

CASE REPORT

설페이트 기반 저용량 액상 장정결제 복용 후 발생한 허혈성 장염 1예

정정화, 이정민, 손영우, 한원철¹, 윤기철

원광대학교 산본병원 소화기내과, 병리과¹

Ischemic Colitis Associated with Low-volume Oral Sulfate Solution for Bowel Preparation

Jung Wha Chung, Jung Min Lee, Young Woo Sohn, Weon Cheol Han¹ and Kichul Yoon

Departments of Internal Medicine and Pathology¹, Wonkwang University Sanbon Hospital, Gunpo, Korea

Ischemic colitis resulting from bowel preparation for colonoscopy is extremely rare, with only a small number of cases with polyethylene glycol having been reported. Here, we present a patient with ischemic colitis after administration of a low-volume oral sulfate solution (OSS). A 49-year-old female without any significant medical history experienced abdominal pain, vomiting, and hematochezia after ingestion of OSS. She complained of severe abdominal pain during colonoscopy, and diffuse edema, hyperemia, friability, and shallow erosions were present on the transverse, descending, and sigmoid colons. A mucosal biopsy revealed mixed lymphoid inflammatory cell infiltration with de-epithelialization, whereas an abdominal CT scan showed submucosal edema on the transverse colon. A diagnosis of ischemic colitis was made. The patient recovered with fluid and antibiotic therapy without significant sequelae. Although OSS is a clinically validated and generally safe bowel preparation agent, ischemic colitis is a rare complication that should be considered. (*Korean J Gastroenterol* 2020;75:216-219)

Key Words: Colitis, ischemic; Bowel preparation; Colonoscopy

INTRODUCTION

Ischemic colitis is caused by impaired blood perfusion to the intestine.¹ It frequently affects the elderly with various clinical courses, from self-limited ischemia to life-threatening infarction and necrosis.² Nonspecific symptoms such as abdominal pain, diarrhea, and hematochezia are frequently present, whereas mesenteric artery embolism or thrombosis, trauma, congestive heart failure, excessive physical activity, shock, and mechanical obstruction are well-known risk factors for this condition.³ Ischemic colitis resulting from bowel prepa-

ration for colonoscopy is extremely rare, with only a few cases due to administering polyethylene glycol (PEG) and bisacodyl having been reported worldwide.⁴ Herein, we report a rare case of ischemic colitis caused by low-volume oral sulfate solution (OSS) for bowel preparation.

CASE REPORT

A 49-year-old female without significant medical history attended the outpatient clinic of the gastroenterology department with severe abdominal pain, which started after ingestion of

Received December 25, 2019. Revised February 10, 2020. Accepted February 17, 2020.

© This is an open access article distributed under the terms of the Creative Commons Attribution Non-Commercial License (<http://creativecommons.org/licenses/by-nc/4.0>) which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

Copyright © 2020. Korean Society of Gastroenterology.

교신저자: 윤기철, 15865, 군포시 산본로 321 원광대학교 산본병원 소화기내과

Correspondence to: Kichul Yoon, Department of Internal Medicine, Wonkwang University Sanbon Hospital, 321 Sanbon-ro, Gunpo 15865, Korea. Tel: +82-31-390-2204, Fax: +82-31-390-2592, E-mail: paradise_city@hanmail.net, ORCID: <https://orcid.org/0000-0003-1392-2808>

Financial support: None. Conflict of interest: None.

OSS for bowel preparation and became aggravated during colonoscopy. She had the colonoscopy as scheduled as part of an elective general health checkup. Upon physical examination, the abdomen was soft to palpation with moderate tenderness of the lower part. Before this episode, she had received colonoscopies several times without complications. She did not have any symptoms before starting the bowel preparation. The patient experienced abdominal pain, vomiting, and hematochezia shortly after ingesting a low-volume OSS (magnesium sulfate anhydrous 1.6 g, sodium sulfate anhydrous 17.5 g, potassium sulfate 3.13 g, in 177 mL of Suclear Solution®; Pharmbio, Seoul, Korea) with water as instructed. During the colonoscopy, she experienced further severe abdominal pain

from the beginning of the procedure onward. Diffuse edematous hyperemic inflammation of the mucosa as well as shallow erosions and friability in the transverse, descending, and sigmoid colons were evident during the colonoscopy (Fig. 1). At the time of admission, her vital signs were blood pressure, 130/70 mmHg; heart rate, 82 beats/min; respiratory rate, 20 breaths/min; and body temperature, 37.0°C. The initial laboratory findings were white blood cell count, 11,000/ μ L (72.9% neutrophils); hemoglobin, 15.2 g/dL; hematocrit 45.1%; platelets 324,000/ μ L; CRP, 0.523 mg/dL; BUN, 15.9 mg/dL; and creatinine, 0.94 mg/dL. An abdominal CT scan with enhancement was carried out after admission to investigate the cause of the abdominal pain, and CT images showed submucosal

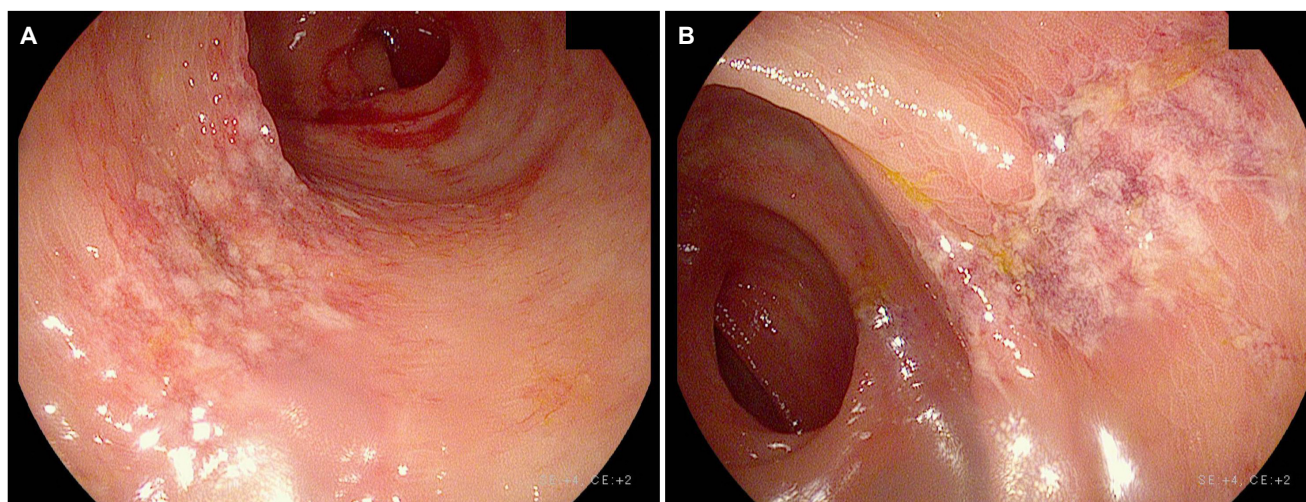


Fig. 1. Colonoscopy revealed diffuse edematous hyperemic inflammation, shallow erosions, and friability in mucosa of (A) sigmoid and (B) transverse colons.

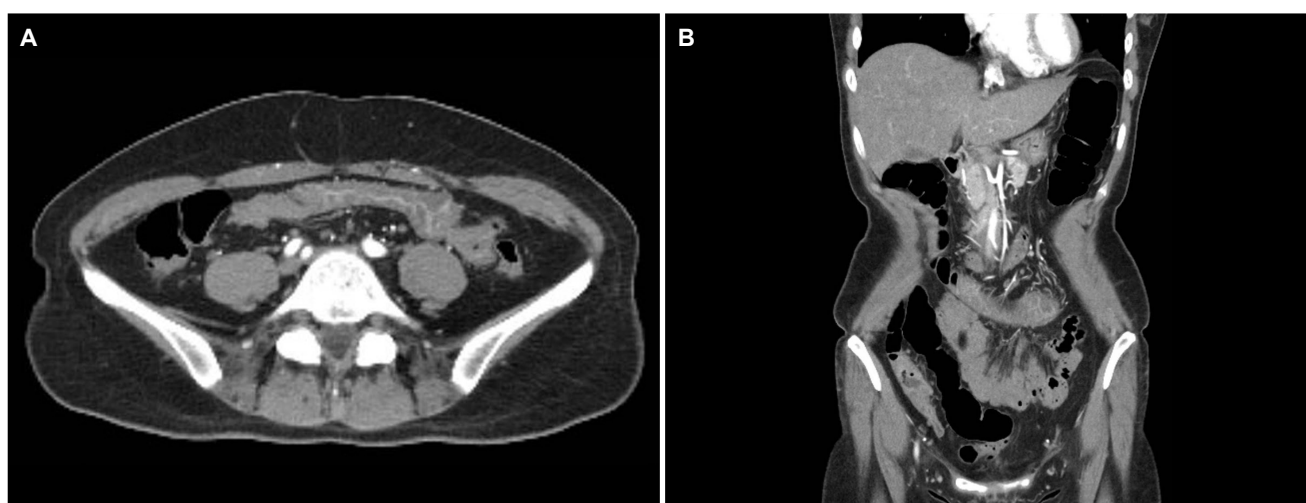


Fig. 2. Abdominal computed tomography revealed submucosal edema of transverse colon (A) transverse section and (B) coronal section.

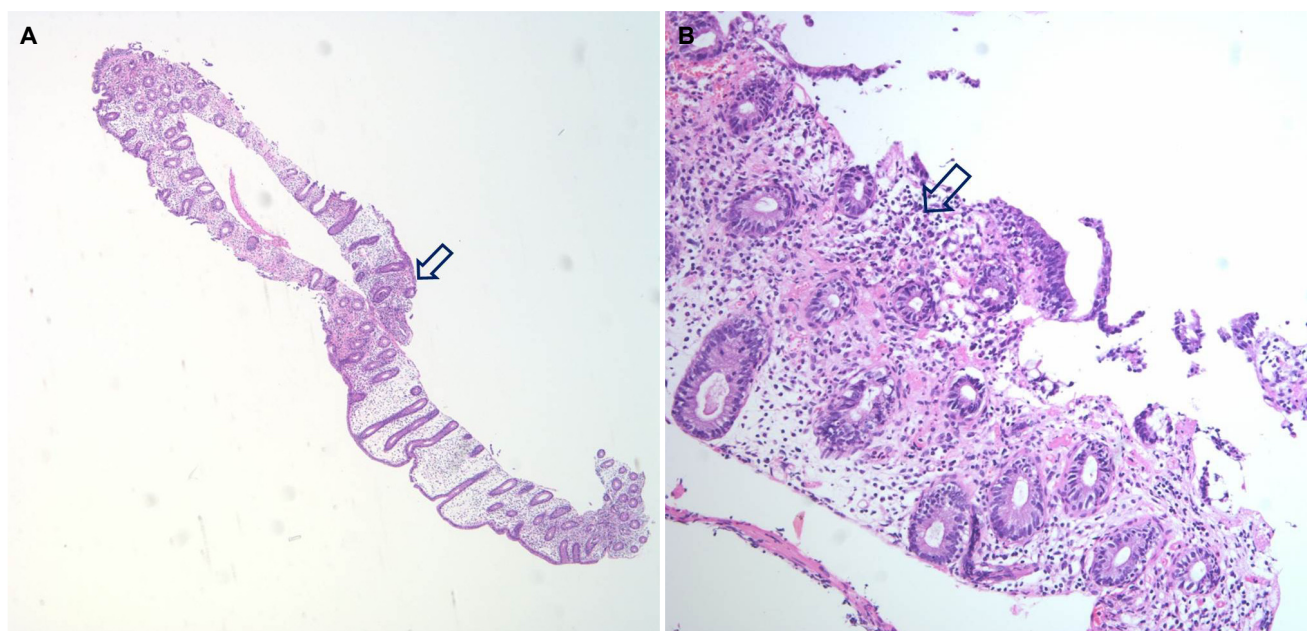


Fig. 3. (A, B) Histologic examination of sigmoid and transverse colonic mucosa showed mixed lymphoplasmic cell infiltration (arrows) and de-epithelialization, consistent with ischemic colitis (A: H&E, ×40; B: H&E, ×200).

edema of the transverse colon (Fig. 2). Multiple biopsies of the transverse and sigmoid colon revealed mixed lymphoid inflammatory cell infiltration with de-epithelialization, thereby suggesting ischemic colitis (Fig. 3). Treatment with dextrose saline hydration and intravenous antibiotics (ceftriaxone and metronidazole) was performed. Her symptoms gradually improved with therapy, and she was discharged without serious complications. In the follow-up outpatient visit, it was found that she had recovered completely without sequelae.

DISCUSSION

Ischemic colitis has various etiological and clinical presentations. Cases rarely present without risk factors such as old age, diabetes, dyslipidemia, heart failure, and/or peripheral arterial disease, whereas medications reported to be associated with ischemic colitis include vasoconstrictors, psychotropics, oral contraceptives, interferon- α , 5-hydroxytryptamine-1 agonists, digoxin, and acetylsalicylic acid.⁵ However, a few cases of ischemic colitis resulting from the administration of electrolyte lavage solution consisting of saline, magnesium citrate, or sodium phosphate have been reported worldwide.⁶⁻⁸

According to a consensus document on bowel preparation before colonoscopy, PEG solutions have proven to be effective

and relatively well tolerated and thus are regarded as a standard method.⁹ PEG solution is comprised of large polymer molecules in an osmotically balanced solution of sodium and potassium chloride and, when administered in large amounts, causes diarrhea due to its osmotic activity.^{7,10} However, as a large volume of solution is needed to administer PEG, there has been demand for a lower-volume alternative laxative regimen to ensure patient compliance. Recently, a new low-volume sulfate solution consisting of sodium sulfate, magnesium sulfate, and potassium sulfate in liquid form has been introduced, and several clinical studies have reported its safety and efficacy.^{11,12} Sulfate is a poorly absorbed anion that is an osmotic agent used in laxatives developed as an alternative to phosphate solutions, which cause serious renal complications.^{11,13} Similar to the safety profile of PEG solution, OSS has been shown to have little effect on the stool electrolyte balance.¹³ Furthermore, OSS does not form urinary calcium precipitates or affect the cardiac QTc interval.¹⁴

In the current case, the patient started having abdominal pain, vomiting, and hematochezia almost immediately after taking OSS. The diagnosis of ischemic colitis was made via colonoscopy, histologic examination, and a CT scan. Although an observational study on OSS has reported the cumulative incidence of ischemic colitis as 0.02%,¹⁴ this is the first case report in Korea. The hypertonic property of the solution could

have resulted in dehydration of the bowels. However, as the incidence of ischemic colitis between PEG and OSS is not significantly different according to the results of a large-scale study, the exact mechanism of ischemic colitis due to OSS has not yet been established. A possible explanation could be bowel hypoperfusion and subsequent ischemia from the rapid shift of intravascular fluid to the colon lumen by the hyperosmolar laxative.⁷ In addition, magnesium sulfate included in OSS is known to stimulate colon motility via cholecystokinin and prostaglandin, which could have also contributed to hypoperfusion and ischemia.¹⁵

As OSS is a relatively novel agent employed for bowel preparation, rare complications such as ischemic colitis, as in this case study, should be monitored and considered in clinical practice. Patients should be educated to imbibe adequate hydration before starting bowel preparation, and symptoms such as abdominal pain or hematochezia during preparation must be reported immediately to the physician.

REFERENCES

1. Sreenarasimhaiah J. Diagnosis and management of ischemic colitis. *Curr Gastroenterol Rep* 2005;7:421-426.
2. Green BT, Tendler DA. Ischemic colitis: a clinical review. *South Med J* 2005;98:217-222.
3. Theodoropoulou A, Koutroubakis IE. Ischemic colitis: clinical practice in diagnosis and treatment. *World J Gastroenterol* 2008;14:7302-7308.
4. Baudet JS, Castro V, Redondo I. Recurrent ischemic colitis induced by colonoscopy bowel lavage. *Am J Gastroenterol* 2010;105:700-701.
5. Higgins PD, Davis KJ, Laine L. Systematic review: the epidemiology of ischaemic colitis. *Aliment Pharmacol Ther* 2004;19:729-738.
6. Lee SO, Kim SH, Jung SH, et al. Colonoscopy-induced ischemic colitis in patients without risk factors. *World J Gastroenterol* 2014;20:3698-3702.
7. Oh JK, Meiselman M, Lataif LE Jr. Ischemic colitis caused by oral hyperosmotic saline laxatives. *Gastrointest Endosc* 1997;45:319-322.
8. Park JE, Moon W, Nam JH, et al. A case of ischemic colitis presenting as bloody diarrhea after normal saline enema. *Korean J Gastroenterol* 2007;50:126-130.
9. Wexner SD, Beck DE, Baron TH, et al. A consensus document on bowel preparation before colonoscopy: prepared by a task force from the American Society of Colon and Rectal Surgeons (ASCRS), the American Society for Gastrointestinal Endoscopy (ASGE), and the Society of American Gastrointestinal and Endoscopic Surgeons (SAGES). *Gastrointest Endosc* 2006;63:894-909.
10. Di Palma JA, Smith JR, Cleveland Mv. Overnight efficacy of polyethylene glycol laxative. *Am J Gastroenterol* 2002;97:1776-1779.
11. Rex DK, Di Palma JA, Rodriguez R, McGowan J, Cleveland M. A randomized clinical study comparing reduced-volume oral sulfate solution with standard 4-liter sulfate-free electrolyte lavage solution as preparation for colonoscopy. *Gastrointest Endosc* 2010;72:328-336.
12. Kim B, Lee SD, Han KS, et al. Comparative evaluation of the efficacy of polyethylene glycol with ascorbic acid and an oral sulfate solution in a split method for bowel preparation: a randomized, multicenter phase III clinical trial. *Dis Colon Rectum* 2017;60:426-432.
13. Patel V, Nicar M, Emmett M, et al. Intestinal and renal effects of low-volume phosphate and sulfate cathartic solutions designed for cleansing the colon: pathophysiological studies in five normal subjects. *Am J Gastroenterol* 2009;104:953-965.
14. Anastassopoulos K, Farraye FA, Knight T, Colman S, Cleveland MV, Pelham RW. A comparative study of treatment-emergent adverse events following use of common bowel preparations among a colonoscopy screening population: results from a post-marketing observational study. *Dig Dis Sci* 2016;61:2993-3006.
15. Hass DJ, Kozuch P, Brandt LJ. Pharmacologically mediated colon ischemia. *Am J Gastroenterol* 2007;102:1765-1780.