

Kasuistik / Casuistry

Death Caused by Hydrogen Peroxide

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Tod durch Wasserstoffperoxid

Summary. A report of the death of a 3-year-old girl following the ingestion of 40% hydrogen peroxide.

Key words: Hydrogen peroxide, intoxication – Intoxication, hydrogen peroxide

Zusammenfassung. Es wird der Todesfall eines dreijährigen Mädchens beschrieben. Es handelt sich um eine Vergiftung durch die Aufnahme von 40%igem Wasserstoffperoxid.

Schlüsselwörter: Wasserstoffperoxid, Vergiftung – Vergiftung, Wasserstoffperoxid

The death of a 3-year-old girl following the ingestion of concentrated solution of hydrogen peroxide is the basis of this report. No similar case has been reported previously.

The accident took place when the child's mother carelessly left a 40% solution of H_2O_2 improperly stored in a bottle of mineral water—"Radenska voda" on the floor of a room. Over the original label on the mineral water bottle was affixed a small, red, hardly visible label, with the inscription— H_2O_2 40%.

The family used to consume mineral water because no tap water was available and the well water was not good for drinking. So the girl was accustomed to drinking mineral water in the familiar bottle.

Immediately after the child had drunk the hydrogen peroxide, foam appeared on her lips and she lost consciousness.

Emergency aid was called immediately and the child was transported to an ENT clinic. The child arrived there unconscious, with no pulse, cyanotic, with

blue lips. Oropharyngoscopically, only a small amount of white foam was seen. The child was intubated, the heart massaged, artificial respiration was applied, and the stomach was lavaged. The heart remained inactive. The dead body was transmitted to a forensic obduction with clinical diagnosis: *Intoxicatio acuta cum hydrogen peroxide (40%)*.

Pathological-anatomic finding was not very impressive. In the respiratory tract there was a small quantity of foamy mucose and the lung parenchyme was a bit more humid than usual. On the stomach mucosa there were about ten small erosions but no visual bleeding. Histological examination revealed edema of the lung and a large stoppage, a superficial defect of the stomach mucosa, without any strong vital reactions. The test for air-emboly was negative.

Chemical analysis showed the presence of large quantities of hydrogen peroxide in the bottle, and in the stomach contents obtained following the lavage in the hospital, but the stomach contents taken during the obduction contained traces of hydrogen peroxide.

The hydrogen peroxide in contact with organic substances (here—ferments of salive and contents of gastric tract, e.g., catalase and peroxidase), or gastric acids and alkali, is decomposed into water and oxygen and gives off thermal energy. If the peroxide is present in higher concentration, the reaction is more turbulent. Owing to oxygen liberation, bubbles are formed and a foam may appear. Hydrogen peroxide liberates nascent oxygen which has great oxidative potency. It is corrosive but only superficially. As a strong oxidizing agent it whitens colored substances (tissues) analogously as does chlorin [1, 2, 3, 4].

Peroxide in nearly double the quantity of that which the girl might have drunk (proportional to body weight) was placed into the stomach of a rat through intubation. The rat, except that it became more quiet, showed no signs by which we could see that its health was seriously affected. About 1 h later, the rat showed normal life activity. It was killed after 3 h: no pathological signs could be seen on the stomach mucosa.

Macroscopic and histological finding did not make easier interpretation of the dying mechanism, nor the classification of the death case. In our opinion, the child's death did not occur because of the local action of the hydrogen peroxide on the mucosa and the gastric wall. We consider that the erosions found during obduction on the stomach mucosa were probably the result of the stomach lavage by means of the tube because the experiments done on the rat indicated that the peroxide did not destroy the mucosa and the erosions seen were probably purely agonal ones. Our opinion is that the mechanism of dying was purely mechanic asphyxia, e.g., the obstruction of distal respiratory tract by foam developed immediately after consuming peroxide. This supposition is conformed by the observations of the child's mother who reported that immediately after the child had drunk, the peroxide foam appeared in the mouth and the child fell unconscious.

If the classic definition is that toxins (organic or inorganic) are substances that cause harm to health by their chemical action, and that those substances which do not act chemically but in some mechanical fashion, are not toxins, we can hardly state that the girl has died by intoxication. More probably the cause of death was a foreign body that mechanically obstructed the respiratory tract.

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