

Esophageal burn Zargar IIIA and placement of percutaneous gastrostomy in preschool patient secondary to caustic ingestion: clinical case report and literature review

Abstract

The intake of caustics continues to be a frequent consultation of Pediatric Surgeons with a high incidence in preschool and school age, with a predominance in the male sex, presenting strong accidental association due to parental neglect, is important to initially know which are the substances that can cause this type of lesions at the digestive tract, the characteristic symptoms that patients may present after ingestion, imaging exams required, as well as the appropriate diagnostic and therapeutic methods that can give resolution, to decrease morbidity and mortality in this type of patient.

Keywords: caustic, burn, esophagus, ingestion, alkali

Volume 7 Issue 1 - 2024

Guillermo Yanowsky Reyes,^{1,2} Beda P Terrazas Moreno,³ Jesús A Aguilar Mata,² Sergio A Trujillo-Ponce,^{1,2} Rafael Santana-Ortiz^{1,2}

¹División de Pediatría, Hospital Civil de Guadalajara "Fray Antonio Alcalde", México

²Servicio de Cirugía Pediátrica, Hospital Civil de Guadalajara "Fray Antonio Alcalde", México

³División de Pediatría, Hospital General de Occidente, México

Correspondence: Guillermo Yanowsky Reyes, División de Pediatría, Hospital Civil de Guadalajara "Fray Antonio Alcalde", Guadalajara, Jalisco, México, Tel +52 3331572737, Email gyanowsky@gmail.com

Received: January 15, 2024 | **Published:** January 22, 2024

Objective

Report the case of a preschool patient with intake of alkaline substance with subsequent esophageal burn Zargar IIIA and review of the literature related to the subject.

Clinical case

Male preschool patient, 2 years 8 months old, without associated perinatal pathologies, optimal growth and development for the current age. It has a surgical history of ileocecolic intestinal invagination at 7 months requiring ileostomy type of intestinal derivation with subsequent reinstallation at 4 months of the initial surgery. Rest of the background without relevance to the case. Patient is received at the pediatric emergency service of the Civil Hospital of Guadalajara Fray Antonio Alcalde secondary to the intake of alkaline substance (caustic soda) in bulk. By indirect interrogation to the mother, the patient accidentally ingested the substance on January 14, 2024 at approximately 11:00 a.m., presenting two vomiting of gastro-food content 5 minutes after the ingestion.¹ Go immediately to the pediatric emergency service, the patient is received irritable but with an adequate hemodynamic state, without pathological data of commitment at the respiratory level (Figure 1).

Physical examination presents TA 90/64 mmHg, FC 86 lpm, FR 18 rpm, oxygen saturation of 96%. Adequate state of alert, presence of edema in the perioral mucosa in addition to significant sialorrhea, cardiopulmonary auscultation without presenting pathological findings, rest of the examination without any abnormality. Chest x-ray is performed in AP and lateral projection where there is no evidence of mediastinitis or any type of infiltrate at the level of the pulmonary parenchyma.

It goes to an endoscopic procedure 24 hours after ingestion by the Pediatric Surgery service where the following relevant findings are

evident: pharynx with the presence of edema and fibrin plaques, at the level of the esophagus edema is observed from the region of the crico as well as erythema of the mucosa, linear lesions are observed in the first half of the esophagus, towards the middle and lower third reaching the hiatus circumferential lesions with fibrin are evident, thrombosis data in the superficial vessels, open esophageal hiatus. In the stomach gastric mucosa is identified with erythema, presence of body injury compatible with superficial ulcer of approximately 20 to 25% of this region, in addition to important erythema in the periphery of it, there is no loss of the integrity of the gastric wall, rest of the stomach without the presence of lesions. After the study, the diagnosis of our patient is established esophageal burn Zargar IIIA is secondary to caustic intake in our patient, Figure 2 Percutaneous gastrostomy probe 20 Fr is placed, 6 hours after the endoscopic assessment. He remains hospitalized in charge of the Pediatric Surgery service with specified management of proton pump inhibitor, systemic corticosteroid and broad-spectrum antibiotic therapy secondary to the referred endoscopic findings, with indication of use of gastrostomy 72 hours after placement.

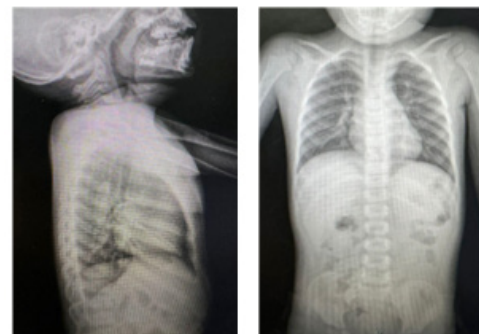


Figure 1 Physical examination.

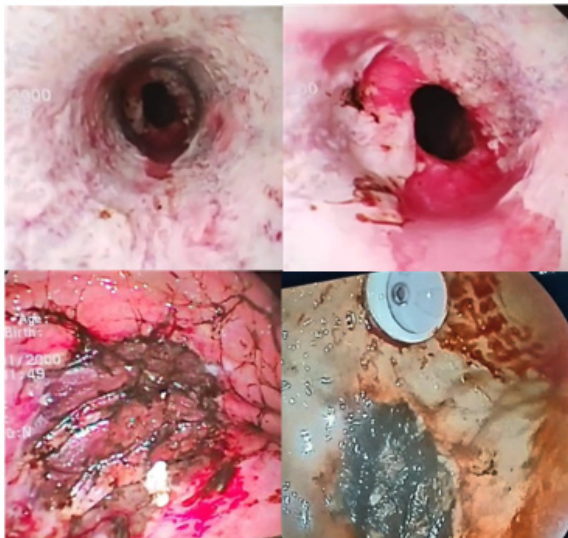


Figure 2 Endoscopic procedure.

Discussion

Children involuntarily ingest objects or substances, home being the most common area. Taking into account that the intake of caustics causes significant morbidity and mortality requiring medical attention, being a cause of frequent consultation in the Pediatric emergency service, with higher incidence in developing countries.² The average incidence is 38.7 cases per 100,000 inhabitants.³ The average age of presentation is in children under 5 years of age in Mexico, but in global terms the highest incidence range is in preschoolers and schoolchildren, considering a wide range of 2 to 8 years.⁴ Other associated risk factors are the male gender with a 3:1 relationship, having deficit attention and hyperactivity disorder, low socioeconomic level on the part of both parents.⁴ It is recommended to identify the ingested product, the nature, the physical form of it, as well as to identify the pH, this information is a fundamental part of the therapeutic approach and management in relation to the patient's evolution.

The damage of the esophagus is related to the nature and concentration of the ingested agent. Alkalis generate necrosis by liquefaction secondary to the saponification of lipids with superficial and deep ulcers, with a high risk of stenosis and perforation associated to high penetration at the submucosal and muscular layer, requiring a pH greater than 12 to generate injury, or less than 12 if we consider higher concentration and intake of the product.³ A study reported at the Federico Gómez Children's Hospital found that in the Mexican population it has a cup of admissions for caustic soda as an alkaline agent in 81.5% of cases.⁴ Acids usually cause coagulation necrosis with limited penetration, requiring a pH of less than 2.⁵ As doctors we must assess whether the ingested agent was stored in non-original containers, since this is related to a higher volume of intake in 29.2% of cases.⁴ As part of the recommendations when evaluating a patient with intake of alkaline substances, it should be avoided to cause vomiting and avoid diluting the corrosive or neutralizing the product due to the risk of worsening the injuries, since these actions are found as common practice in 43.8% of the reported cases. The most frequent location of esophageal injury is in the upper third by 65.5% and in the middle third by 25%, with a short thickness of the acidic agents and the long thickness of the alkaline agents.² The literature establishes

as a recommendation the performance of endoscopy during the first 12-48 hours after ingestion. Endoscopy is not recommended after the first week due to the high risk of perforation.³

From the pathophysiological point of view of caustic injury, it consists of 4 phases:

- Phase 1- Day 1 to 3 with inflammatory reaction with edema and eosinophilic necrosis
- Phase 2- Day 3 to 5 with the presence of ulcers in the muscle layer.
- Phase 3- Day 6 to 14 with the presence of granulation tissue.
- Phase 4- Day 15 to 30 with the presence of scarring, establishing esophageal stenosis.³

The symptoms associated with this type of injury are dysphagia 93.5% of patients, accompanied by vomiting, abdominal pain, hematemesis, nausea, sialorrhea, irritability, odynophagia, dysphonia and bleeding. These symptoms together are associated with high-grade lesions, in the literature it is referred to that asymptomatic patients may present a serious injury if we find lesions in the oral cavity to the physical examination. In the presence of more than 4 aforementioned symptoms we have the possibility of having an esophageal injury of type Zargar 2B and 3.⁴ A useful tool for decision-making is the use of the Drool Scale, emphasizing the observation of the patient's symptoms, allowing us to predict the development of stenosis with a score equal to or less than 4 points, with a positive predictive value of 85%.³ Complementing with the PEWS score, which emphasizes the cardiopulmonary state and neurological state, using it as an early indicator of clinical deterioration, with a high risk of admission to the intensive care unit.⁶

In laboratory tests we can find mild to moderate anemia in 38.7%, leukocytosis in 41.9% and increase in C-reactive protein in 25.8% of patients.² In recent studies it is considered that the neutrophil/lymphocyte ratio will be increased with the intake of alkaline agents, this value together with a marked leukocytosis increases the prognosis of a higher mortality.⁷ With regard to complementary cabinet studies, transmural necrosis can be evidenced in computed tomography, which is associated with worse evolution during the acute period and high incidence of surgical procedure requirement, we must consider it as an approach in patients in whom endoscopy is contraindicated, as is the case of those patients who are not in the window period to perform this diagnostic procedure.⁸ It is important to have institutions that have a Pediatric Endoscopy service with 24-hour access with the necessary personnel and infrastructure resources to guarantee adequate care in relation to an acute event and thus reduce the rate of subsequent complications. It is recommended to perform endoscopy within the following 24 hours in a hemodynamically stable symptomatic patient, since it allows us to plan the appropriate treatment and follow-up. Zargar's classification system to evaluate endoscopic findings secondary to the intake of caustics helps us predict the prognosis in relation to management and possible subsequent complications such as the risk of stenosis.

This classification includes 4 degrees of severity:

- **Grade 0:** Normal mucosa
- **Grade 1:** Slight edema and redness of the mucus
- **Grade 2A:** Superficial ulcers, bleeding and exudate
- **Grade 2B:** Local deep ulceration or surrounding

- **Grade 3A:** Focal necrosis
- **Grade 3B:** Extensive necrosis
- **Grade 4:** Perforation

Most patients with grade 1 or 2A lesions have a good prognosis without risk of death or the development of immediate or late complications. For patients with grade 3B lesions, mortality can increase to 65% requiring surgical resolution.³ Grade 1 lesions do not require treatment or fasting, grade 2 and 3 lesions require proton pump inhibitors to reduce the risk of secondary reflux, antibiotic therapy to reduce the risk of bacterial growth in necrotic tissue, and reduces the risk of infection in granulation tissue, corticosteroids at high doses for 3 days to prevent the formation of stenosis, taking caution in the formation of peptic ulcer or fungal infection in the esophagus.⁹ The placement of a gastrostomy tube is the most frequent method of enteral feeding in 64.5% in patients with significant burns due to the high risk of malnutrition, complementing with esophageal dilations by 64.5% which can be performed from the third week.¹⁰ We must consider that the best way to prevent this type of injury is with adequate training of parents about this type of agents at home, precautions and care of children.¹¹

Conclusion

The intake of caustics is an important problem in the pediatric population and in our country, being associated with the lack of training to parents about the risks at home, the early suspicion by trained personnel, and hospitals with the infrastructure of having pediatric surgeons trained in endoscopy, for the timely realization of it for an appropriate therapeutic approach and management, is indispensable for the evolution of children.

Acknowledgments

None.

Conflicts of interest

The authors declare that there are no conflicts of interest.

References

1. Ripoll TN, Martínez SL, Habimana JA, et al. Ingestion of caustic substances: An analysis of the safety and benefit of a less aggressive protocol. *Anales de Pediatría*. 2019;90(4):207–212.
2. Mantho P, Engbang JP, Ndzana ACD, et al. Caustic esophageal strictures in children: diagnosis, treatment and evolution in the city of Douala. *Journal of Surgery and Research*. 2022;5(3):486–493.
3. Pierre AR, Neri S, Contreras M, et al. Ibero-Latin American clinical practice guide on caustic esophagitis in Pediatrics: Pathophysiology and clinical-endoscopic diagnosis (1st Part). *Revista Chilena de Pediatría*. 2022;91(1):149.
4. Almanza ME, Blanco RG, Penchyna GJ, et al. Importance of early endoscopic and clinical evaluation of children with caustics ingestion. *Bol Med Hosp Infant Mex*. 2021;78(6):544–548.
5. Oliva S, Romano C, De Angelis P, et al. Foreign body and caustic ingestions in children: a clinical practice guideline. *Digestive and Liver Disease*. 2020;52(11):1266–1281.
6. Sharif AF, Gameel DE, Abdo SA, et al. Evaluation of pediatric early warning system and drooling reluctance oropharynx others leukocytosis scores as prognostic tools for pediatric caustic ingestion: a two-center, cross-sectional study. *Environmental Science and Pollution Research*. 2021;29:5378–5395.
7. Dilawari JB, Singh S, Rao PN, et al. Corrosive acid ingestion in man - a clinical and endoscopic study. *Gut*. 1984;25(2):183–187.
8. Tosca J, Villagrana R, Sanahuja A, et al. Caustic ingestion: development and validation of a prognostic score. *Endoscopy*. 2020;53:784–791.
9. Hend EL Helaly, Ahmed B Radwan, Wael AG, et al. The impact of initial management for pediatric corrosive ingestion in a specialized toxicology center “Poison Control Center Ain Shams University Hospitals” (PCCASUH) on Long term outcome of corrosive ingestion sequels. *Zagazig J Forensic Med. & Toxicology*. 2022;20(1):210–224.
10. Niedzielski A, Schwartz SG, Partycka PK, et al. Caustic agents ingestion in children: A 51-year retrospective cohort study. *Ear, Nose & Throat Journal*. 2019;99(1):52–57.
11. Narkutė A, Žilinskaitė, V. Overview of caustic ingestion cases at the children’s hospital of vilnius university hospital Santaros klinikos between 2011 and 2018. *Acta medica Lituanica*. 2020;26(4):199–204.