

FEMICIDE BY HYDROCHLORIC ACID

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We describe a fatal case of intimate partner violence (femicide) by hydrochloric acid. The victim's ex-partner poured the acid into her mouth while she was unconscious. The death was caused by acute corrosive injury of digestive and respiratory organs, due to ingestion and aspiration of acid. Considering that homicidal acid poisoning represents a rarity in forensic practice, this is a unique autopsy report published in the recent literature. *Acta Medica Medianae 2017;56(3):116-120.*

Key words: femicide, intimate partner violence, hydrochloric acid

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Introduction

Hydrochloric Acid (HCl) is a colorless liquid with pungent and strong irritating odor, which belongs to the group of corrosive poisons (1). This inorganic acid is widely used in industry, manufacture, and laboratories. It is produced in solutions of up to 38% (concentrated grade). For household purposes, mostly for cleaning, solutions are about 18% to 20% or less than 10%, as bleaching agents. The lethal dose of concentrated acid for adults is 5-20 ml on an average. Poorly concentrated solutions have irritant effects on tissues and organs (2). Higher concentrated solutions produce caustic effects and structural tissue damage in the form of coagulation necrosis (2-4).

Case presentation

Twenty-four hours later, a 20-year-old female had been reported missing, her body was found floating in a semi-frozen local lake. The last time she was seen alive accompanied by her ex-intimate partner with whom she had recently ended the relationship. Under the suspicion of a homicide, the investigative authorities ordered a

judicial autopsy to find the cause and manner of the death.

Autopsy findings

A standard complete forensic autopsy was performed 12 hours after the discovery of the corpse. The corpse was wrapped in a sleeping bag. Before the autopsy, a detailed inspection of the victim's clothing did not show any defects or damage. The deceased was a young female aged about 20 years (Figure 1).



Figure 1: General appearance of the corpse before autopsy

External examination of the body revealed the signs of immersion (pale and sodden body skin, macerated hands and feet skin, bright reddish hypostasis). The most prominent findings were multiple irregularly shaped grayish-white colored corrosive burns on the lips, nose, eyelids, and cheeks (Figure 2, Figure 3). There was also a recent skin hematoma in the nasal, orbital and forehead region, without facial bone fractures. Ca-

reful preparation of the skin and under-lying soft tissue from the skull revealed the presence of dark grayish discoloration of the subcutaneous nasal tissues and subcutaneous hematoma of the frontal and parietal region (Figure 4). The opening of the rib cage and abdominal cavity revealed an unpleasant smell of the strong pungent odor. The oral cavity, esophageal and tracheal mucosal surfaces were swollen with grayish discoloration. A large amount of liquid spumescent brownish fluid filled the tracheal and bronchial cavities. The lungs were swollen and firm. Widespread necrotic and hemorrhagic areas dominated at the cutting surface of the lower pulmonary lobes (Figure 5). The stomach was softened, distended and without perforations.



Figure 2: Corrosive burns of the facial skin



Figure 3: Corrosive burns of the oral mucosa

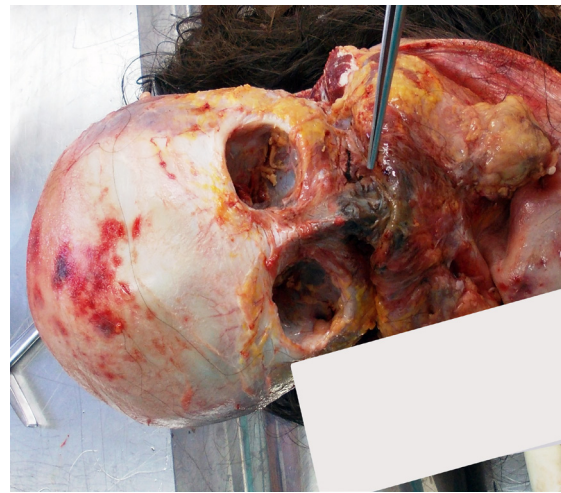


Figure 4: Subcutaneous hematoma of the nasal, frontal and parietal region

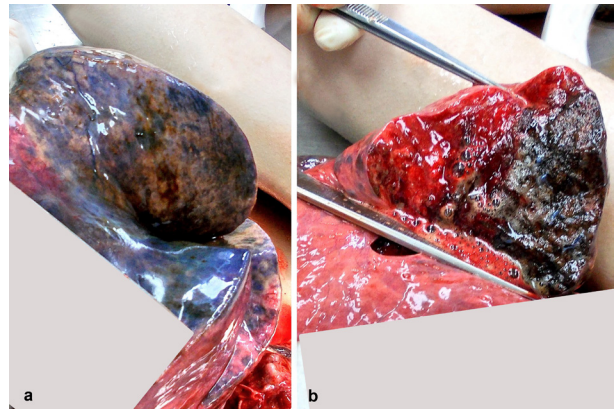


Figure 5: a) Corrosive lesions of the lower pulmonary lobes due to acid aspiration; b) Necrotic and hemorrhagic areas of the pulmonary cutting surfaces

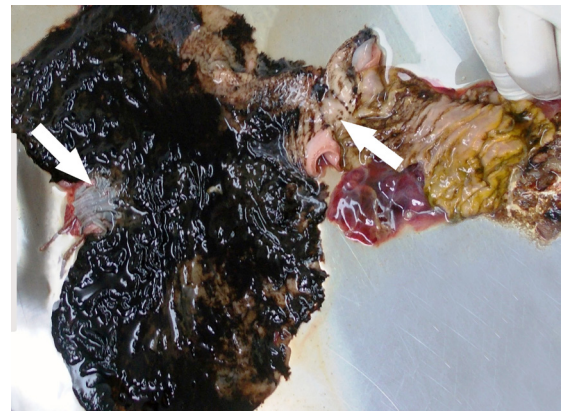


Figure 6: Extensive necrosis of the gastric mucosa (arrows pointing to a sharp border to the esophagus and pylorus)

The gastric cavity contained about 150 ml of a tar-like dense content and about 50 ml of turbid brownish liquid with an acidic reaction to pH paper. A whole surface of the gastric mucosa demonstrated marked blackish discoloration of

extensive necrosis, sharply edged by the pylorus from an intact intestinal mucosa (Figure 6). The blood in the heart chambers and great vessels was in the liquid state. The other internal organs were preserved well without any significant pathological findings. The sections from internal organs were sampled for routine histological preparation. Tissue specimens, gastric content, femoral blood, vitreous humor and urine samples were collected for toxicology analysis.

Microscopic examination

Microscopically, coagulation necrotic lesions of the esophageal and tracheal mucosa were prominent, as well as the extensive gastric mucosal hemorrhagic necrosis. Histological findings of the affected parts of lung tissue showed widespread necrotic and hemorrhagic zones surrounded by collapsed alveoli. The tissue specimens of unaltered areas showed bronchial epithelial degeneration and severe pulmonary edema.

Toxicology analysis

The pH value of the sampled gastric contents was 0.76, detected by digital pH meter (with a range from -2.00 to 16.00 and accuracy of ± 0.01 pH). The pH of femoral vein blood sample was 5.98. A complete toxicology analysis revealed no evidence of any toxic substances or drugs.

Discussion

Any substance that may cause temporary or permanent structural and functional impairment of the cells or their metabolic processes may represent a poison (5). Corrosive poisons, especially acids, can lead to serious health impairments if applied in sufficient quantities and in a proper way (1, 5). As a strong acid, HCl mainly acts locally and have few systemic effects. As such, it is more suitable for deliberate harming than for homicide (1, 3, 6).

By origin, poisoning by HCl is more accidental and suicidal than homicidal. As such, it is often the object of forensic expertise and toxicological analysis (1, 6). Accidental poisonings relate to the household and occupational exposures. Domestic accidents affect more often children than adults, and they are rarely fatal because the devastating pain reflexively stops further ingestion. Ingestion of the small amount of acid causes non-fatal damage of the proximal parts of the digestive system (6, 7). It is observed that the fatality rate increases with the amount of ingested acid (which characterizes voluntary acid consumption), or if aspiration accompanies ingestion (8). Consequently, acute respiratory distress and metabolic acidosis may cause severe health impairment and fatal outcome (3, 9). Forensic practice shows that fatal cases of HCl poisoning were most frequently suicidal. Homicidal poisoning by HCl is exceedingly rare. This phenomenon is conditioned by the physical and chemical pro-

perties of the corrosive poisons that make them unsuitable for committing homicide of healthy adults without any resistance (1, 7, 10). To the best of our knowledge, this is the unique autopsy presentation of homicidal hydrochloric acid poisoning described in the recent forensic literature.

Despite the fact that homicidal poisonings are rare, intentionally inflicting injuries by throwing acid (Vitriolage, Acid Attacks) are reported in the scientific literature (11). Violent acid assaults are relatively common in some societies of the Middle East and South Asia. In the scope of intimate partner violence, those attacks represent socially acceptable behavior for punishing women who have dishonored their families (12). Consequences may be non-fatal (burns, permanent scarring of the face, disfigurement, blindness) or fatal (primarily caused by an extension of the injuries or secondarily induced by complications) (12, 13).

By its nature, homicidal poisoning is a premeditated act that implies an intentional killing of another person with a tendency to hide the offense. For this reason, the most commonly used poisons are unnoticeable for the victim and suitable for usage (5). Corrosive substances do not have these features. Namely, unpleasant smell and taste or strong pain reaction in the contact with the tissues implied a physical resistance of a conscious victim. However, homicidal application of a corrosive is possible only in victims who are not able to resist (newborns, infants, and infirm or incapacitated - unconscious, sedated or drugged adults) (1) as was in the case presented here.

Autopsy findings in a given case confirmed almost all characteristics of HCl poisoning, well described in the forensic literature (1, 3, 6, 8, 14). A distinct grayish-white or ashy colored skin and mucosal corrosive burns were the results of direct chemical action by coagulation and precipitation of cellular proteins (1, 8). Severely damaged stomach mucosa in contrast to spared esophageal inner surface was the result of a fast passage of acid through the esophagus and its dilution by saliva (14, 15). The absence of stomach perforation pointed out the limited penetrating abilities of the administered corrosive substance - acid (8). Reflex spasm of pyloric muscle prevented damage of the intestinal mucosa (8, 9, 15). Despite the potential post-mortal water entering due to immersion (16), determination of the pH value of the stomach contents led to the conclusion that the victim swallowed a considerable amount of acid. Characteristic colored corrosive skin and mucosal lesions suggested a high probability of HCl effects on tissues.

During the investigative authority's proceedings, a suspected 60-years old male, confronted with indisputable forensic evidence, confessed the murder of his ex-girlfriend by acid poisoning. The reason was the inability to accept the termination of their intimate relationship. According to his statement, they started to argue, he inflicted several blows to her head and she lost consciousness. Then he dragged her to the lakeshore, put the rubber gloves on hands, took the bottle of a

commercial household cleaning product (16-18% solved solution of hydrochloric acid) and poured it into victim's mouth. Unconscious, she began to gurgle, coughing, and shortly afterward died. He wrapped the dead body in a sleeping bag and threw it into the lake, where it sank. He was convicted to the maximal prison sentence for aggravated murder.

Depending on the historic, cultural and economical context of a particular society, women have been killed by current or former male intimate partners most commonly by firearms, battering, stabbing, and asphyxiation (12, 17). On the other hand, acid poisoning is a rare, unusual manner of death in homicidal intimate partner violence. These results confirm the numerous studies of intimate partner femicide conducted around the world (12, 17-19). Presented case also confirmed that the women are at the highest risk of being killed after the termination of a relationship by ex-partners who stalked them and

tried to keep up the relationship at any cost (18, 19).

Conclusion

Based on the autopsy findings, it was concluded that the death case was violent by nature and caused by acute corrosive injury, particularly to the stomach and lungs, due to ingestion and aspiration of an acid. Characteristic appearance of skin and mucosal lesions indicate specific effects on tissues produced by HCl. Detection of the head trauma, absence of defensive injuries, as well as the circumstances related to the finding of the corpse, pointed to the homicidal origin of this death.

Ethical standards: The presented content complies with the laws in Serbia.

Conflicts of interest: The authors declare that they have no conflicts of interest.

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Prikaz slučaja

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FEMICID HLOROVODONIČNOM KISELINOM

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Opisali smo slučaj fatalnog intimnog partnerskog nasilja – femicide (ubistva žene) trovanjem hlorovodoničnom kiselinom. Bivši intimni partner je sipao kiselinu u usta besvesne žrtve. Smrt je nastupila usled akutnog korozivnog oštećenja digestivnih i respiratornih organa, kao posledica gutanja i udisanja kiseline. S obzirom da homicidalno trovanje predstavlja retkost u sudsko medicinskoj praksi, ovo je jedinstveni obdukcioni prikaz objavljen u novijoj literaturi. *Acta Medica Medianae 2017;56(3):116-120.*

Ključne reči: femicid, nasilje intimnih partnera, hlorovodonična kiselina

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