# World Journal of *Gastrointestinal Endoscopy*

World J Gastrointest Endosc 2024 May 16; 16(5): 227-272





Published by Baishideng Publishing Group Inc

W J G E World Journal of Gastrointestinal Endoscomu

### Contents

### Monthly Volume 16 Number 5 May 16, 2024

### **EDITORIAL**

Asymptomatic bile duct stones: The devil is in the details 227

Elsayed MOK, Talkhan MG

- 232 Beyond boundaries: Feasibility of curved linear array echoendoscope in appendiceal neoplasm detection Daba G, Altonbary A
- Has Coca-Cola treatment become the first-line therapy for gastric bezoars, both in general and specifically 237 for western countries?

Delgado Galan M, Rabago LR

244 Constipation and colonoscopy

Popovic DD, Filipovic B

### **ORIGINAL ARTICLE**

### **Retrospective Study**

250 Endoscopic full-thickness plication along with argon plasma coagulation for treatment of proton pump inhibitor dependent gastroesophageal reflux disease

Harwani Y, Butala S, More B, Shukla V, Patel A

### **Prospective Study**

259 Effect of vinegar supplementation on patients with esophageal lesions lightly stained with Lugol's iodine solution: Prospective single-centre trial

Gao Y, Ye LS, Li X, Yu B, Liao K, Xie J, Du J, Zhang QY, Hu B



### Contents

World Journal of Gastrointestinal Endoscopy

Monthly Volume 16 Number 5 May 16, 2024

### **ABOUT COVER**

Editorial Board Member of World Journal of Gastrointestinal Endoscopy, Moinak Sen Sarma, MD, Associate Professor, Pediatric Gastroenterology, Sanjay Gandhi Postgraduate Institute of Medical Sciences, Lucknow 226014, Uttar Pradesh, India. moinaksen@gmail.com

### **AIMS AND SCOPE**

The primary aim of World Journal of Gastrointestinal Endoscopy (WJGE, World J Gastrointest Endosc) is to provide scholars and readers from various fields of gastrointestinal endoscopy with a platform to publish high-quality basic and clinical research articles and communicate their research findings online.

*WJGE* mainly publishes articles reporting research results and findings obtained in the field of gastrointestinal endoscopy and covering a wide range of topics including capsule endoscopy, colonoscopy, double-balloon enteroscopy, duodenoscopy, endoscopic retrograde cholangiopancreatography, endosonography, esophagoscopy, gastrointestinal endoscopy, gastroscopy, laparoscopy, natural orifice endoscopic surgery, proctoscopy, and sigmoidoscopy.

### **INDEXING/ABSTRACTING**

The WJGE is now abstracted and indexed in Emerging Sources Citation Index (Web of Science), PubMed, PubMed Central, Reference Citation Analysis, China Science and Technology Journal Database, and Superstar Journals Database. The 2023 Edition of Journal Citation Reports® cites the 2022 impact factor (IF) for WJGE as 2.0; IF without journal self cites: 1.9; 5-year IF: 3.3; Journal Citation Indicator: 0.28.

### **RESPONSIBLE EDITORS FOR THIS ISSUE**

Production Editor: Yi-Xuan Cai; Production Department Director: Xu Guo; Cover Editor: Jia-Ping Yan.

NAME OF JOURNAL	INSTRUCTIONS TO AUTHORS
World Journal of Gastrointestinal Endoscopy	https://www.wjgnet.com/bpg/gerinfo/204
ISSN	GUIDELINES FOR ETHICS DOCUMENTS
ISSN 1948-5190 (online)	https://www.wjgnet.com/bpg/GerInfo/287
LAUNCH DATE	GUIDELINES FOR NON-NATIVE SPEAKERS OF ENGLISH
October 15, 2009	https://www.wjgnet.com/bpg/gerinfo/240
FREQUENCY	PUBLICATION ETHICS
Monthly	https://www.wjgnet.com/bpg/GerInfo/288
EDITORS-IN-CHIEF	PUBLICATION MISCONDUCT
Anastasios Koulaouzidis, Bing Hu, Sang Chul Lee, JooYoung Cho	https://www.wignet.com/bpg/gerinfo/208
EDITORIAL BOARD MEMBERS	ARTICLE PROCESSING CHARGE
https://www.wjgnet.com/1948-5190/editorialboard.htm	https://www.wjgnet.com/bpg/gerinfo/242
PUBLICATION DATE	STEPS FOR SUBMITTING MANUSCRIPTS
May 16, 2024	https://www.wjgnet.com/bpg/GerInfo/239
COPYRIGHT	ONLINE SUBMISSION
© 2024 Baishideng Publishing Group Inc	https://www.f6publishing.com
PUBLISHING PARTNER	PUBLISHING PARTNER'S OFFICIAL WEBSITE
Digestive Endoscopy Center of West China Hospital, SCU	http://www.cd120.com/index.html

© 2024 Baishideng Publishing Group Inc. All rights reserved. 7041 Koll Center Parkway, Suite 160, Pleasanton, CA 94566, USA E-mail: office@baishideng.com https://www.wjgnet.com



F WJ

## World Journal of Gastrointestinal Endoscopy

Submit a Manuscript: https://www.f6publishing.com

World J Gastrointest Endosc 2024 May 16; 16(5): 244-249

DOI: 10.4253/wjge.v16.i5.244

ISSN 1948-5190 (online)

EDITORIAL

### **Constipation and colonoscopy**

Dusan Dj Popovic, Branka Filipovic

**Specialty type:** Gastroenterology and hepatology

**Provenance and peer review:** Invited article; Externally peer reviewed.

Peer-review model: Single blind

Peer-review report's classification

Scientific Quality: Grade B Novelty: Grade B Creativity or Innovation: Grade B Scientific Significance: Grade B

P-Reviewer: Machado NC, Brazil

Received: March 21, 2024 Revised: April 15, 2024 Accepted: April 24, 2024 Published online: May 16, 2024



**Dusan Dj Popovic, Branka Filipovic,** Faculty of Medicine, University of Belgrade, Belgrade 11000, Serbia

**Dusan Dj Popovic, Branka Filipovic,** Department of Gastroenterology and Hepatology, Clinic for Internal Medicine, University Clinical Hospital Center "Dr. Dragisa Misovic-Dedinje", Belgrade 11000, Serbia

**Corresponding author:** Dusan Dj Popovic, MD, PhD, Assistant Professor, Consultant Physician-Scientist, Research Assistant Professor, Faculty of Medicine, University of Belgrade, Dr. Subotica 8, Belgrade 11000, Serbia. pduschan@gmail.com

### Abstract

Constipation is a significant sociomedical problem, which can be caused by various reasons. In the diagnostic approach to patients with constipation, the following data are usually sufficient: History, complete physical examination (including rectal examination), and additional diagnostic tests. A colonoscopy is not a necessary diagnostic method for all patients with constipation. However, if patients have alarm symptoms/signs, that suggest an organic reason for constipation, a colonoscopy is necessary. The most important alarm symptoms/signs are age > 50 years, gastrointestinal bleeding, new-onset constipation, a palpable mass in the abdomen and rectum, weight loss, anemia, inflammatory bowel disease, and family history positive for colorectal cancer. Most endoscopists do not like to deal with patients with constipation. There are two reasons for this, namely the difficulty of endoscopy and the adequacy of preparation. Both are adversely affected by constipation. To improve the quality of colonoscopy in these patients, good examination techniques and often more extensive preparation are necessary. Good colonoscopy technique implies adequate psychological preparation of the patient, careful insertion of the endoscope with minimal insufflation, and early detection and resolution of loops. Bowel preparation for colonoscopy often requires prolonged preparation and sometimes the addition of other laxatives.

**Key Words:** Constipation; Functional constipation; Colonoscopy; Bowel preparation; Polyethylene glycol

©The Author(s) 2024. Published by Baishideng Publishing Group Inc. All rights reserved.

Raisbidene® WJGE https://www.wjgnet.com

**Core Tip:** Constipation is a common medical problem, especially in the elderly population. Diagnosis of constipation includes history, physical examination, and basic laboratory analyses. Colonoscopy is not a necessary diagnostic method for all patients with constipation. It is indicated if alarm symptoms and signs are present. Colonoscopy in patients with constipation is often compromised by factors that cause "difficult colonoscopy," as well as poor bowel preparation. Colonoscopy under sedation is of great importance, but it cannot replace a good examination technique. If a total colonoscopy is not possible, it is necessary to repeat the examination or perform a virtual colonoscopy.

Citation: Popovic DD, Filipovic B. Constipation and colonoscopy. World J Gastrointest Endosc 2024; 16(5): 244-249 URL: https://www.wjgnet.com/1948-5190/full/v16/i5/244.htm DOI: https://dx.doi.org/10.4253/wjge.v16.i5.244

### INTRODUCTION

Constipation is a common problem in everyday medical practice. It has been described to affect 11%-20% of the adult population annually[1]. The prevalence of constipation increases with age[2]; moreover, it is estimated that about 50% of the population aged  $\geq$  80 years has constipation[2]. While there is no single definition, constipation is most often defined by less than three bowel movements per week[3,4]. Since there are different types of constipation (functional constipation, irritable bowel syndrome - C type, functional defecation disorders, etc.), there are also a variety of diagnostic criteria.

### COLONOSCOPY

Colonoscopy is the "gold standard" method for the exploration of the colon, and most often includes an examination of the terminal ileum. In addition to being a diagnostic method, colonoscopy is also a therapeutic method. Namely, it is possible to perform polypectomies, endoscopic mucosal resections, endoscopic submucosal dissections, endoscopic hemostasis, dilation and stenting of strictures, and endoscopic tattooing, etc. Colonoscopic treatment of precancerous lesions reduces mortality from colorectal cancer[5].

### Indications and contraindications for colonoscopy

For the colonoscopy to be performed adequately, in addition to good preparation and good examination technique, it is necessary to know the indications and contraindications for colonoscopy. Based on the recommendations of the American Society for Gastrointestinal Endoscopy (ASGE), gastrointestinal endoscopy (including colonoscopy) is performed if endoscopy findings will change the therapeutic approach, in the case that the attempt to treat a suspected benign disease has had no effect, and if endoscopy is the initial therapeutic modality or endoscopy is an alternative another (usually more invasive) method [6]. The most important fact is that endoscopy is performed only if its findings will change the therapeutic approach. Namely, if the findings of endoscopy have no effect on further treatment, its application only exposes the patient to risk (it must not be forgotten that this is an invasive method) and increases the cost of treatment without any benefit. Based on ASGE recommendations, the most important indications for colonoscopy are[6,7]: (1) Iron deficiency anemia; (2) Gastrointestinal bleeding; (3) Chronic diarrheal syndrome; (4) Early detection of colorectal neoplasia; (5) Evaluation of pathological findings diagnosed by another method (e.g., ultrasonography, contrast radiography, computed tomography (CT), nuclear magnetic resonance); and (6) Use of interventional endoscopic procedures.

In addition to the above, there are other indications for colonoscopy, but constipation is not included among them. Therefore, the question is whether colonoscopy is indicated for patients with constipation. For most patients with constipation, colonoscopy is not a necessary diagnostic method[8]. Namely, adequate diagnostics can be carried out with a detailed medical history, physical examination, and basic laboratory analyses. This is clear if we know that constipation is most often a consequence of functional disorders. Colonoscopy is indicated for patients who, in addition to constipation, have some of the alarm symptoms or signs. Alarm symptoms and signs may suggest the presence of serious organic diseases, and require a detailed examination. The most significant alarm symptoms/signs are[9-12]: (1) Age > 50 years; (2) Gastrointestinal bleeding; (3) New-onset constipation; (4) Palpable mass in the abdomen and rectum; (5) Weight loss; (6) Anemia; (7) Inflammatory bowel disease; and (8) Family history positive for colorectal neoplasia.

They are supported by the results of the published studies. Pepin and Ladabaum<sup>[13]</sup> conducted a study of 563 patients undergoing colonoscopy. They analyzed the colonoscopic findings of patients with constipation as the only indication for colonoscopy and patients with constipation and some other symptom/sign (most often an alarm one). Patients who have only constipation have a frequency of colorectal cancer at 0% and malignant polyps at 0.4% (n = 1)[6]. In the group of patients with constipation and some other indications for colonoscopy, the frequency of colorectal cancer is significantly higher at 2.4% (n = 8)[6]. Ratnasingham et al[14], in a total of 100 colonoscopies in patients with constipation, detected colon cancer in 1 patient, adenomas in 3, and hyperplastic polyps in 2. In that study, the frequency and reason for incomplete colonoscopy were analyzed. Colonoscopy was incomplete in 37% of cases[14]. The most common reasons were discomfort (51.4%) and poor bowel preparation (27%)[14]. A relatively high percentage of incomplete colonoscopies in that study can be explained by the heterogeneous structure of the endoscopists. Namely, endoscopies were performed

WJGE | https://www.wjgnet.com

by surgeons, gastroenterologists, specialist registrars, or specialist endoscopy nurse practitioners<sup>[14]</sup>.

#### "Difficult colonoscopy"

Most endoscopists do not like having constipated patients for colonoscopy. There are two reasons. Namely, based on the recommendations of the European Association for Gastrointestinal Endoscopy (ESGE), two important measures of endoscopy performance are the cecal intubation rate and the adequacy of preparation[15]. Based on these recommendations, a cecal intubation rate and adequate preparation should be  $\ge 90\%$  [15]. Due to the motility and bowel configuration in constipated patients, this is not always possible to achieve. A "difficult colonoscopy" is any colonoscopy in which the endoscopist has difficulty in achieving cecal intubation without significant effort or discomfort to the patient[16]. Factors associated with difficult colonoscopy are [17-20]: (1) Female sex; (2) Younger age or age  $\geq$  60 years; (3) Lower body mass index; (4) Constipation; (5) Diverticular disease; (6) Inflammatory bowel disease; (7) Previous abdominal or pelvic surgery (especially hysterectomy); (8) Anterior abdominal wall hernia; (9) Hypersensitivity to pain or anxiety; and (10) Colonoscopy in private practice.

In a study by Moon et al[21], it was proven that the predictors of "difficult colonoscopy," as assessed by the time required for cecum intubation, are female sex, body mass index that is higher or lower than the normal range, and the involvement of a fellow in the colonoscopy procedure. In this study, constipation did not significantly affect cecal intubation time. However, in a study by Anderson et al[22], it was concluded that constipation in men as well as the use of laxatives are predictors of "difficult colonoscopy." The opinion of the authors of this manuscript is that chronic constipation is associated with difficult colonoscopy. The main reason for a "difficult colonoscopy" is the formation of loops. There are different types of loops, such as N, alpha, reverse alpha, and gamma<sup>[23]</sup>. The most common colon segment for forming loops is the sigmoid colon. Since most parts of the colon are mobile, and patients with constipation may have an elongated colon, it is understandable why loops are more easily formed in it.

If loops are not detected and resolved in an adequate manner, perforation may occur. Perforation is a rare complication of colonoscopy, which is less common in diagnostic (0.019%-0.8%) than in therapeutic (0.1%-3%) colonoscopy [24]. It can occur as a result of mechanical trauma, barotrauma, and use of electrosurgery, as well as other miscellaneous reasons[2]. The most common localization of perforation is the rectosigmoid colon (53%), followed by the cecum (24%)[2].

The effect of deep sedation on the risk of colonic perforation is quite controversial [25]. In a study by Adeyemo *et al* [26], among a sample of 118,004 colonoscopies, it was concluded that the use of propofol was associated with an increased risk of colonic perforation. However, Bielawska et al[27], among a sample of 3059045 colonoscopies, did not find an increased risk of perforation if the colonoscopy was performed under anesthesia. The author of this Manuscript (Dusan Dj Popovic) prefers colonoscopy without sedation, including for the group of patients with constipation. A colonoscopy without anesthesia provides better feedback (e.g., bloating, pain), allows more frequent changes in the patient's position, and perhaps most importantly, allows conversation with the patient during the procedure. Pre- and intra-procedural conversation with the patient make the procedure much easier. Of course, anesthesia is very important in certain groups of patients, especially if they have predictors of "difficult colonoscopy," but it cannot be a substitute for good and careful colonoscopy technique. To make the colonoscopy procedure easier, good examination technique is essential. Good colonoscopy technique implies adequate psychological preparation of the patient, careful insertion of the endoscope with minimal air insufflation, and early detection and resolution of loops.

### **Bowel preparation**

For a colonoscopy to be performed properly, in addition to an adequate indication, an experienced colonoscopist and good bowel preparation are also necessary. Some of the predictors of poor bowel preparation for colonoscopy, in addition to chronic constipation, are male sex, inpatient colonoscopy, some diseases (stroke, dementia, liver cirrhosis), use of tricyclic antidepressants, non-compliance with preparation instructions, etc. [28,29]. Poor bowel preparation reduces the performance of colonoscopy, primarily reducing the adenoma detection rate, as well as increasing the risk of complications.

The quality of bowel preparation can be assessed using different, validated scales. The most commonly used one is the Boston Bowel Preparation Scale (BBPS) (Figure 1). Based on this scale, the preparation is scored in the range of 0-3, where a score of 0 represents an unprepared bowel and a score of 3 a clean bowel[30]. The score is determined for each segment of the colon (right colon, transverse, and left colon). The sum is the total BBPS score. The preparation is adequate if the BBPS is  $\geq 6[31]$ .

To improve preparation for colonoscopy, ESGE recommends the use of improved preparation guidelines[32]. In the study by Wang et al[33], it was concluded that the use of medication guidance and targeted educational guidance leads to a significant improvement in the quality of bowel preparation and reduces the frequency of side effects in patients with constipation.

Different agents can be used for bowel preparation: High-volume polyethylene glycol (PEG) preparations, low-volume PEG preparations, and non-PEG-based preparations (sodium picosulfate, magnesium citrate, trisulfate, etc.)[32]. The most commonly used agent for colonoscopy preparation is PEG. PEG works as an osmotic laxative. Since it is minimally absorbed in the colon, it osmotically attracts water into the lumen, thus softening the stool and stimulating peristalsis[34].

Based on the recommendations of the ESGE, it is recommended to use the preparation in a split dose, which means that half of the amount of the preparation is taken the day before the examination and the other half on the day of the examination[32]. If the colonoscopy is scheduled for the afternoon, the entire amount of preparation can be taken on the day of the examination [32]. For better bowel preparation, it is advised that the day before the colonoscopy, patients consume food with less than 10 g fiber, and the use of simethicone is also recommended[32]. The use of other preparations as well as the routine use of enemas is not recommended [32]. It is an interesting fact that ESGE does not have specific recommendations for the preparation of patients with constipation, although it is known that this group of



WJGE | https://www.wjgnet.com



Figure 1 The quality of bowel preparation was assessed using the Boston bowel preparation scale. A: The quality of bowel preparation as assessed by the Boston bowel preparation scale (BBPS) is score 3; B: BBPS score 2; C: BBPS score 1; D: BBPS score 0.

patients is the most difficult to prepare for colonoscopy[32].

In a meta-analysis conducted by Dang *et al*[28], it was concluded that the administration of sodium phosphate (NaP) is superior to PEG in the preparation of patients with constipation [odds ratio (OR) 1.87, 95%CI 1.06–3.32, P = 0.003]. As the authors of that meta-analysis apostrophized, further studies are necessary in which the diagnosis of constipation would be standardized and in which the NaP would be standardized to more accurately assess the effectiveness of both treatments[28]. It would be interesting to see the impact of the combined application of these preparations.

Improvement of bowel preparation in patients with constipation can also be achieved by adding different laxatives to the standard preparation (*e.g.*, bisacodyl, lactulose, lubiprostone)[29]. If laxatives (bisacodyl, lactulose, senna), prokinetics (mosapride), or probiotics are added to the standard preparation (PEG or NaP), the quality of the bowel preparation improves (OR 2.19, 95%CI 1.16–4.17; P = 0.02)[35]. Although there are no current recommendations for the preparation of patients with constipation, in daily practice, prolonged preparation (usually 2 d), counseling of increased fluid intake, and sometimes the addition of bisacodyl to the preparation, are most often used. A case has been described where adequate preparation required 5 d of a clear liquid diet and 5 gallons of PEG[19]. However, each patient with constipation needs an individual approach.

### Incomplete initial colonoscopy

Sometimes, despite all preparation measures and adequate examination techniques, it is not possible to perform a total colonoscopy in all patients with constipation. According to the author of the Manuscript (Dusan Dj Popovic), two approaches are rational in that case. One is to repeat the colonoscopy under anesthesia, the next day, by the same or a more experienced endoscopist, and the other is to refer the patient directly to a virtual colonoscopy. It would be ideal to perform CT colonography on the same day to avoid re-preparation of the patient for the examination. Ratnasingham *et al* [14] described that only one colorectal cancer was detected in a sample of 100 patients with constipation and that the method was successful in all patients. Based on these results, the authors suggest that CT colonography may be an acceptable first-line method in constipated patients.

Which of these two approaches will be chosen depends on several factors: General condition of the patient and comorbidities, availability of methods, and personnel, *etc.* However, if there is a clinical suspicion of the existence of an organic cause of constipation in the proximal, unexamined parts of the colon, it is always best to try the colonoscopy again. What must always be kept in mind is that CT colonography is associated with exposure to a significant dose of radiation and does not allow for the application of interventional procedures.

Raishideng® WJGE https://www.wjgnet.com

### CONCLUSION

Constipation is a significant sociomedical problem, which can be caused by various reasons. A colonoscopy is not a necessary diagnostic method for all patients with constipation. It is indicated if alarm symptoms and signs are present. Most endoscopists do not like to deal with patients with constipation. There are two reasons: The difficulty of endoscopy and the adequacy of preparation. If a total colonoscopy is not possible, it is necessary to repeat the examination or perform a virtual colonoscopy.

### FOOTNOTES

Author contributions: Popovic DD and Filipovic B contributed to this paper; Popovic DD designed the overall concept and outline of the manuscript; Popovic DD and Filipovic B contributed to the acquisition, analysis, and interpretation of the data; Popovic DD drafted the article; Popovic DD and Filipovic B made critical revisions related to important intellectual content of the manuscript; All approved the final version of the article.

Supported by the Ministry of Science, Technological Development and Innovations, Republic of Serbia, No. 451-03-66/2024-03/200110.

Conflict-of-interest statement: Dr. Popovic reports grants from Ministry of Science, Technological Development and Innovations, Republic of Serbia, during the conduct of the study.

**Open-Access:** This article is an open-access article that was selected by an in-house editor and fully peer-reviewed by external reviewers. It is distributed in accordance with the Creative Commons Attribution NonCommercial (CC BY-NC 4.0) license, which permits others to distribute, remix, adapt, build upon this work non-commercially, and license their derivative works on different terms, provided the original work is properly cited and the use is non-commercial. See: https://creativecommons.org/Licenses/by-nc/4.0/

Country of origin: Serbia

ORCID number: Dusan Dj Popovic 0000-0002-5912-0360.

S-Editor: Li L L-Editor: A P-Editor: Cai YX

### REFERENCES

- Schiller LR. Chronic constipation: new insights, better outcomes? Lancet Gastroenterol Hepatol 2019; 4: 873-882 [PMID: 31609241 DOI: 1 10.1016/S2468-1253(19)30199-2]
- 2 Rai V, Mishra N. Colonoscopic Perforations. Clin Colon Rectal Surg 2018; 31: 41-46 [PMID: 29379407 DOI: 10.1055/s-0037-1602179]
- Barbara G, Barbaro MR, Marasco G, Cremon C. Chronic constipation: from pathophysiology to management. Minerva Gastroenterol 3 (Torino) 2023; 69: 277-290 [PMID: 36727654 DOI: 10.23736/S2724-5985.22.03335-6]
- 4 Mearin F, Lacy BE, Chang L, Chey WD, Lembo AJ, Simren M, Spiller R. Bowel Disorders. Gastroenterology 2016 [PMID: 27144627 DOI: 10.1053/j.gastro.2016.02.031]
- Zauber AG, Winawer SJ, O'Brien MJ, Lansdorp-Vogelaar I, van Ballegooijen M, Hankey BF, Shi W, Bond JH, Schapiro M, Panish JF, 5 Stewart ET, Waye JD. Colonoscopic polypectomy and long-term prevention of colorectal-cancer deaths. N Engl J Med 2012; 366: 687-696 [PMID: 22356322 DOI: 10.1056/NEJMoa1100370]
- Early DS, Ben-Menachem T, Decker GA, Evans JA, Fanelli RD, Fisher DA, Fukami N, Hwang JH, Jain R, Jue TL, Khan KM, Malpas PM, 6 Maple JT, Sharaf RS, Dominitz JA, Cash BD; ASGE Standards of Practice Committee. Appropriate use of GI endoscopy. Gastrointest Endosc 2012; 75: 1127-1131 [PMID: 22624807 DOI: 10.1016/j.gie.2012.01.011]
- Popović D. Gastroenterološki pristup krvarenju iz digestivnog trakta. Beograd: Medicinski fakultet Univerziteta u Beogradu CIBID, 2022: 25-7 27
- 8 Black CJ, Ford AC. Chronic idiopathic constipation in adults: epidemiology, pathophysiology, diagnosis and clinical management. Med J Aust 2018; 209: 86-91 [PMID: 29996755 DOI: 10.5694/mja18.00241]
- Milosavljevic T, Popovic DD, Mijac DD, Milovanovic T, Krstic S, Krstic MN. Chronic Constipation: Gastroenterohepatologist's Approach. 9 Dig Dis 2022; 40: 175-180 [PMID: 33946065 DOI: 10.1159/000516976]
- 10 Brandt LJ, Prather CM, Quiglev EM, Schiller LR, Schoenfeld P, Tallev NJ. Systematic review on the management of chronic constipation in North America. Am J Gastroenterol 2005; 100 Suppl 1: S5-S21 [PMID: 16008641 DOI: 10.1111/j.1572-0241.2005.50613 2.x]
- Cho YS, Lee YJ, Shin JE, Jung HK, Park SY, Kang SJ, Song KH, Kim JW, Lim HC, Park HS, Kim SJ, Cha RR, Bang KB, Bang CS, Yim SK, 11 Ryoo SB, Kye BH, Ji WB, Choi M, Sung IK, Choi SC; Korean Society of Neurogastroenterology and Motility. 2022 Seoul Consensus on Clinical Practice Guidelines for Functional Constipation. J Neurogastroenterol Motil 2023; 29: 271-305 [PMID: 37417257 DOI: 10.5056/jnm23066]
- 12 Sadler K, Arnold F, Dean S. Chronic Constipation in Adults. Am Fam Physician 2022; 106: 299-306 [PMID: 36126011]
- Pepin C, Ladabaum U. The yield of lower endoscopy in patients with constipation: survey of a university hospital, a public county hospital, 13 and a Veterans Administration medical center. Gastrointest Endosc 2002; 56: 325-332 [PMID: 12196767 DOI: 10.1016/s0016-5107(02)70033-3]



- Ratnasingham K, Lo T, Jamal K, Varatharajan L, Tabbakh Y, Kaderbhai H, West NJ. The role of colonoscopy and CT colonography in 14 patients presenting with symptoms of constipation. Br J Radiol 2017; 90: 20160147 [PMID: 28256902 DOI: 10.1259/bjr.20160147]
- Kaminski MF, Thomas-Gibson S, Bugajski M, Bretthauer M, Rees CJ, Dekker E, Hoff G, Jover R, Suchanek S, Ferlitsch M, Anderson J, 15 Roesch T, Hultcranz R, Racz I, Kuipers EJ, Garborg K, East JE, Rupinski M, Seip B, Bennett C, Senore C, Minozzi S, Bisschops R, Domagk D, Valori R, Spada C, Hassan C, Dinis-Ribeiro M, Rutter MD. Performance measures for lower gastrointestinal endoscopy: a European Society of Gastrointestinal Endoscopy (ESGE) Quality Improvement Initiative. Endoscopy 2017; 49: 378-397 [PMID: 28268235 DOI: 10.1055/s-0043-103411]
- Watson RR. Accessing a Difficult Colon. Gastroenterol Hepatol (N Y) 2021; 17: 79-81 [PMID: 34035768] 16
- Wei MT, Friedland S. Strategies to manage the difficult colonoscopy. World J Gastrointest Endosc 2023; 15: 491-495 [PMID: 37547242 DOI: 17 10.4253/wjge.v15.i7.491]
- 18 Shah HA, Paszat LF, Saskin R, Stukel TA, Rabeneck L. Factors associated with incomplete colonoscopy: a population-based study. Gastroenterology 2007; 132: 2297-2303 [PMID: 17570204 DOI: 10.1053/j.gastro.2007.03.032]
- 19 Rex DK. How I Approach Colonoscopy in Anatomically Difficult Colons. Am J Gastroenterol 2020; 115: 151-154 [PMID: 31809298 DOI: 10.14309/ajg.00000000000004811
- Takahashi Y, Tanaka H, Kinjo M, Sakumoto K. Prospective evaluation of factors predicting difficulty and pain during sedation-free 20 colonoscopy. Dis Colon Rectum 2005; 48: 1295-1300 [PMID: 15793639 DOI: 10.1007/s10350-004-0940-1]
- Moon SY, Kim BC, Sohn DK, Han KS, Kim B, Hong CW, Park BJ, Ryu KH, Nam JH. Predictors for difficult cecal insertion in colonoscopy: 21 The impact of obesity indices. World J Gastroenterol 2017; 23: 2346-2354 [PMID: 28428714 DOI: 10.3748/wjg.v23.i13.2346]
- Anderson JC, Messina CR, Cohn W, Gottfried E, Ingber S, Bernstein G, Coman E, Polito J. Factors predictive of difficult colonoscopy. 22 Gastrointest Endosc 2001; 54: 558-562 [PMID: 11677470 DOI: 10.1067/mge.2001.118950]
- Roberts-Thomson IC, Teo E. Colonoscopy: Art or science? J Gastroenterol Hepatol 2009; 24: 180-184 [PMID: 19215330 DOI: 23 10.1111/j.1440-1746.2008.05739.x]
- Cai SL, Chen T, Yao LQ, Zhong YS. Management of iatrogenic colorectal perforation: From surgery to endoscopy. World J Gastrointest 24 Endosc 2015; 7: 819-823 [PMID: 26191347 DOI: 10.4253/wjge.v7.i8.819]
- 25 Sidhu R, Turnbull D, Haboubi H, Leeds JS, Healey C, Hebbar S, Collins P, Jones W, Peerally MF, Brogden S, Neilson LJ, Nayar M, Gath J, Foulkes G, Trudgill NJ, Penman I. British Society of Gastroenterology guidelines on sedation in gastrointestinal endoscopy. Gut 2024; 73: 219-245 [PMID: 37816587 DOI: 10.1136/gutjnl-2023-330396]
- Adeyemo A, Bannazadeh M, Riggs T, Shellnut J, Barkel D, Wasvary H. Does sedation type affect colonoscopy perforation rates? Dis Colon 26 *Rectum* 2014; **57**: 110-114 [PMID: 24316954 DOI: 10.1097/DCR.0000000000000002]
- Bielawska B, Hookey LC, Sutradhar R, Whitehead M, Xu J, Paszat LF, Rabeneck L, Tinmouth J. Anesthesia Assistance in Outpatient 27 Colonoscopy and Risk of Aspiration Pneumonia, Bowel Perforation, and Splenic Injury. Gastroenterology 2018; 154: 77-85.e3 [PMID: 28865733 DOI: 10.1053/j.gastro.2017.08.043]
- Dang JT, Moolla M, Dang TT, Shaw A, Tian C, Karmali S, Sultanian R. Sodium phosphate is superior to polyethylene glycol in constipated 28 patients undergoing colonoscopy: a systematic review and meta-analysis. Surg Endosc 2021; 35: 900-909 [PMID: 32124060 DOI: 10.1007/s00464-020-07464-0]
- 29 Shahini E, Sinagra E, Vitello A, Ranaldo R, Contaldo A, Facciorusso A, Maida M. Factors affecting the quality of bowel preparation for colonoscopy in hard-to-prepare patients: Evidence from the literature. World J Gastroenterol 2023; 29: 1685-1707 [PMID: 37077514 DOI: 10.3748/wjg.v29.i11.1685]
- Lai EJ, Calderwood AH, Doros G, Fix OK, Jacobson BC. The Boston bowel preparation scale: a valid and reliable instrument for 30 colonoscopy-oriented research. Gastrointest Endosc 2009; 69: 620-625 [PMID: 19136102 DOI: 10.1016/j.gie.2008.05.057]
- Kaminski MF, Thomas-Gibson S, Bugajski M, Bretthauer M, Rees CJ, Dekker E, Hoff G, Jover R, Suchanek S, Ferlitsch M, Anderson J, 31 Roesch T, Hultcranz R, Racz I, Kuipers EJ, Garborg K, East JE, Rupinski M, Seip B, Bennett C, Senore C, Minozzi S, Bisschops R, Domagk D, Valori R, Spada C, Hassan C, Dinis-Ribeiro M, Rutter MD. Performance measures for lower gastrointestinal endoscopy: a European Society of Gastrointestinal Endoscopy (ESGE) quality improvement initiative. United European Gastroenterol J 2017; 5: 309-334 [PMID: 28507745 DOI: 10.1177/2050640617700014]
- Hassan C, East J, Radaelli F, Spada C, Benamouzig R, Bisschops R, Bretthauer M, Dekker E, Dinis-Ribeiro M, Ferlitsch M, Fuccio L, Awadie 32 H, Gralnek I, Jover R, Kaminski MF, Pellisé M, Triantafyllou K, Vanella G, Mangas-Sanjuan C, Frazzoni L, Van Hooft JE, Dumonceau JM. Bowel preparation for colonoscopy: European Society of Gastrointestinal Endoscopy (ESGE) Guideline - Update 2019. Endoscopy 2019; 51: 775-794 [PMID: 31295746 DOI: 10.1055/a-0959-0505]
- Wang H, Wang Y, Yuan JH, Wang XY, Ren WX. Pre-colonoscopy special guidance and education on intestinal cleaning and examination in 33 older adult patients with constipation. World J Gastrointest Surg 2022; 14: 778-787 [PMID: 36157373 DOI: 10.4240/wjgs.v14.i8.778]
- Izzy M, Malieckal A, Little E, Anand S. Review of efficacy and safety of laxatives use in geriatrics. World J Gastrointest Pharmacol Ther 34 2016; 7: 334-342 [PMID: 27158549 DOI: 10.4292/wjgpt.v7.i2.334]
- Ding L, Duan J, Yang T, Jin C, Luo J, Ma A. Advanced intestinal regulation improves bowel preparation quality in patients with constipation: 35 A systematic review and network meta-analysis. Front Pharmacol 2022; 13: 964915 [PMID: 36761469 DOI: 10.3389/fphar.2022.964915]



WJGE | https://www.wjgnet.com



### Published by Baishideng Publishing Group Inc 7041 Koll Center Parkway, Suite 160, Pleasanton, CA 94566, USA Telephone: +1-925-3991568 E-mail: office@baishideng.com Help Desk: https://www.f6publishing.com/helpdesk https://www.wjgnet.com

