

## A Rare Cause of Aeroportia and Aerobilia: Accidental Ingestion of Hydrogen Peroxide

Sara Ez-zaky\*, Oujidane Zamani, Sanae Jellal, Jamal El Fenni and Rachida Saouab

Radiology Department, Mohamed V Military Instruction Hospital, Rabat, Morocco

\*Corresponding Author: Sara Ez-zaky, Radiology Department, Mohamed V Military Instruction Hospital, Rabat, Morocco.

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### Abstract

Hydrogen peroxide, at various concentrations, is used in several domestic, medical, and industrial installations due to its oxidizing properties.  $H_2O_2$  can induce the generation of air bubbles in the portal venous system, in addition to causing symptoms related to irritation of the gastrointestinal system. We present the case of a 32-year-old patient with no notable medical history who experienced a burning sensation in the throat after accidentally ingesting three sips of a colorless and odorless liquid. It was determined that the liquid ingested by the patient was a solution of  $H_2O_2$ . A cervico-thoraco-abdomino-pelvic CT scan performed in our department revealed aeroportia, aerobilia in the common bile duct, and gastric wall pneumatosis.

**Keywords:** Aeroportia; Aerobilia; Hydrogen Peroxide ( $H_2O_2$ ); Accidental Ingestion; Gastric Wall Pneumatosis

### Introduction

Hydrogen peroxide, found at various concentrations, is utilized across numerous household, medical, and industrial settings due to its oxidizing properties [1]. Being a clear and relatively odorless liquid at lower concentrations, it can easily be mistaken for water, leading to accidental ingestion [2]. Adverse effects stem from direct caustic tissue injuries, lipid peroxidation, and the release of substantial oxygen amounts, resulting in embolism. Approaches like hyperbaric oxygen therapy have been attempted to address gas embolisms, yet a definitive consensus on their efficacy remains elusive [3].

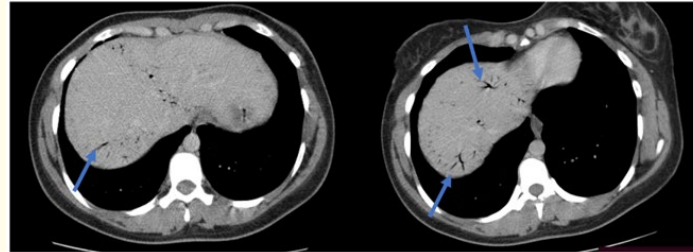
### Case Report

This concerns a 32-year-old female patient with no notable medical history, who experienced a burning sensation in her throat after accidentally drinking three sips (approximately 40 cc) of a colorless and odorless liquid. It was determined that the liquid consumed by the patient was an  $H_2O_2$  solution used in a dental office (our patient being a dental assistant). The patient presented with abdominal pain and sought consultation at our facility.

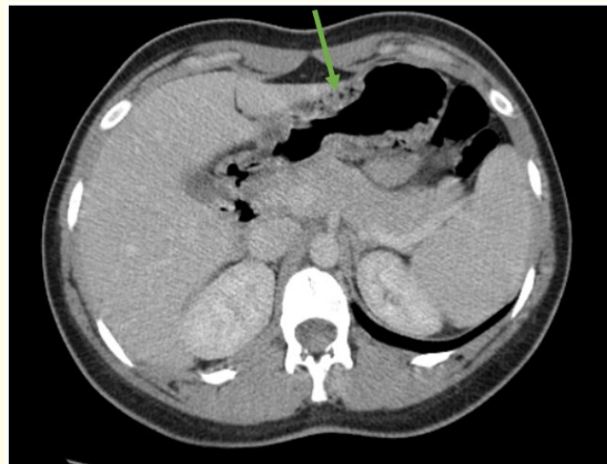
Physical examination revealed a patient in good general condition, with a temperature of 37°C, blood pressure of 120/70 mmHg, and a regular heart rate of 80 beats per minute.

Abdominal examination revealed no specific findings, with a soft abdomen. A cervico-thoraco-abdomino-pelvic CT scan performed in our department revealed aeroportia, aerobilia in the common bile duct, and gastric parietal pneumatosis.

The patient was hospitalized for 24 hours and subsequently underwent an esophagogastroduodenoscopy (EGD), which returned without anomalies.



**Figure 1:** Axial section of an abdominal CT scan with contrast injection showing Portal vein gas: aeroportia. (Blue arrow).



**Figure 2:** Axial section of an abdominal CT scan with contrast injection showing gastric wall pneumatosis (Green arrow).



**Figure 3:** Coronal reconstruction of a thoraco-abdominal CT scan after contrast injection showing aerobilia in the common bile duct (Yellow arrow).

### Discussion

Hydrogen peroxide is utilized at various concentrations in numerous household, medical, and industrial settings due to its oxidizing properties [1]. As a clear and relatively odorless liquid at lower concentrations, it can easily be mistaken for water, leading to accidental ingestion, particularly when stored in unlabeled containers [2].

H<sub>2</sub>O<sub>2</sub> induces health issues through three primary mechanisms: corrosive damage, gas oxygen formation, and lipid peroxidation [4]. Ingestion of concentrated H<sub>2</sub>O<sub>2</sub> can result in the production of large volumes of oxygen. When oxygen levels surpass their maximum solubility in the blood, venous or arterial gas embolisms may occur. Rapid oxygen generation within closed body cavities can cause mechanical distension, posing a potential risk of hollow viscus rupture due to oxygen release. Painful gastric distension and belching can occur due to the release of substantial oxygen volumes in the stomach. Mucosal injuries and oropharyngeal burns are commonly observed following ingestion of concentrated solutions. Laryngospasms and hemorrhagic gastritis have also been documented. Additionally, sinus tachycardia, lethargy, coma, confusion, seizures, subglottic narrowing, and stridor may manifest minutes after ingestion. [4].

In cases of hydrogen peroxide ingestion, computed tomography (CT) should be performed as it is the most sensitive imaging modality for aeroportia and systemic complications resulting from H<sub>2</sub>O<sub>2</sub> ingestion. Aeroportia manifests as branched air densities following the distribution of the portal vein, more peripherally within the liver. Ultrasound (US) reveals echogenic foci at the liver periphery.

Several cases have been reported in the literature of accidental hydrogen peroxide ingestion resulting in aeroportia and gastric pneumatosis, but no cases of aerobilia have been reported.

The management of hydrogen peroxide ingestion depends on the concentration of H<sub>2</sub>O<sub>2</sub>, as well as the degree and extent of injury. Treatment options include conservative, surgical, and/or hyperbaric oxygen therapy. Ingestion of diluted H<sub>2</sub>O<sub>2</sub> without significant symptoms typically resolves spontaneously. For esophageal and gastric symptoms, antacids (proton pump inhibitors and H<sub>2</sub> antagonists) are administered. Additionally, nasogastric irrigation may be employed, serving as the preferred treatment to alleviate many symptoms and complications [5].

### Conclusion

Hydrogen peroxide is an eco-friendly product with multiple uses. It can have serious effects on human health in case of accidental or intentional exposure, especially for concentrations exceeding 35%.

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