

Nutritional challenges in accidental caustic soda ingestion: a case report

Abstract

Accidental sodium hydroxide ingestion is eventually found in Pediatrics and poses a great risk of serious and often irreversible lesions in the gastrointestinal tract. The extension and severity of the injuries vary with each patient. Esophageal stenosis is one of the most feared complications with great morbidity. For these patients, feeding is difficult and proper nutritional therapy is a challenge. Currently, no consensus exists regarding the best nutritional approach. We report a case of accidental caustic soda injury in a toddler who developed severe malnutrition due to prolonged critical illness and esophageal stenosis. We aim to stimulate debate around this concerning issue and hopefully shed some light on therapeutic possibilities.

Keywords: caustic soda ingestion, caustic soda, sodium hydroxide, malnutrition, esophageal stenosis, nutritional therapy, pediatrics

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Introduction

Sodium hydroxide (or caustic soda) is a colorless alkaline substance with great corrosive action. Accidental ingestion is occasionally found in Pediatric Emergency Services and carries a great risk of serious and irreversible gastrointestinal (GI) tract injuries.¹⁻³

These patients can become severely ill, and adequate nutritional care is essential for a good recovery. At the same time, it is a great challenge due to severe upper GI tract lesions. Furthermore, many patients develop esophageal stenosis during the healing process. Therefore, alternative feeding routes are the rule as oral ingestion becomes impossible. Currently, no guidelines exist to determine the best way to feed this population.

We report a case of a child who accidentally ingested sodium hydroxide and developed malnutrition after multiple complications and long in-hospital stays.

Case report

A 16-month-old female child was hospitalized after accidentally ingesting caustic soda in her home. At the time, she was treated at a local hospital and received enteral feeding through a nasogastric tube.

Approximately 20 days after the event, she developed esophageal stenosis. Repeated sessions of endoscopic dilatation were performed. Unfortunately, one of the procedures was complicated by an esophageal perforation. She was then submitted to an esophagostomy and a gastrostomy (GTT) feeding tube was placed.

She managed to be discharged home using a home-made diet complemented with an industrialized polymeric normocaloric diet. In the following months, she had to perform serial dilations of the esophagostomy orifice due to recurring stenosis. About one year after the event, she was transferred to our hospital to have a pharyngo-coloplasty which went well.

On the first post-operative day, she weighed 10kg (Z score/age: -1.83), had a body mass index (BMI) of 13, 3 kg/m² (Z score/age: -1.97), and a middle-upper arm circumference (MUAC) of 14cm (Z score/age: -1.05). On the fifth day, the enteral diet was restarted, and the day after oral feeding. Two days later, she was discharged.

A month later, she was readmitted to her local hospital due to aspiration pneumonia and required mechanical ventilation. Parenteral nutrition was started since clinical conditions did not allow enteral feeding. Subsequent investigation revealed an esophageal cyst compressing the trachea that needed additional surgery, but the procedure was delayed due to inadequate clinical conditions. She was then transferred again to our service.

At that time, she weighed 9.05kg (Z score/age: -3.16); had a BMI of 8.7 kg/m² (Z score/age: -6.62); and had a MUAC of 12cm (Z score/age: -3.13). Anthropometric data were calculated using estimated height because clinical conditions didn't allow proper measurement.

Upon arrival, she presented with nystagmus, dizziness, and an unstable gait. A probable diagnosis of Wernicke's encephalopathy was made. Thiamine supplementation was initiated, and neurologic symptoms improved.

We gradually introduced complimentary normocaloric and normoproteic enteral feeding via the GTT tube, totaling an average intake of 690 kcal/day (70.5% caloric adequacy) and 20 g/day of protein (100% protein adequacy). After a few days, she was weaned off the parenteral nutritional support. Better nourishment allowed the surgical removal of the cyst.

A recovery diet plan with caloric and protein targets of 115% and 100% of dietary reference intake (DRI) was made. She continued to improve, and after nine days, she initiated oral feeding with good tolerance. She was discharged home and received an oral diet complemented with GTT nutrition to reach her target.

On her final assessment, she weighed 10.7kg (Z score/age: -1.81); had a BMI (Z score/age: -4.94); and a MUAC of 12.7cm (Z score/age: -2.45).

Discussion

Caustic soda ingestion is a severe condition that poses life-threatening risks and great morbidity to the patient. It must be recognized as such by the general pediatrician, as these patients are eventually seen in general pediatric emergency services.^{1,2} Nourishing this population is a challenge.

Most accidents occur at home, and their prevalence is highest in children under 5 years old. Those less than 2 years old are especially at risk as their mobility has increased, but their risk assessment skills are poor (2). Also, sodium hydroxide is a colorless liquid, and it is not unusual for parents to store it inappropriately (e.g., in soft drink bottles), facilitating the child's access.⁴ It has a high pH, and when in contact with the mucosa, it can lead to liquefaction necrosis.^{2,3} In the most severe cases, deeper layers are affected, causing ulceration and perforation of the upper GI tract structures.^{4,5}

Symptoms can manifest early in the course, and milder cases can be managed conservatively after a period of observation. However, the absence of symptoms in the initial phase does not exclude the possibility of esophageal damage.⁶

The healing process is prone to complications, as the scarred tissue usually leads to esophageal strictures and dysphagia.⁷ Many patients need to change their diets or become malnourished.⁸ Currently, endoscopic esophageal dilation is the treatment of choice and not infrequently has to be repeated several times, increasing the likelihood of complications such as esophageal perforation.

There are no guidelines to guide nutritional support in this population, and an individualized approach is necessary.⁹ As a rule of thumb, patients with oral cavity lesions or digestive symptoms should be kept nil per os¹⁰ and an upper GI endoscopy should be performed.⁶

Our patient had a severe intoxication and a disease course permeated with complications. She developed Wernicke's encephalopathy due to thiamine deficiency. At one stage, she fulfilled the World Health Organization (WHO) criteria for severely underweight and moderate acute malnutrition.^{11,12}

It is well recognized that adequate nourishment is essential for the adequate management of a sick infant.¹³ Despite the esophageal injury, our patient had a preserved lower GI tract, which allowed us to nourish her with enteral feeding.

Another important facet of this case is the difficulty in acquiring correct anthropometric data. A promising alternative is the middle upper arm circumference. It is easily assessed and provides a good correlation with subcutaneous fat and muscle mass loss.¹⁴ Our patient had a 2cm loss in MUAC, reaching the definition of moderate acute malnutrition. MUAC improved along with her nutritional status, following the same tendency as weight and age-adjusted BMI.

We described a complex case of caustic soda intoxication leading to malnutrition. Using a multimodal nutritional strategy composed of oral, enteral, and parenteral feeding helped improve her nourishment status. These cases remain challenging, and more studies are necessary to guide proper nutritional management.

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Conflicts of interest

The authors declare that there are no conflicts of interest.

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