Case Report

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Successful Healthcare Administration for Esophageal Thermal Injury from Sodium Picosulfate/Magnesium Citrate Ingestion: A Case Report

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Sodium picosulfate/magnesium citrate (SPMC), a laxative with dual actions, has been in clinical use in European countries for over 20 years. Nevertheless, SPMC-induced upper gastrointestinal (UGI) injury has been sporadically reported from Asian countries in the recent decade. We report a 73-year-old man scheduled for a colonoscopic examination the next day who directly swallowed a sachet of SPMC without first dissolving it in water. Because of throat and chest burning sensation, he visited our emergency department where the tentative diagnosis of acute coronary syndrome was made because of his history of hypertension. After ruling out the cardiovascular origin, a detailed history implicated the direct ingestion of SPMC for which esophagogastroduodenoscopy revealed diffuse ulcerative and erythematous change of esophgeal mucosa with friability over mid-esophagus (Zargar's Grade 3) as well as diffuse ulcerative and hyperemic change of gastric mucosa over mid- and upper body. After being given detailed education about home care, the patient was discharged to ambulatory care with the prescriptions of oral sucralfate, proton pump inhibitor, and L-glutamine. Telephone follow-ups of patient's condition were conducted daily in the next three days, followed by weekly till the next endoscopic examination. Follow-up endoscopic examination three weeks later showed notable improvement. Our case highlighted the importance of early endoscopic examination for assessing the severity of SPMC-induced UGI injuries for which outpatient care incorporated with an all-round health administration plan including patient education and telephone follow-ups could achieve satisfactory patient outcome.

Key words: laxative, upper gastrointestinal injury, airway injury, esophageal stricture, health education

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Introduction

Colorectal cancer is the third most common cancer and the second most deadly malignancy worldwide.[1] Colonoscopic examination is the most popular diagnostic tool that can serve both diagnostic and therapeutic purposes. For a satisfactory colonoscopic examination, bowel preparation is vital. Sodium picosulfate/magnesium citrate (SPMC) is dispensed in a sachet that contains powder of sodium picosulfate (0.01 g), magnesium oxide (3.5 g), and citric acid (12.0 g). SPMC is a laxative with dual actions. On dissolving in water, magnesium oxide and citric acid react to give magnesium citrate that acts as an osmotic laxative, while sodium picosulfate works as a stimulate laxative after being hydrolyzed by colonic bacteria to the active metabolite 4,4'-dihydroxydiphenyl-(2-pyridyl)methane.[2] It has gained popularity in European countries for over two decades.[3] On the other hand, there have been reports of airway[4] and upper gastrointestinal injuries[5-7] in recent 10 years from Asian countries.

We report a case of direct swallowing of SPMC powder that caused diffuse esophageal and gastric mucosal injuries. The patient was satisfactory treated in an outpatient setting through a combined effort of the gastroenterology and nursing teams.

Case Report

A 73-year-old businessman, who was scheduled for a colonoscopic examination the following day, ingested a pack of SPMC (Bowklean® Powder, Genovate Biotechnology Co., Ltd., Taoyuan, Taiwan) directly from the package with a glass of warm water for bowel preparation. Immediately after the episode, he experienced a burning sensation over his throat and chest together with diaphoresis for which he visited the emergency department of a tertiary referral hospital 55 minutes after the ingestion. On arrival, he complained of persistent chest pain with a severity of 5 out of a scale from 0 to 10. He was afebrile (36.4℃) with a stable hemodynamic (heart rate: 72/min; blood pressure: 126/80 mmHg) and respiratory (respiratory rate: 20/min; arterial oxygen saturation: 95%) status. The results of physical examination were unremarkable. His hemogram was normal. Taking into account his history of hypertension and previous myocardial ischemic pattern on treadmill exercise stress test, the emergency physician performed a 12-lead electrocardiogram and checked his circulating troponin-I concentration with a tentative diagnosis of acute coronary syndrome. Following the discovery of normal findings in both tests, endoscopic examination was arranged for ruling out a possible upper gastrointestinal origin.

Endoscopic examination 16 hours after laxative ingestion revealed diffuse ulcerative and hyperemic change of mucosa with friability over middle and lower esophagus (Fig. 1A) compatible with Grade 3a corrosive injury according to Zargar's classification.[5] Grade 2 injuries were noted in the stomach with diffuse ulcerative and friable erythematous mucosa (Fig. 1B) as well as diffuse slough covering the mucosal surface (Fig. 1C). The patient was discharged to outpatient care with the prescriptions of oral sucralfate (1 gm PO three times a day), proton pump inhibitor (Esomeprazole 40 mg PO per day), and L-glutamine (24 gm PO twice a day). Patient education on discharge included the avoidance of deep-fried and hard foods as well as hot water for three weeks before the next endoscopic examination. Telephone follow-ups of patient's condition were conducted daily in the following three days, followed by weekly till the next endoscopic examination. Through telephone interviews, the nursing staff ensured a good drug compliance of the patient as well as evaluated the

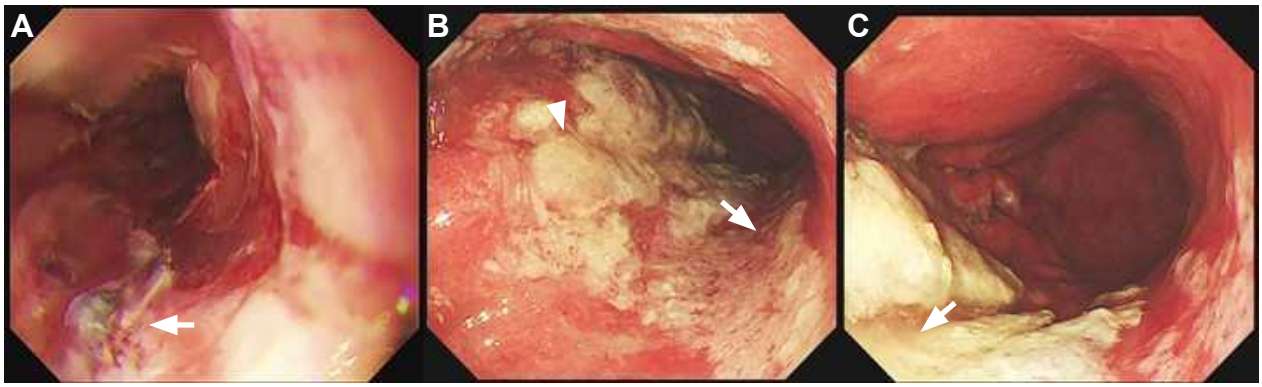

Fig. 1 (A) Focal ulcerative and erythematous change of mucosa over lower esophagus (arrow) 16 hours after laxative ingestion; (B) Diffuse ulcerative and hyperemic change of gastric mucosa over mid- and upper body (greater curvature [arrowhead] and posterior wall [arrow]); and (C) mid-to lower body (greater curvature side) covered with sloughs (arrow).

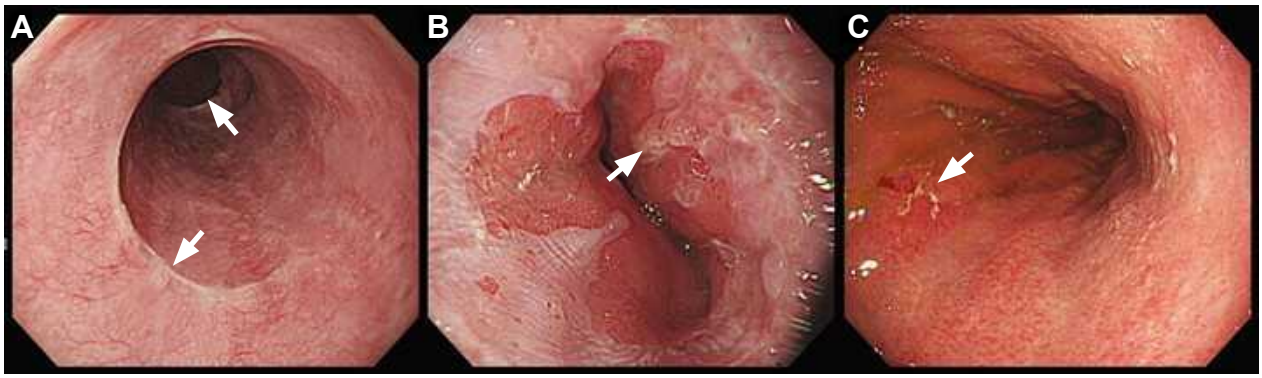

Fig. 2 Follow-up endoscopic examination three weeks later showing (A) multiple esophageal ulcer scars over mid- and lower esophagus (arrow) without stenosis; (B) Mucosal erosions over lower esophagus near esophagocardiac junction (arrow); and (C) Gastric mucosal erosion at greater curvature side of mid-body (arrow).

presence of specific symptoms suggestive of the possibility of complications including dysphagia to solid and/or liquids, chest and/or abdominal pain, fever, and airway-related manifestations such as sore throat, hoarseness, and dyspnea. For the presence of any of these symptoms, the physician in the care team would be informed and the patient would be scheduled for an immediate follow-up. None of the symptoms occurred during the three-week telephone follow-ups after the episode.

Follow-up endoscopic examination three weeks later showed multiple esophageal ulcer scars without stenosis over mid- and lower esophagus (Fig. 2A). In addition to mucosal breaks (< 5 mm) at lower esophagus, erosive mucosa was noted at esophagocardiac junction (Fig. 2B). Examination of the stomach revealed a 2.5 cm mucosal erosion at the greater curvature side of mid-body (Fig. 2C) as well as hyperemic changes at antrum. Taking into account the notable improvements in esophageal and gastric mucosal injuries on follow-up endoscopic examination and the absence of any complaint of discomfort, the patient was scheduled for a telephone follow-up one month later. Because the patient stayed symptom-free, another telephone follow-up was scheduled three months afterwards. After a six-month follow-up, no sequelae were noted and the patient was informed to visit the outpatient clinic only when needed.

Discussion

The widespread concept of health promotion has endorsed the popularity of health screening examinations in which colonoscopy has become an indispensable part. SPMC that possesses dual actions of being both stimulant and osmotic laxatives has been widely accepted as an effective bowel preparatory agent in the western world for over two decades.[3] It was only after its being introduced in the Asian countries that the first case of SPMC-induced acute esophageal mucosal injury was reported from South Korea in 2014.[8] Over the following years, several sporadic reports, mostly from South Korea, have also been published. Therefore, a lack of health education regarding the proper use of SPMC powder may be the probable cause of injuries. There were two reported cases of SPMC-related complications after direct swallowing of SPMC powder. Oropharyngeal swelling with upper airway obstruction was reported in a 59-year-old man who was treated by endotracheal intubation and tracheostomy,[4] while esophageal stricture was noted two weeks after SPMC ingestion in a 75-year-old woman who received metallic esophageal stenting and subsequent balloon dilatation for esophageal restenosis.[9] Despite the complicated clinical courses, both patients were successfully treated without sequeale on subsequent follow-ups.[4,9]

Regarding the mechanism of injury, SPMC powder-induced injury is mainly caused by the exothermic reaction that occurs when picosulfate is dissolved in water ($MgO + C_6H_8O_7 + H_2O \rightarrow C_6H_6MgO_7 + 2H_2O$) in which anhydrous citric acid reacts with magnesium oxide to form magnesium citrate.[7] In contrast to previous reports,[4,9] our patient was discharged to outpatient care after initial endoscopic assessment of the severity of injury, patient education, and prescriptions of medications. Oral intake was not inhibited. The condition of the patient was monitored closely through daily telephone inquiry for three days, followed by weekly telephone follow-ups till the next endoscopic survey. The patient was informed to contact the case manager or directly visit the emergency department for any abrupt change in condition during the course of treatment with minimal disruption of daily life. After demonstration of notable improvement in his esophageal and gastric mucosal injuries during on follow-up endoscopic survey, the patient was followed for six months without notable sequelae.

In conclusion, our case demonstrated the importance of an elaborate collaboration between the medical (i.e., gastroenterologists) and nursing teams in the successful delivery of continuous patient care in an ambulatory setting during the acute period of SPMC-induced upper gastrointestinal injuries. Our results not only underscored the importance of patient education regarding the appropriate use of SPMC powder but also highlighted the possibility of judicious use of medical resources and minimizing adverse impacts on patient's quality of life through the implementation of an effective standardized patient care program. In addition, prompt diagnosis and therapeutic intervention including early esophagoduodenoscopic examination and initiation of medical treatment (e.g., proton pump inhibitor) may reduce the risk of late complications (e.g., esophageal stricture).

Author Contributions

Shu-Yen Yang, Chia-Chang Hsu and Cheuk-Kwan Sun conceived of the study. Wen-Lun Wang, Chih-Ching Chin and Jen-Chieh Chen gathered relevant information and reviewed literature. Cheuk-Kwan Sun wrote the first draft of the manuscript. All authors participated in revision of the manuscript and agreed on the publication of the work in E-Da Medical Journal.

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All authors declared no conflict of interest in this work.

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