

Case Report

Death due to Hydrogen Peroxide Poisoning: A Case Report

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ABSTRACT

Hydrogen peroxide is a commonly used oxidizing agent with a variety of uses depending on its concentration. Although historically it has been used for medicinal purposes such as wound irrigation, its toxic effects preclude its routine use today. Ingestion of hydrogen peroxide is not an uncommon cause of poisoning, and results in morbidity and occasionally mortality.

The growing naturopathic health industry has promoted the use of hydrogen peroxide in treating a wide variety of medical conditions making its availability more common. This can lead to increased incidence of poisoning due to this compound. One such case is reported here.

Key Words: Hydrogen peroxide; H_2O_2 ; Accidental poisoning

INTRODUCTION

Hydrogen peroxide is a clear, colourless, odourless oxidizing agent found in concentrations ranging from 3% to 90%. Three percent solutions are used as common household disinfectants, and are therefore a common source of accidental poisonings, especially in children.

The three main mechanisms of hydrogen peroxide toxicity include:

1. Direct caustic injury
2. Oxygen gas formation
3. Lipid per oxidation

The Case: A 55-year-old man inadvertently ingested 50 ml of unlabelled hydrogen peroxide intended for industrial use. He was taken to a private hospital with vomiting, burning sensation in mouth and throat with excessive salivation.

On examination, the patient was conscious, with blood pressure of 140/100 mm Hg, and pulse rate 78/min. Redness and swelling was noted over the oral mucosa. There were no other significant features.

The patient was treated with IV fluids, IV and oral antacids, and other supportive measures. In spite of these measures, he developed respiratory distress and hypotension, and was referred to a higher centre. However, while shifting, the patient expired on the way and the dead body was brought to our hospital for postmortem examination. At autopsy, the following features were observed on external examination: A deceased male measuring 166 cm in height, moderately built and nourished with brownish complexion. Rigor mortis was appreciated in all parts of the body. Postmortem staining was present over the back of the body. An intravenous injection cannula was present on the back of the right hand.

Internal examination revealed the following findings: Mouth, pharynx and oesophagus showed caustic burn injuries. Brain was congested, with petechiae in the white matter on cut section. Both lungs were congested and oedematous and cut sections caused exudation of blood mixed with froth. Stomach contained 50 ml of brown-

coloured fluid (**Fig 1**), with unusual smell. The mucosa was congested and haemorrhagic (**Fig 2**).

Cause of death was opined as 'death due to shock as a result of consumption of caustic substance consistent with hydrogen peroxide poisoning.'



Fig 1: Brown coloured fluid in the stomach



Fig 2: Congested and haemorrhagic stomach mucosa

DISCUSSION

Hydrogen peroxide is relatively unstable and will rapidly decompose through an exothermic reaction, into water and oxygen in the presence of alkali, metals and the enzyme catalase, which is found in mucous membranes, liver, kidney, red blood cells and bone marrow.¹ Ingestion of 3% hydrogen peroxide usually results in only mild gastritis, unless ingested in large quantities.² Ingestion of more concentrated forms including 35% hydrogen peroxide can produce severe gastrointestinal erosion, ulceration and perforation.¹ Caustic injury can also occur in the airway if aspirated or inhaled, and can lead to subglottic stenosis and laryngospasm requiring intubation and mechanical ventilation.

The volume of oxygen liberated from the decomposition of hydrogen peroxide can be considerable, with 30 mL of 35% hydrogen peroxide yielding 3.5 L of oxygen.

This rapid release of oxygen can lead to hollow viscous perforation. If the amount of oxygen exceeds the maximum solubility in blood, it may lead to gas embolism particularly in to the portal venous system, gastric wall,³ and brain.⁴ Gas embolism in the brain presents similar to ischaemic stroke and has been successfully treated with hyperbaric oxygen therapy.⁴

Lipid peroxidation from ingested hydrogen peroxide can lead to direct cytotoxic effects.¹

Management of hydrogen peroxide exposure depends on the severity of ingestion and includes airway management and treatment of associated complications. Due to the rapid decomposition, gut decontamination is not required. Signs and symptoms do not consistently correlate with the extent of injury, making endoscopy the only reliable method to assess for injury.

Strictures may occur in survival cases, most frequently in the oesophagus, and generally develop between 6 and 12 weeks.

CONCLUSION

Most exposures to hydrogen peroxide involve the 3% solution, which results in little or no morbidity. However, the storage and use of 35% hydrogen peroxide for natural health benefits is an emerging source for more serious ingestions. Thirty-five percent hydrogen peroxide can be lethal when ingested, and needs to be treated with caution and stored appropriately. Public awareness and regulation of the use of this substance is therefore imperative.

REFERENCES

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