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Effect of Inadequate Bowel Preparation on Urgent Colonoscopy in Patients with Post-Polypectomy Bleeding (PPB): A Descriptive Study

Jian Chen[1,a], Zhihao Kang[1,b], Weiyun Shi[2,c,*], Zhixin Zhang[2,d,*]

[1]Xiang Shan Red Cross Taiwan Compatrion Hospital Medical and Health Group, Ningbo, 315000, China
[2]Department of Gastroenterology, The First Affiliated Hospital of Ningbo University, Ningbo, 315000, China
[a]chenjian704548687@qq.com, [b]13736197559@163.com, [c]442517809@qq.com, [d]125984355@qq.com
**Corresponding authors*

Abstract: *Post-polypectomy bleeding (PPB) is the most common complication of colonoscopy. The purpose of this study was to explore the effect of inadequate bowel preparation on urgent colonoscopy in patients with PPB.In this retrospective, single-centre study, we enrolled PPB patients who underwent urgent colonoscopy at a university-affiliated hospital from 2010 to 2020 and assessed the outcome indicators of interest (diagnostic rate, ileocaecal intubation, repeated colonoscopy, endoscopic therapy, success rate of treatment) and clinical outcomes (surgery, transfusion requirement, length of stay (d), cost ($)).Of the 34 included patients with PPB, 29 were males and 5 were females. The mean age of the patients was 56.7±9.7 years, and 19 patients (55.9%) had chronic diseases; 6 patients in the sample were treated with enema for bowel preparation, and 28 patients were prepared with endoscopic irrigation. In all patients, the source of bleeding was found by endoscopy, endoscopic treatment was provided, and the bleeding was successfully stopped.Our study showed that, for patients with PPB, inadequate bowel preparation might not compromise the effectiveness of urgent colonoscopy, and the hospitalization cost was low.*

Keywords: *Post-polypectomy bleeding; Urgent colonoscopy; Bowel preparation; Bowel cleanliness*

1. Introduction

Based on the 2020 global cancer statistics, colorectal cancer exhibits an incidence rate of 10%, positioning it as the third most prevalent cancer worldwide. Furthermore, its mortality rate of 9.4% places it second only to lung cancer, establishing it as the second primary contributor to cancer-related fatalities[1]. Colonic polyps are known precursors to colon cancer [2]. Colonoscopy is the most effective tool for detecting colorectal cancers and colorectal polyps [3]. Although colonoscopy is now a mature technology, complications such as bleeding or perforation may also occur. Post-polypectomy bleeding (PPB) is the most common complication of colonoscopy, occurring in 1% of patients [4].

PPB is classified into immediate PPB, which occurs during the procedure, and delayed PPB, which occurs after the process. Delayed PPB may be more severe than immediate PPB due to the unpredictability of the former. Some studies have shown that delayed PPB occurs in approximately 2% of all colonic polypectomies[5]. For persistent bleeding, many studies have shown that urgent colonoscopy performed within 12–24 hours after admission is safe and may be helpful in identifying and treating bleeding lesions and reducing the length of stay. [6-8]. The guidelines recommend adequate bowel preparation for patients undergoing repeated colonoscopy [9], and inadequate bowel preparation can significantly impair the ability of colonoscopy to recognize lesions and locate bleeding sites, especially for diverticulosis and angiomas [10,11]. However, it is not clear whether adequate bowel preparation is necessary for patients with PPB.

The purpose of this study was to explore the effect of inadequate bowel preparation on repeated colonoscopy in patients with PPB.

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2. Methods

2.1 Study design and participants

This retrospective descriptive observational study was conducted at The First Affiliated Hospital of Ningbo University from 2010 to 2020. The inclusion criteria were as follows: 1) patients with bleeding after polypectomy, 2) patients treated with colonoscopy within 24 hours after bleeding, and 3) patients who did not receive adequate bowel preparation (oral laxatives). We excluded seven patients whose main outcome indicators were not clearly described and two patients whose baseline characteristics were missing. Ultimately, a total of 34 patients were included in this analysis (figure 1). The trial complied with the Declaration of Helsinki, and the study protocol was reviewed and approved by the Ningbo First Hospital Ethics Committee. We did not obtain informed consent from every individual patient because of the retrospective observational design of the study. The study was registered at Clinical Trials.gov (NCT 04468737) on 07/11/2020.

Delayed PPB is defined as bleeding within 1 to 21 days after colonoscopic polypectomy[12]. All patients who met this criterion were enrolled in the study. The following data were collected: electronic medical records (sex, age, height, body weight, chronic medical illness and history of abdominal surgery), outcome indicators of interest (diagnostic rate, ileocecal intubation, repeated colonoscopy, endoscopic therapy, the success rate of treatment) and clinical outcomes (surgery, transfusion requirement, lengths of stay (d), cost ($)). All data were verified by two independent researchers.

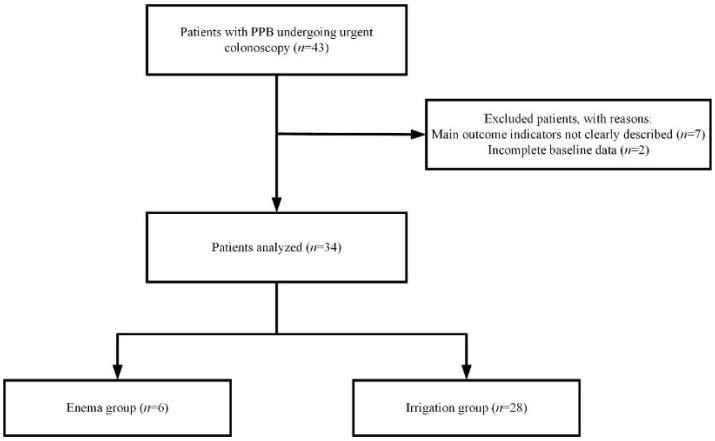

Figure 1: Flow chart of patient selection.

2.2 Statistical Analysis

Continuous variables were expressed as the mean and standard deviation or median and interquartile range (IQR) as appropriate and were compared using Student's t-test or the Mann–Whitney U test. Categorical variables were expressed as numbers and percentages, and the chi-squared test or Fisher's exact probability method was used for. $P < 0.05$ were taken to indicate statistical significance. Statistical analysis was carried out using SPSS version 21 (SPSS, Chicago, IL, USA).

3. Results

A total of 34 patients were included in this study. There were 29 (85.3%) males and 5 (14.7%) females with a mean age of 56.7±9.7 years (table 1). Nineteen (55.9%) patients had chronic diseases, including hypertension, diabetes, heart disease, haemophilia and others. Eight patients had a history of abdominal surgery. None of the patients had adequate bowel preparation. Six patients were prepared by enema, and 28 patients were prepared by endoscopic irrigation (without bowel preparation, use saline to properly flush through the lumen of the endoscope). After the first colonoscopy, most of the patients recovered and were discharged to their homes, and only three patients needed a second colonoscopy.

The origin of the bleeding was identified in every patient included in the study, for a diagnostic rate of 100%. A total of 19 (55.9%) haemorrhagic foci in the left colon. The ileocaecal intubation rate of the enema group was 16.7%, and the ileocaecal intubation rate of the irrigation group was 57.1%. The total ileocaecal intubation rate was 50.0%. There was no significant difference between the two groups (P =

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0.175). All cases but one had a clip placed on the resection site, which may helped re-locating it. The majority of cases (97.1%) had single resections. Only three patients in the irrigation group needed secondary colonoscopy to stop the bleeding; the total rate of secondary enteroscopy was 8.8%. The rate of endoscopic therapy and the success rate of therapy were 100% (table 2).

None of the patients needed surgery. Three patients required blood transfusions, and one case was complicated with haemophilia. The median lengths of stay were 7.5 days (quartiles, 6.0–13.0) and 7.5 days (quartiles, 5.6–10.5) in the irrigation and enema groups, respectively. There was no significant difference in length of stay between the two groups (P = 0.586). The mean treatment cost of the irrigation group was 1585.3±1402.4 dollars, and that of the enema group was 1206.3±516.8 dollars; the overall median cost was 1518.4±1292.7 dollars. There was no significant cost difference between the two groups (P = 0.523) (table 3). In our study, there were no other adverse reactions, such as perforation.

Table 1: Baseline characteristics of the study participants.

Parameter	Total	Enema (*n* = 6)	Irrigation (*n* = 28)	*P*-value
Age, mean ± SD, y	56.7 ± 9.7	57.8 ± 4.0	56.5 ± 10.6	0.759[a]
Sex, *n* (%)				
Male	29 (85.3)	4(66.7)	25(89.3)	0.205[b]
Female	5 (14.7)	2(33.3)	3(10.7)	
Height, mean ± SD, cm	168.1 ± 6.7	169.3 ± 8.5	167.9 ± 6.3	0.630[a]
Weight, mean ± SD, kg	66.2 ± 11.5	68.1 ± 10.2	65.8 ± 11.9	0.663[a]
BMI, mean ± SD, kg/m^2	23.3 ± 3.4	23.6 ± 2.1	23.3 ± 3.6	0.805[a]
Chronic medical illness, n (%)	19 (55.9)	3 (50.0)	16 (57.1)	1.000[b]
Hypertension	14 (41.2)	3(50)	11(39.3)	0.672[b]
Diabetes	3 (8.8)	0(0.0)	3(10.7)	/
Inflammatory bowel disease	0 (0.0)	0(0.0)	0(0.0)	/
Haemophilia	1 (2.9)	0(0.0)	1(3.6)	/
Heart disease	4 (11.8)	0(0.0)	4(14.3)	/
Other	4 (11.8)	0(0.0)	4(14.3)	/
History of abdominal surgery, n (%)	8 (23.5)	0(0.0)	8(28.6)	/
Appendicitis	5 (14.7)	0(0.0)	5(17.9)	/
Colon surgery	1 (2.9)	0(0.0)	1(3.6)	/
Gynaecological surgery	1 (2.9)	0(0.0)	1(3.6)	/
Hernia surgery	1 (2.9)	0(0.0)	1(3.6)	/

[a] Two-sample t-test; [b] Fisher‘s exact probability method

Table 2: Comparison of endoscopic outcomes between the enema group and the irrigation group

Group	Total	Enema (*n* = 6)	Irrigation (*n* = 28)	*P*-value
Diagnostic rate, n (%)	34 (100)	6 (100.0)	28 (100.0)	/
Ileocaecal intubation, n (%)	17(50.0)	1 (16.7)	16 (57.1)	0.175[b]
Repeated colonoscopy, n (%)	3 (8.8)	0 (0)	3 (10.7)	/
Endoscopic therapy, n (%)	34 (100.0)	6 (100.0)	28 (100.0)	/
Success rate of therapy, n (%)	34 (100.0)	6 (100.0)	28 (100.0)	/
Location, n (%)				
Proximal colon	15(44.1)	2(33.3)	13(46.4)	0.672 [b]
Cecum	0(0.0)	0(0.0)	0(0.0)	/
Ascending	6(17.6)	0(0.0)	6(21.4)	/
Transverse	9(26.5)	2(33.3)	7(25.0)	0.644[b]
Left colon	19(55.9)	4(66.7)	15(53.6)	0.672 [b]
Descending	0(0.0)	0(0.0)	0(0.0)	/
Sigmoid	8(23.5)	3(50.0)	5(17.9)	0.126[b]
Rectum	11(32.4)	1(16.7)	10(35.7)	0.638[b]
Prophylactic clipping, n (%)				
Yes	33(97.1)	6(100.0)	27(96.4)	1.000
No	1(2.9)	0(0.0)	1(3.6)	
Single resections, n (%)				
Yes	31(91.2)	6(100.0)	25(89.3)	1.000
No	3(8.8)	0(0.0)	3(10.7)	

[b] Fisher‘s exact probability method

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Table 3: Comparison of clinical outcomes between the enema group and the irrigation group

Group	Total (n = 34)	Enema (n = 6)	Irrigation (n = 28)	P-value*
Surgery, n (%)	0 (0.00%)	0 (0.00%)	0 (0.00%)	/
Transfusion requirement, n (%)	3 (8.8%)	0 (0.00%)	3 (10.7%)	/
Length of stay, median (quartiles), d	7.5 (6.0-12.3)	7.5 (5.6-10.5)	7.5 (6.0-13.0)	0.586[c]
Cost, mean (SD), $	1518.4 ±1292.7	1206.3±516.8	1585.3 ±1402.4	0.523[a]

[a]Two-sample t-test; [c] Mann–Whitney's U-test.

4. Discussion

This is a retrospective descriptive study to explore whether adequate bowel preparation is needed for repeated colonoscopy in patients with PPB. We reported retrospective data from 34 patients with PPB in a university-affiliated hospital in eastern China. In our study of patients with PPB, the rate of localization of the bleeding source was 100%, and endoscopic therapy success was also achieved in all 34 even if the bowel preparation was inadequate. This study noted a shorter hospitalization time and a lower treatment cost than other studies [13].

The usual bowel preparation process requires oral polyethylene glycol electrolyte solution or nasogastric tube irrigation, but because of the aversive taste, patients are highly prone to nausea and vomiting in the process; additionally, the preparation takes longer than an enema or irrigation[14]. Nasogastric tube insertion is one of the most uncomfortable bedside procedures, and the patient's score of discomfort is similar to that of fracture reduction or abscess drainage[15]. Although the methods of bowel preparation in our study may not be adequate, patients suffer less and are more receptive. In a study by Jing LI et al. [13], the median duration of hospitalization of patients with urgent colonoscopy was ten days, and the average hospital stay reported by Naoyoshi Nagata et al. [16] was 10.3 days, both of which are longer than what was observed in our study. According to the current guidelines, a colonoscopy should be performed after adequate bowel preparation for haemodynamically stable patients [9,17]. Our research shows that simple endoscopic irrigation or moderate enema is sufficient for patients with PPB while causing less suffering and taking less time than conventional preparation. To the best of our knowledge, few studies to date have focused on or even discussed the most appropriate and evidence-based pre-procedural preparation for this set of patients. Thus, our study provides an efficient and sufficient solution. It is hoped that our study can provide a reference for bowel preparation in patients with PPB.

A meta-analysis [18] of 12 studies on urgent colonoscopy found an 88.6% localization rate of the bleeding source and a rate of endoscopic treatment rate was 34.0%. In our research, however, both of these indicators were 100%. There are several possible reasons for this difference. First, in all but one of the patients in our study, a clip was used after the first colonoscopy to prevent bleeding; the clip acted as a marker, which made it easier for operators to identify the source of the bleeding. Second, in our study, most of the bleeding patients had had only one polyp removed, which made it easier to locate the source of the bleeding, and the previous colonoscopy provided a reference for the doctors who later stopped the bleeding.

In contrast to previous studies, our study had a low ileocaecal intubation rate, but it did not seem to affect the rate of diagnosis or the success rate of treatment. In a study by Jing LI et al. [13], the ileocaecal intubation rate in urgent colonoscopy was 66.9%, compared with 50.0% in our study. One potential reason may be the different habits of individual endoscopists; some endoscopists did not enter the caecum after finding the source of the bleeding. In our study, three patients needed secondary colonoscopy to stop bleeding, and one of them had haemophilia; in all cases, the bleeding was successfully stopped without adequate bowel preparation, which saved a considerable amount of time for the patients. This may suggests that inadequate bowel preparation may be viable for such patients.

This study has some limitations. First, this was a retrospective, single-centre study, and the sample size was relatively small; as a result, the effect estimates were imprecise. We were unable to collect data such as the cleanliness of each intestinal segment from electronic medical records; therefore, large-scale clinical trials need to be performed to verify the generalizability of the present conclusion. Second, compared with other studies, our study had a low ileocaecal intubation rate; however, this discrepancy did not seem to affect our diagnosis rate or the effectiveness of treatment. Third, our study merely found that the treatment of post-polypectomy bleeding may not require adequate bowel preparation; our conclusion cannot be extended to lower gastrointestinal bleeding with other aetiologies. Fourth, the most resection sites were marked with a clip to facilitate their re-location, it could have had an influence on

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the study results, however, this is precisely the characteristic of PPB patients.

In summary, our study examined the need for adequate bowel preparation in patients with PPB when they underwent repeat endoscopic treatment. Our results showed that urgent colonoscopy in patients with PPB was effective, the hospitalization time was short, and the cost was low even if the bowel preparation was abbreviated. However, further prospective randomized studies with larger sample sizes are needed to confirm this finding.

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References

[1] Sung H, Ferlay J, Siegel RL, Laversanne M, Soerjomataram I, Jemal A, et al. Global Cancer Statistics 2020: GLOBOCAN Estimates of Incidence and Mortality Worldwide for 36 Cancers in 185 Countries. CA Cancer J Clin 2021; 71 (3):209-249.
[2] T M, HJ B, BC M. The evolution of cancer of the colon and rectum. Cancer 1975; 36 (6):2251-2270.
[3] DA L, JL W, JL H, CD M, JR L, GM E, et al. Colonoscopy utilization and outcomes 2000 to 2011. Gastrointestinal endoscopy 2014; 80 (1):133-143.
[4] W H, M D, T R, A M, G S, J H, et al. The Munich Polypectomy Study (MUPS): prospective analysis of complications and risk factors in 4000 colonic snare polypectomies. Endoscopy 2005; 37 (11):1116-1122.
[5] Fatima H, Rex DK. Minimizing Endoscopic Complications: Colonoscopic Polypectomy. Gastrointestinal Endoscopy Clinics of North America 2007; 17 (1):145-156.
[6] BT G, DC R, G P, PR T, S G, MS B, et al. Urgent colonoscopy for evaluation and management of acute lower gastrointestinal hemorrhage: a randomized controlled trial. The American journal of gastroenterology 2005; 100 (11):2395-2402.
[7] DM J, GA M, R J, TO K. Urgent colonoscopy for the diagnosis and treatment of severe diverticular hemorrhage. The New England journal of medicine 2000; 342 (2):78-82.
[8] M W, T N, M K, Y H, S K, H M, et al. Colonic diverticular bleeding and predictors of the length of hospitalization: An observational study. Journal of gastroenterology and hepatology 2019; 34 (8):1351-1356.
[9] Ferlitsch M, Moss A, Hassan C, Bhandari P, Dumonceau JM, Paspatis G, et al. Colorectal polypectomy and endoscopic mucosal resection (EMR): European Society of Gastrointestinal Endoscopy (ESGE) Clinical Guideline. Endoscopy 2017; 49 (3):270-297.
[10] DM J. What to choose for diagnosis of bleeding colonic angiomas: colonoscopy, angiography, or helical computed tomography angiography? Gastroenterology 2000; 119 (2):581-584.
[11] Jensen DM. Diverticular bleeding: An appraisal based on stigmata of recent hemorrhage. Techniques in Gastrointestinal Endoscopy 2001; 3 (4):192-198.
[12] Sonnenberg A. Management of delayed postpolypectomy bleeding: a decision analysis. Am J Gastroenterol 2012; 107 (3):339-342.
[13] Li J, Tang J, Chen Y, Zhi FC, Liu SD, He MR. Value of urgent colonoscopy in diagnosis of severe acute lower gastrointestinal bleeding in patients with different bowel cleanliness. Journal of Southern Medical University 2016; 37 (4):522-527.
[14] Hao Z, Gong L, Shen Q, Wang H, Feng S, Wang X, et al. Effectiveness of concomitant use of green tea and polyethylene glycol in bowel preparation for colonoscopy: a randomized controlled study. BMC Gastroenterol 2020; 20 (1):150.
[15] AJ S, PB R, A K, HC T. Comparison of patient and practitioner assessments of pain from commonly performed emergency department procedures. Annals of emergency medicine 1999; 33 (6):652-658.
[16] Nagata N, Niikura R, Sakurai T, Shimbo T, Aoki T, Moriyasu S, et al. Safety and Effectiveness of Early Colonoscopy in Management of Acute Lower Gastrointestinal Bleeding on the Basis of Propensity Score Matching Analysis. Clin Gastroenterol Hepatol 2016; 14 (4):558-564.
[17] Strate LL, Gralnek IM. ACG Clinical Guideline: Management of Patients With Acute Lower Gastrointestinal Bleeding. Am J Gastroenterol 2016; 111 (4):459-474.
[18] Kouanda AM, Somsouk M, Sewell JL, Day LW. Urgent colonoscopy in patients with lower GI bleeding: a systematic review and meta-analysis. Gastrointest Endosc 2017; 86 (1):107-117.