

CASE REPORT

Swallowed danger: A Case Report of Accidental Acid Ingestion in a Child

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<u>Abstract</u>

Introduction: Accidental acid ingestion in children is a severe yet preventable emergency, often leading to fatal complications. It is more common in regions where acids are easily accessible due to inadequate safety regulations and improper storage. Such incidents can cause extensive gastrointestinal and systemic damage, requiring immediate medical intervention.

Case Presentation: A 6-year-old boy accidentally ingested acid at home, leading to severe vomiting, respiratory distress, and extreme pain. He was rushed to the hospital in critical condition, where initial stabilization attempts were administered, which included intravenous fluids, pain management, and proton pump inhibitors. Despite aggressive medical intervention, his condition rapidly deteriorated, and he succumbed within 18 hours. Autopsy findings revealed extensive esophageal charring, gastric perforation, and severe tissue necrosis, indicative of widespread corrosive damage.

Discussion: Accidental ingestion of corrosive acids, particularly among children, remains a serious public health concern. Studies indicate that nearly 80% of such cases involve children, with most incidents occurring at home due to poorly stored household cleaners or industrial chemicals. Unlike adults, where acid ingestion is often intentional and more severe, pediatric cases are accidental but still carry significant risks. Even small amounts of corrosive substances can lead to damaging effects, including gastrointestinal burns, perforation, hemorrhage, infection, sepsis, and death. Immediate endoscopic evaluation is crucial for assessing damage.

Conclusion: This tragic case underscores the urgent need for stronger preventive measures. Implementing stringent regulations, increasing caregiver awareness, promoting childproof storage solutions, and enforcing proper labeling of hazardous substances can significantly reduce such incidents and protect children from life-threatening injuries.

Key words: Corrosive Acid, Perforation, Emergency Medicine, Endoscopy, Child Vulnerability

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INTRODUCTION

Accidental ingestion of corrosive substances, particularly acids, is a rare, yet potentially fatal event, especially in young children. While acid ingestion is a rare occurrence in the United States, affecting fewer than 5% of cases, it is more common in countries like India, where hydrochloric and sulfuric acids are readily available [1]. The consequences of such ingestion can be devastating, leading to severe damage to the gastrointestinal tract, respiratory system, other essential organs and skin manifestations resulting in pain, blisters, and tissue ulceration upon contact.

Children are especially vulnerable due to their curiosity, developmental stage, and tendency to explore their environment, often without understanding the dangers posed by household chemicals. Corrosive acids, commonly found toilet cleaners (sulphuric, hydrochloric), anti-rust compounds (hydrochloric, oxalic, hydrofluoric), battery fluids (sulphuric), and swimming pool cleaners (hydrochloric) can cause irreversible damage even with small amounts ingested. Beside acids, corrosive alkalis such as sodium hydroxide (NaOH) and potassium hydroxide (KOH), are also being abused [2].

While medical interventions such as decontamination, supportive care, and surgery can improve outcomes, the severity of the injury often leads to complications such as infection, sepsis, and multi-organ failure, which may ultimately result in death. The management of such cases requires rapid recognition, timely medical treatment, and an understanding of the potential long-term consequences. However, preventing such incidents is of utmost importance, as they are largely avoidable with proper safety measures and increased awareness.

This autopsy case report highlights the tragic death of a child following accidental acid ingestion, and underscores the need for improved preventive strategies.

CASE REPORT

A 6-year-old male child ingested acid at his residence followed by multiple episodes of vomiting, retching and devloped oral lesions. He was then taken to the Emergency Medicine department of Chacha Nehru Bal Chikitsalaya, Delhi. Upon examination, the patient was afebrile with a heart rate of 126 beats per minute, respiratory rate of 42 per minute,

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SpO₂ of 95% on room air and low volume pulse. The physician's plan included nil per oral (NPO), and starting the patient on intravenous fluid, antibiotics and proton pump inhibitors, in order to minimize the reflux of gastric contents back into the esophagus and esophageal re-injury. Choline salicylate was applied on the oral lesions. The plan also included strict monitoring of vitals and I/O charting. CECT-neck, thorax and abdomen was planned after hemodynamic stabilisation. There, during the course of conservative treatment, the patient expired after 18 hours of survival.

External Examination: Excoriation of lips was present (figure 1) along with corrosion of buccal mucosa and dorsum of tongue. Reddish brown colored dribbling marks were found from the right nostril to the chin. Nail beds of both hands were cyanosed.

Internal Examination:

Epiglottis was edematous and congested. Mucosal walls of trachea were congested. Esophageal walls showed brownish black discoloration along with charring at places and were congested and edematous (figure 2).

About 200mL and 400mL of reddish brown colored fluid (figure 3) was present in the pleural and abdominal cavity respectively. Perforation of the stomach involving whole wall thickness along the greater curvature was present and a perforation of the mesentery was also present. Thinning and charring with blackish discoloration was present all over the mucosal walls of stomach (figure 4) and mesentery. All other internal organs were congested and intact. Viscera was preserved in rectified spirit and sent for toxicological analysis.



Figure 1. Showing excoriation over lips



Figure 2. Showing brownish black discoloration of the esophageal wall.



Figure 3. Showing reddish brown fluid in abdominal cavity



Figure 4. Showing stomach which is soft, boggy, black mass

DISCUSSION

Accidental ingestion of corrosive acids by children remains a significant public health concern despite ongoing efforts to prevent such incidents. Although children account for 80% of accidental ingestion of corrosives, ingestion in adults is more often suicidal in intent and therefore tends to be more serious [3]. Kay and Wyllie in their pediatric study found that the case fatality rate for pediatric patients is significantly less than that of adolescents and adults because of the accidental nature of the ingestion in the former [4]. Most poisonings occurred in young children, at home, by unintentional ingestion of a single substance [5]. Ingestion of even small amounts of corrosive substances can lead to catastrophic consequences, including gastrointestinal tract (esophagus, stomach, pylorus, and duodenum) stricture formation, gastrointestinal tract perforation, and hemorrhage. Systemic effects may also occur, such as disseminated intravascular coagulation (DIC), multi-organ system failure, sepsis [6]. And even death, as seen in this case report.

A study carried out in 2024 recently evaluated 69 Saudi Arabian children who required upper endoscopy because of caustic substance ingestion. Common symptoms were swelling of the mouth, ulceration, and erythema, and the symptoms that were displayed in majority (89.1%) included vomiting, discomfort, drooling, respiratory distress, and dysphagia. Endoscopy works best 48 hours after ingestion, when the lumen is still at its greatest, and is essential for evaluating oesophageal burns even in the absence of oral lesions [7].

Two recent examples involved endoscopy: one had a youngster in Karnataka who purposefully took drain cleaner powder, resulting in serious oral and oesophageal injuries [8], and the other involved a patient who accidentally consumed a cleaner containing hydrochloric acid, which later caused odynophagia and throat pain [9]. Endoscopic evaluation was essential in determining the degree of damage and directing treatment plans that included medication, dilatation, surgery, and nutritional support. These incidents demonstrate how important endoscopy is for identifying corrosive injuries, facilitating prompt treatment, and enhancing patient outcomes.

Strode and team suggested an immediate perforation of the stomach if the acid is concentrated. The stomach is severely affected and, in many cases, the whole mucosal surface has a black tarry appearance or there may be areas of black altered blood and severe inflammation of the adjacent part. Perforation may occur with the escape of gastric contents into the peritoneal cavity [10] as seen in this case. Gastric perforation is almost invariably fatal due to toxic and septic effects of acute hemorrhagic pancreatitis, multiple bowel perforations, and peritonitis.

Immediate and late sequelae of corrosive ingestion requiring numerous diagnostic and interventional procedures put a significant social and economic burden on the family and healthcare system [11].

According to Annual Report of America's Poison Centers National Poison Data System (NPDS), the most common exposures in children age 5 years or less were household cleaning substances (10.3%), analgesics (9.54%), cosmetics/personal care products (9.49%), dietary supplements/herbals/homeopathic (6.65%), and foreign bodies/toys/miscellaneous (6.61%) [12].

Children from lower-middle and upper-lower-class families face a high risk of accidental acid ingestion due to semi-neglect, as parents work long hours, leaving them unsupervised. Lack of safety awareness means strong cleaning acids are stored within reach, often in cheap, unmarked bottles resembling soft drinks. In crowded urban homes, unlocked bathrooms make acids easily accessible to curious kids. They lack childproofing and immediate medical access, delaying treatment. Caught between poverty and stability, these families miss both government safety interventions and proper precautions, making their children vulnerable.

One of the primary challenges in preventing accidental acid ingestion is the widespread availability and common use of corrosive substances in everyday household and industrial products. Items such as cleaning agents, drain cleaners, and certain pesticides often contain strong acids, and their containers may not always be adequately secured or childproof. Young children, driven by curiosity and the natural tendency to explore their environment, may not recognize the inherent dangers of these substances, making proper storage and labeling critical.

Raising awareness among parents, caregivers, and the general public is essential in reducing the risk of such incidents. Public health campaigns should focus on educating parents about the dangers of corrosive substances, the importance of storing these products out of reach and in childproof containers, and recognizing the early signs of ingestion. In addition, regulatory measures can play a role in minimizing the risks associated with these substances. For example, the implementation of more stringent packaging requirements for corrosive chemicals, such as child-resistant caps and clearer warning labels, would make it more difficult for children to access these dangerous materials.

Educational efforts should also focus on first aid and emergency response for accidental ingestion. Caregivers should be aware of the appropriate steps to take if a child ingests a harmful substance, including not attempting to neutralize the acid with home remedies, as this may exacerbate the injury. Immediate medical attention is crucial, and knowledge of local poison control centers and emergency services should be made widely available to the public.

CONCLUSION

Accidental acid ingestion in children is a grave, yet preventable, emergency with devastating consequences. Immediate medical intervention is crucial, but true protection lies in proactive measures—stricter regulations, caregiver awareness, and responsible storage. By prioritizing prevention, we can ensure that childhood curiosity leads to discovery, not disaster. A child's curiosity should spark wonder, not catastrophe—prevention isn't optional, it's essential. **Conflict of interest:** The authors have no conflict of interest to declare.

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REFERENCES

- 1. Zargar SA, Kochar R, Nagi B. Ingestion of strong corrosive alkalis: spectrum of injury to upper gastrointestinal tract and natural history. Am J Gastroenterol. 1992;87:337-41.
- Chibishev A, Pereska Z, Chibisheva V, Simonovska N. Corrosive poisonings in adults. Mater Sociomed. 2012;24(2):125-30.
- 3. Kovil R, Vivek V G. Corrosive Ingestion in Adults. J Clin Gastroenterol. 2003;37: 119-24.
- 4. Kay M, Wyllie R. Caustic ingestion in children. Curr Opin Pediatr 2009;651-4.
- Lee J, Fan NC, Yao TC, Hsia SH, Lee EP, Huang JL et al. Clinical spectrum of acute poisoning in children admitted to the pediatric emergency department. Pediatr Neonatol. 2019;60(1):59-67.
- Hall AH, Jacquemin D, Henny D, Mathieu L, Josset P, Meyer B. Corrosive substances ingestion: a review. Crit Rev Toxicol. 2019;49(8):637–69.
- Almajed M, Albarrak Y, Aldosari W, Alkhormi M, Alawfi A, Islam H. Post corrosive ingestion in pediatrics; precaution and awareness; retrospective hospital-based study. Medical Science 2024; 28:e15ms3295.
- Ramesh BY, Konda KC, Kini BS. Extensive Oral Injury following Ingestion of Drain Cleaner (Alkali) in an Adolescent Boy with Endoscopy Findings and Complete Recovery. Medical Journal of Dr. D.Y. Patil Vidyapeeth. 2024;17:391-93.
- 9. Sati WO, Abdow M, Sabir DM, Elhassan H, Salem W. Acute Gastric Necrosis Induced by Caustic Substance Ingestion: A Case Report. Cureus. 2024;16(11):e74719.
- 10. Strode EC, Dean ML. Acid burns of the stomach: report of 2 cases. Ann Surg. 1950;131:801-11.
- 11. Kalayarasan R, Ananthakrishnan N, Kate V. Corrosive Ingestion. Indian J Crit Care Med. 2019;23(4):282-6.
- Gummin DD, Mowry JB, Beuhler MC, Spyker DA, Rivers LJ, Feldman R et al. 2022 Annual Report of the National Poison Data System® (NPDS) from America's Poison Centers®: 40th Annual Report. Clin Toxicol (Phila). 2023;61(10):717-939.