rate.** Dig Dis Sci. 2019; 64(12):3579-3588.
4. **Hassan C, East J, Radaelli F, et al. Bowel preparation for colonoscopy: European Society of Gastrointestinal Endoscopy (ESGE) Guideline—Update 2019.** Endoscopy. 2019; 51(8):775-794.
5. **Kluge MA, Williams JL, Wu CK, et al. Inadequate Boston Bowel Preparation Scale scores predict the risk of missed neoplasia on the next colonoscopy.**GastrointestEndosc. 2018; 87(3):744-751.
6. **Mahmood S, Farooqui SM, Madhoun MF. Predictors of inadequate bowel preparation for colonoscopy: a systematic review and meta-analysis.**Eur J Gastroenterol Hepatol. 2018; 30(8):819-826.
7. **Abudeeb H, Khan K, Maung M, Malcomson L, Brown A. Quality optimisation in colonoscopy: a function of time of colonoscopy or bowel preparation.** Pan Afr Med J. 2019; 32:205.
8. **Lee J, Kim TO, Seo JW, et al. Shorter waiting times from education to colonoscopy can improve the quality of bowel preparation: a randomized controlled trial.** Turk J Gastroenterol. 2018; 29(1):75-81
9. **Dafnis G, Granath F, Pahlman L, et al: The impact of endoscopists' experience and learning curves and interendoscopist variation on colonoscopy completion rates.** Endoscopy 2001, 33:511–517.
10. **Oh SY, Sohn CI, Sung IK, et al: Factors affecting the technical difficulty of colonoscopy.**Hepatogastroenterology. 2007, 54:1403–1406.
11. **Shah HA, Paszat LF, Saskin R, et al: Factors associated with incomplete colonoscopy: a population-based study.** Gastroenterology. 2007, 132:2297–2303.

12. **Bernstein C, Thorn M, Monsees K, et al: A prospective study of factors that determine cecal intubation time at colonoscopy.**GastrointestEndosc. 2005, 61:72–75.
13. **Anderson JC, Messina CR, Cohn W, et al: Factors predictive of difficult colonoscopy.**GastrointestEndosc. 2001, 54:558–562.
14. **Lai EJ, Calderwood AH, Doros G, et al. The Boston bowel preparation scale: a valid and reliable instrument for colonoscopy-oriented research.**GastrointestEndosc. 2009; 69(3 Pt 2):620–5.
15. **WHO expert consultation: Appropriate body-mass index for asian populations and its implications for policy and intervention strategies.** Lancet 2004, 363:157–163.
16. **Türk HŞ, Aydoğmuş M, Ünsal O, et al. Ketamine versus alfentanil combined with propofol for sedation in colonoscopy procedures: a randomized prospective study.** Turk J Gastroenterol 2014; 25: 644-9.
17. **Barrison IG, Bramble MG, Wilkinson M et al. Provision of Endoscopy Related Services in District General Hospitals.** BSG working party report 2001.
18. **Bernstein C, Thorn M, Monsees K, Spell R, O'Connor JB. A prospective study of factors that determine cecal intubation time at colonoscopy.**GastrointestEndosc. 2005; 61: 72–5.
19. **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.**GastrointestEndosc. 2005; 61: 378–84
20. **Hassan C, East J, Radaelli F, et al. Bowel preparation for colonoscopy: European Society of Gastrointestinal Endoscopy (ESGE) Guideline—Update 2019.** Endoscopy. 2019; 51(8):775-794.
21. **Clark BT, Rustagi T, Laine L. What level of bowel prep quality requires early repeat colonoscopy: systematic review and meta-analysis of the impact of preparation quality on adenoma detection rate?** Am J Gastroenterol. 2014; 109(11):1714-1723.
22. **Calderwood,A.H.,Schroy, P.C.,Lieberman, D.A.,J.R. Logan, D.A.,Zurfluh, M. Jacobson, B.C. Boston Bowel Preparation Scale scores provide a standardized definition of adequate for describing bowel cleanliness.**Gastrointestinal Endoscopy 80(2) (2014) 269-276
23. **Park HJ, Hong JH, Kim HS, Kim BR, Park SY, Jo KW, Kim JW. Predictive factors affecting cecal intubation failure in colonoscopy trainees.** BMC Med Educ. 2013 Jan 19; 13:5.
24. **Sharma P, Burke CA, Johnson DA, Cash BD. The importance of colonoscopy bowel preparation for the detection of colorectal lesions and colorectal cancer prevention.**Endosc Int Open. 2020 May; 8(5):E673-E683.

This work is licensed under a Creative Commons Attribution Non-Commercial 4.0 International License.

	Patients, No. /total No. (%)	Patients, No. /total No. (%)	P value

	Good & very good bowel preparation(n= 96)	Poor bowel preparation (n=26)	
Age, mean (SD), y	51.5 (12.5)	53.6 (11.4)	0.12
Sex, No. (%)			
Male	49 (51.1)	14 (53.8)	0.85
Female	47 (48.9)	12 (46.2)	
BMI, mean (SD)	23.4 (3.8)	23.9 (3.5)	.20
Cigarette smoking			
Current	35 (36.5)	8 (30.8)	0.36
Past	8 (8.3)	2 (7.7)	
Never	53 (55.2)	16 (61.5)	
Comorbidities			
Hypertension	9 (9.4)	4 (15.4)	0.23
Diabetes	7 (7.3)	2 (7.6)	0.18
No other diseases	80 (83.3)	20(77)	0.24
Indication for colonoscopy (%)			
Screening	30 (31.2)	9 (30.7)	0.19
Symptomatic	66 (68.8)	17 (65.3)	0.68

Table (1): Baseline characteristics of patients.

Table 2 Outcome of the Colonoscopy examination

Outcome	Patients, No./total No. (%)	Patients, No./total No. (%)	P value
	Good & very good bowel preparation(n= 96)	**Poor bowel preparation (n=26)**	
Cecal intubation			
Success	89 (92.7)	3 (11.5)	0.001*
Failed	7 (7.3)	23 (88.5)	
Air/Water Nozzle blockage times/ procedure mean±SD	2.3±1.2	8.6±2.4	0.001*
Pain severity mean±SD	42.8±7.4	53.2±10.8	0.0001*
Anxiety score mean±SD	47.5±7.15	51.8±9.15	0.0001*
Willingness to repeat colonoscopy, mean±SD score	6.29±1.44	2.7± 1.3	0.001*