

# Potassium permanganate ingestion as a suicide attempt

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## Abstract

Potassium permanganate is a highly corrosive, water-soluble oxidizing antiseptic. A 68-year-old female patient was admitted to our Emergency Department after ingestion of 3 tablets of 250 mg potassium permanganate as a suicide attempt. The physical exam revealed brown stained lesions in the oropharynx. Emergency endoscopy was performed by the gastroenterologist after the third hour of ingestion. Emergency endoscopy revealed multiple superficial (Grade I-II) lesions on the esophagus and cardia, which were considered secondary to the caustic substance. The mainstay in the treatment of potassium permanganate is supportive and the immediate priority is to secure the airway. Emergency endoscopy is an important tool used to evaluate the location and severity of injury to the esophagus, stomach and duodenum after caustic ingestion. Patients with signs and symptoms of intentional ingestion should undergo endoscopy within 12 to 24 h to define the extent of the disease.

## Introduction

Severe caustic ingestions are uncommon events in most emergency departments; however they can produce devastating damage. By teen years and on into adulthood, approximately 50% of ingestions occur as suicide attempts. In these cases, the amount of ingested material is usually much greater, and consequently the damage is more severe and the mortality rate is significant.<sup>1</sup>

Potassium permanganate is a highly corrosive, water-soluble oxidizing antiseptic for cleansing and deodorizing suppurative eczematous reactions and wounds, used in baths and wet bandages.<sup>2</sup> It has been used as an abortifacient and as a urethral irrigation

fluid for treatment of gonorrhea.<sup>3</sup> Formulations include ready-to-use solutions, pellets, tablets, crystals, and powder. At room temperature, potassium permanganate exists as dark purple or bronze-colored, odorless, sweetish, astringent tasting crystals, that are described as having a blue, metallic sheen. It is readily soluble in water; aqueous solutions are pink to violet in color and slowly deposit manganese dioxide. The corrosive effects of potassium permanganate ingestion on the gastrointestinal tract and the eye may be secondary to the formation of potassium hydroxide, a strong alkaline corrosive. Alkaline corrosives cause liquefaction necrosis, allowing deep penetration into mucosal tissue as cells are destroyed.<sup>4</sup> Potassium permanganate is absorbed poorly by the gastrointestinal tract; however systemic symptoms may result in the wake of oral exposure.<sup>3</sup>

In this case report, we aimed to point out the management of potassium permanganate ingestion, which is a rare form of suicide attempt.

## Case Report

A 68-year-old female patient was admitted to our Emergency Department after ingestion of 3 tablets of 250 mg potassium permanganate as a suicide attempt. She arrived at the hospital one hour after the ingestion. She was conscious, cooperated and orientated. At the time of arrival her vital signs were as follows; blood pressure 120/80 mmHg, pulse rate 100 beats/min, respiratory rate 20 breaths/min, temperature 36.7°C, and oxygen saturation 98% on room air. Her Glasgow Coma Scale (GCS) was 15 (E4V5M6). The physical exam revealed brown stained lesions in the oropharynx and the other system examinations, electrocardiogram and arterial blood gases were in normal ranges. Blood tests were normal except leukocyte count, which was 13.7 K/ $\mu$ L (4.60-10.20 K/ $\mu$ L). Serum methemoglobin level was 1.14%. The patient was monitored, symptomatic and supportive therapy was started. Gastroenterology and general surgery consultations were made. Emergency endoscopy (most authors propose a time span of 24 h)<sup>5</sup> was performed by the gastroenterologist after the third hour of ingestion. Emergency endoscopy revealed multiple superficial (Grade I-II) lesions on the esophagus and cardia, which were considered secondary to the caustic substance. The patient was hospitalized, oral intake was stopped and supportive treatment (1000 cc 0.9% NaCl intravenous infusion and omeprazole 40 mg intravenously) was continued. On the second day of the hospitalization there were no additional complaints and her physical examination was normal, oral

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intake of fluids was resumed. During the hospitalization period, the patient was also consulted to a psychiatrist. On the third day of the hospitalization, she was discharged and invoked to follow-up controls. One week later, the patient applied to the hospital and physical examination revealed epigastric tenderness, the other system examinations were normal.

## Discussion

Potassium permanganate is a highly corrosive, water-soluble oxidizing antiseptic for cleansing and deodorizing suppurative eczematous reactions and wounds, used in baths and wet bandages.<sup>2</sup> It is a simply obtainable, over the counter oxidant. The strong oxidizing action of potassium permanganate causes burns depending on the concentration and amount of local irritation<sup>6</sup> and it causes liquefaction necrosis.<sup>4</sup> Formulations include ready-to-use solutions, pellets, tablets, crystals, and powder.<sup>4</sup> Ingestion of dilute solutions can cause brown staining of the mouth and throat, sore throat, abdominal pains, vomiting and dysphagia. Concentrated solutions, or dry crystals, can cause swelling and bleeding of lips and tongue, pharyngeal edema and swelling of the larynx, as well as gastrointestinal burns. Systemic effects do not usually manifest due to poor absorbance; however they can cause tachycardia, hypotension, hallucinations,

methemoglobinemia and cyanosis, metabolic acidosis, hemolysis, pancreatitis and coma. Some effects can be delayed up to 36 h post-ingestion including disseminated intravascular coagulation, cardiac failure and hepatorenal failure.<sup>2</sup> In our patient, brown staining and lesions were determined in the oral cavity and dysphagia was the major complaint. The probable lethal dose for an (70 kg) adult is 10 grams<sup>2-4</sup> and death usually results from pharyngeal edema and cardiovascular collapse.<sup>2</sup> Our patient ingested 750 milligrams potassium permanganate which does not cause serious complaints.

The mainstay in the treatment of potassium permanganate is supportive<sup>2-4</sup> and the immediate priority is to secure the airway.<sup>3</sup> There is a risk of perforation in insertion of nasogastric tube; however because of the potential for severe systemic toxicity, insertion of a small, flexible nasogastric tube for aspiration of gastric contents should be considered after large ingestions, at the discretion of the clinician.<sup>4</sup>

It is not known, whether activated charcoal binds potassium permanganate, and its use may obscure endoscopy findings. Use is left to the judgement of the individual clinician. While experimental models have suggested that immediate dilution may lessen caustic injury, this has not been adequately studied in humans. Both milk and water have been shown to be effective in experimental studies of caustic ingestion. If no respiratory compromise is present, dilution immediately with milk or water; no more than 250 milliliters in adults and 15 milliliters/kilogram in children is recommended to minimize the risk of vomiting.<sup>4</sup> In our case, potassium permanganate was diluted with water and milk mixture. However, a nasogastric tube was not inserted because of the risk of perforation and activated charcoal was not used as performing emergency endoscopy was planned.

Emergency endoscopy is an important tool used to evaluate the location and severity of injury to the esophagus, stomach and duode-

num after caustic ingestion. Indications for endoscopy vary, so the endoscopist should be consulted in all cases of caustic ingestion.<sup>7</sup> Minor ingestions with no oropharyngeal signs or symptoms (drooling, dysphagia, visible mouth lesions or airway embarrassment) can be safely observed without endoscopy.<sup>1</sup> Patients with signs and symptoms (vomiting, drooling, stridor or dyspnea) of intentional ingestion should undergo endoscopy within 12 to 24 h to define the extent of the disease. Endoscopy performed too early may miss the extent or depth of tissue injury.<sup>8</sup> Delayed endoscopy increases the risk of perforation.<sup>9</sup> Because of this follow-up exams should also be avoided between days 5 and 15.<sup>7</sup> In our patient, endoscopy was performed after the third hour of the ingestion and multiple superficial (Grade I-II) lesions were determined on the esophagus and cardia, which were considered secondary to the caustic substance.

The use of corticosteroids for the treatment of caustic ingestion is controversial.<sup>4,8,9</sup> The use of antibiotics is suggested if perforation or infection is suspected.<sup>4</sup> Even though their curative effects and roles in decreasing the complications are not proven, anti-acids, sucralfates, H<sub>2</sub> receptor blockers and analgesics provide symptomatic relief.<sup>9</sup> In our case, corticosteroid and antibiotic therapies were not administered; however omeprazole 40 mg twice a day as a proton-pump inhibitor was started.

The limitation of our case report is not having endoscopic image because of the technical reasons of the endoscopic equipment.

## Conclusions

Emergency endoscopy has a significant role in diagnosis and management of potassium permanganate ingestion. The patients can be discharged in the early period of the hospitalization, whether ingested amount is small,

emergency endoscopy is available and there are no serious endoscopic findings. However after the discharge patient should be invoked to close follow-up controls.

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