



Unexpected Caustic Esophageal Injury Associated with the Use of a Bowel Preparation Agent

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Bowel preparation is crucial for maintaining the quality of colonoscopic findings. Many bowel preparation agents are available that have a few adverse effects. However, inappropriate use of bowel preparation agents may cause severe complications that need immediate management. Sodium picosulfate with magnesium citrate (SPMC) is a widely used colon-cleansing agent. We present a case wherein inappropriate use of SPMC manifested as extensive esophageal ulceration. The patient did not comply with the drug instructions. Progressive chest tightness and epigastric pain developed after he took the drug. Upper endoscopy revealed caustic esophageal injury of the middle-to-distal esophagus. The patient was treated with a proton-pump inhibitor and sucralfate. There was no chronic complication during the 3-month follow-up period. The patient education regarding the correct use of SPMC should be prioritized by the clinician.

Key words: Sodium picosulfate with magnesium citrate, thermal esophageal injury, corrosive esophagitis, bowel preparation

INTRODUCTION

In recent years, the concept of colonoscopy for colorectal cancer has been well established. Bowel preparation is critical for maintaining the quality of the colonoscopic findings. There are many bowel preparation agents, including polyethylene glycol, sodium phosphate tablet, and sodium picosulfate with magnesium citrate (SPMC). To improve the compliance of bowel preparation agents, the flavor and instruction of the agents are constantly modified for patients and clinicians. Clinically, the inappropriate use of bowel preparation agents results in poor preparation. Moreover, there are some adverse effects, such as abdominal cramps, abdominal pain, nausea, disturbance of daily activity, headache, and sleep disturbance.¹ Here, we present a case wherein the inappropriate use of bowel preparation agents caused extensive esophageal ulceration, rarely observed previously.

CASE REPORT

A 63-year-old male visited our gastroenterology outpatient department because of progressive heartburn sensation

for 1 day after he took a cathartic for bowel preparation. SPMC (Bowklean® Powder, Genovate, Taiwan) was prescribed to him for bowel preparation. However, he did not comply with the drug instruction that suggested dissolving the SPMC powder in 150 mL of water and cooling for 5 min. Instead, he swallowed the powder first and then drank a little water. After drinking the water, he experienced progressive heartburn sensation and epigastric pain. His vital signs were stable. A series of laboratory tests, including electrolyte level, hemoglobin, and coagulation test, were all within the normal range.

Considering inappropriate ingestion of a bowel preparation agent, we performed esophagogastroduodenoscopy and observed friability of mucosa with whitish membranes, exudate, and deep discrete ulceration over the middle esophagus and circumferential ulceration over the distal esophagus [Figure 1]. There was no evidence of bleeding or perforation. The final diagnosis was caustic esophageal injury, Zargar's Grade 2b from the middle to distal esophagus caused by SPMC

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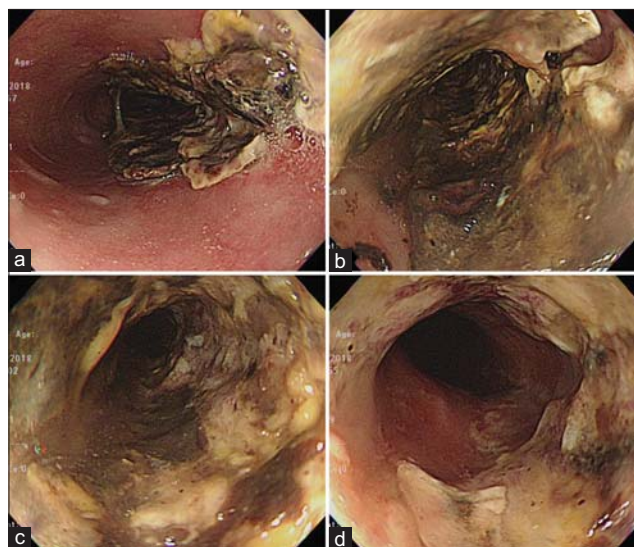


Figure 1: Endoscopy performed at first (a-d) friability of mucosa with whitish membranes, exudate, and deep discrete ulceration over the middle esophagus and circumferential ulceration over the distal esophagus

powder. He received medication, including a proton-pump inhibitor (lansoprazole 30 mg PO per day) and sucralfate, and his symptoms were relieved. We advised continuous endoscopic follow-up, and there was no dysphagia or difficulty in swallowing during the 3-month follow-up period.

DISCUSSION

The most commonly ingested caustic agents include alkali and acidic agents. The caustic ingestions mainly happen in children accidentally. However, in adults, most events occur as part of suicide attempts. The pathophysiology of these two agents is different. Alkaline ingestion includes liquefactive necrosis of the mucosa and the submucosa of the esophagus and stomach. In contrast, coagulative necrosis of the mucosa with superficial necrosis may be caused by the ingestion of acidic agents.² Endoscopic finding of caustic injury of the esophagus can include edema, hyperemia of the mucosa, superficial ulceration, erosion, and extensive necrosis.³ Zargar's grading classification is used to evaluate the mucosal injury caused by ingestion of caustic substances [Table 1].⁴ However, ingestion of caustic agents is often associated with thermal injury of the esophagus. Endoscopic findings of thermal injury of the esophagus may present as hyperemia, erosion, whitish pseudomembrane, linear, longitudinal, or geographic ulcers.⁵ Transepidermal necrosis of the skin can occur in case of contact with hot water at a temperature $>70^{\circ}\text{C}$ for several seconds.⁶ A pack of SPMC powder dissolved in 30 mL of water can increase the temperature from 25°C to 68°C .⁷ Thus, thermal injury of the esophagus may occur when the SPMC powder is swallowed

Table 1: Zargar's grading classification of caustic injury of mucosa

Grade	Description
Grade 0	Normal examination
Grade 1	Edema and hyperemia of the mucosa
Grade 2a	Friability, hemorrhages, erosions, blisters, whitish membranes, exudates, and superficial ulcerations
Grade 2b	Grade 2a plus deep discrete or circumferential ulceration
Grade 3a	Small scattered areas of necrosis presented as areas of brown-black or grayish discoloration
Grade 3b	Extensive necrosis

with a small amount of water. In this case, the endoscopic finding of the esophagus showed friability of the mucosa with whitish membranes, exudate, and deep discrete ulceration over the middle esophagus and circumferential ulceration over the distal esophagus. This is a typical presentation with caustic esophageal injury, Zargar's Grade 2b classification. Considering the exothermic reaction of SPMC dissolved in water, a combination of caustic and thermal injury of the esophagus may be the major cause of esophageal injury in our case.

Oral SPMC consists of 0.01 g picosulfate sodium, 3.5 g magnesium oxide, and 12 g citric acid anhydrous per sachet. It is a safe laxative agent for most patients, reported to have mild adverse events. However, when SPMC dissolves in the water, hydrolysis contributes to the acidic of the liquid and is accompanied by an exothermic reaction that markedly increases the temperature of the water.⁶ Recently, several cases of SPMC-related esophageal or gastric mucosal injury have been reported [Table 2].⁷⁻⁹ The causes of mucosal injury include the inappropriate use of SPMC powder with little water. The symptoms range from epigastric pain to hematemesis. The patients received conservative treatment with fasting, antibiotics, proton-pump inhibitor, or parenteral nutritional support. None of them had permanent complications or dysphagia. Reviewing the associated cases, an early (3–48 h) endoscopic assessment of the extent and severity of caustic injuries from the luminal perspective is important. Furthermore, computed tomography scan to evaluate the depth of necrosis and possible emergent complications, such as perforation, should be considered simultaneously. Treatment of caustic ingestion includes emergency surgery and medical treatment. Any patient who presents with obvious transmural necrosis should receive surgical intervention with esophagogastrectomy. Otherwise, nonsurgical management with conservative treatment should be administered.¹⁰

SPMC is a safe laxative agent and is widely used for bowel preparation. However, the present case was rare because the esophageal injury occurred due to SPMC use. For those patients

Table 2: Summary of previously reported mucosal injuries of the upper gastrointestinal tract caused by sodium picosulfate with magnesium citrate

Case	Age/sex	Symptom	Endoscopic finding	Treatment	Permanent complication
Yang <i>et al.</i> ⁷	56/male	Chest pain and hematemesis	Deep ulceration and hemorrhage, U/3–M/3 esophagus	Fasting, antibiotics, and parenteral nutritional support	None
Seo <i>et al.</i> ⁸	48/male	Hematemesis	Diffuse linear mucosal breaks with oozing and whitish exudates in the M/3 esophagus	Fasting, antibiotics, IV form proton-pump inhibitor, and parenteral nutritional support	None
Ze <i>et al.</i> ⁹	69/male	Epigastric pain	Multiple longitudinal ulcers with hematin on the entire gastric body and antrum	Oral proton-pump inhibitor	None

IV=Intravenous

who may not follow the drug instructions correctly, it may lead to relatively severe complications. Inappropriate use of SPMC, such as keeping the powder in the mouth first, then consuming water, and mixing them in the mouth or directly ingesting the powder, should be avoided. This practice may cause thermal and corrosive damages to the upper gastrointestinal tract. Hence, patient education regarding the correct use of SPMC should be given importance by the clinician.

Ethical approval

The study was approved by Tri-Service General Hospital. Approval number : TSGHIRB No.: 2-108-05-146 and Approval Date:2019.08.12.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given his consent for his images and other clinical information to be reported in the journal. The patient understands that his name and initial will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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