



Ingestion of Caustic Products in Children Seen at the Stage of Isolated Antropyloric Stenoses

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Abstract

Introduction: The ingestion of caustic products is responsible for long-term complications. This study aimed to investigate the epidemiological, diagnostic, therapeutic, and evolutionary profile of cases of caustic ingestions in children aged 0 to 15 years old seen at the Sourô Sanou University Hospital (SSHU).

Methods and Materials: This was a cross-sectional, descriptive study conducted from January 1, 2019 to December 31, 2022. The study included children aged 0 to 15 years who were managed at CHUSS for ant pyloric stenosis of caustic origin.

Results: 43 children who ingested corrosive products and were found to have an antropyloric stenosis were recorded, an average of 10.25 cases per year. The most common age group was 13-24 months (78%). The sex ratio was 3.56. Corrosive ingestion was accidental in 95.12% of cases. The most commonly ingested caustics were bases (97.56%) and potash (78.05%). The main symptom was vomiting. Resuscitation preceded surgical treatment. Postoperative outcome was favorable in 34 cases (85%) and mortality was 4.88%.

Conclusion: A chemical analysis complemented by an experimental study of the potassium chloride used in our kitchens would allow us to better understand the propensity for antropyloric damage when ingesting this potassium chloride.

Keywords: Caustic; Vomiting; Stenosis; Antropyloric; Child

Abbreviations

SSHU: Sourô Sanou University Hospital

Introduction

Caustic ingestion is a diagnostic and therapeutic emergency requiring multidisciplinary management [1]. This ingestion is most often accidental in children, unlike in adults where it is intentional in attempts at autolysis [2]. While the incidence is decreasing significantly in Europe due to the impact of preventive measures in the population [3], the prevalence is increasing sharply in sub-Saharan

Africa, with high rates approaching 10% [4-6]. Potassium is the most common caustic in our context [7]. This ingestion is responsible for numerous complications, including antropyloric stenosis, which refers to a narrowing of the lumen of the antropylorobulbar region, resulting in an obstruction to the evacuation of gastric contents. This is a medical surgical emergency [1,2]. The diagnosis of antropyloric stenosis is based on clinical and paraclinical findings and the presence of incoercible vomiting. Treatment is surgical, supported by medical therapy, including pre- and postoperative resuscitation [8]. However, isolated strictures of caustic origin are

rare [7,9]; the African literature reports only isolated cases in children and adults [10,11]. The literature associates gastric complications with acidic caustics and esophageal complications with alkaline products such as potassium [6,7]. Gastric stenosis seems to be more common after the ingestion of strong acids [12,13]. In Africa, and particularly in Burkina Faso, the location of antropyloric lesions after caustic ingestion is poorly known and documented. As a result, very few preventive measures against the ingestion of corrosive products have been implemented in our context. Our study will focus on the epidemiologic, diagnostic, therapeutic and evolutionary aspects of children who have ingested caustic products and are seen at CHUSS in the late stage of antropyloric stenosis.

Materials and Methods

Our study was conducted at the CHUSS Pediatric Nutritional Recovery Center and Pediatric Surgery Department in Bobo-Dioulasso, Burkina Faso. Bobo-Dioulasso is the economic capital of Burkina Faso and the second most populous city after Ouagadougou (989,967 inhabitants). It is the capital of the Hauts-Bassins region, the province of Houet and the prefecture of the department of the same name. It covers an area of 13,678 hectares. This was a cross-sectional descriptive study. It focused on children aged 0 to 15 who were admitted to the CHUSS for incoercible vomiting and treated for antropyloric stenosis from January 1, 2019 to December 31, 2022, i.e. 04 years. All children aged 0 to 15 years who were suspected and/or confirmed to have ingested a caustic agent, diagnosed with antropyloric stenosis, and treated during the study period were included. Incomplete and unusable records and forms related to esophageal stenosis were not included. We performed a non-probability exhaustive sampling, which consisted of including every patient who met the inclusion criteria during the study period. Data were collected by survey. On the one hand, a literature review was used to extract data from the pediatric surgery department's admission registers, medical records, treatment sheets, and operative reports. Data were collected using a specially designed individual survey form. The collected data were entered into a computer. Microsoft Word and Excel 2013 were used for word processing and designing tables and figures. Statistical analysis was performed using Epi info software version 7.2.2.6. Results were expressed as means with standard deviations for quantitative variables or as percentages for qualitative variables. A simple descriptive analysis was performed on the entire study population. This included sociodemographic clinical, and therapeutic data.

Results and Discussion

Results

During the period from January 1, 2019 to December 31, 2022, the SSHU Pediatric Surgery Department and Pediatric Nutritional Recovery Center registered 3,560 patients. Among them, 43 patients had antropyloric stenosis after ingestion of corrosive products (i.e. 1.21% of hospitalized patients). The annual mean was 10.75 cases.

Sociodemographic characteristics

The mean age of the patients was 25.4 months, with extremes of 12 months and 14 years. The most affected age group was 13-24 months with a frequency of 77.8%. There was a predominance of males, with 33 boys, giving a sex ratio of 3.3. Most of the fathers of our patients were farmers (62.5%). The mothers were mainly housewives (93.3%).

Diagnostic aspects

Caustic ingestion was accidental in 39 patients (95.1%) and voluntary in 02 (4.9%). The period of caustic ingestion was recorded in 36 patients. The majority occurred in October, followed by May (25% and 17%, respectively). Figure 1 shows the distribution of patients according to the period of caustic ingestion. The mean time between ingestion of the caustic and admission was 32.8 days, with extremes of 10 days and 92 days. The various signs occurred on average 11.3 days after ingestion of the caustic, with extremes of 01 and 30 days; 97.5% of the caustics ingested were bases. Potash accounted for 80.5%. There were 01 cases of bleach ingestion. None of the children had ingested acid.

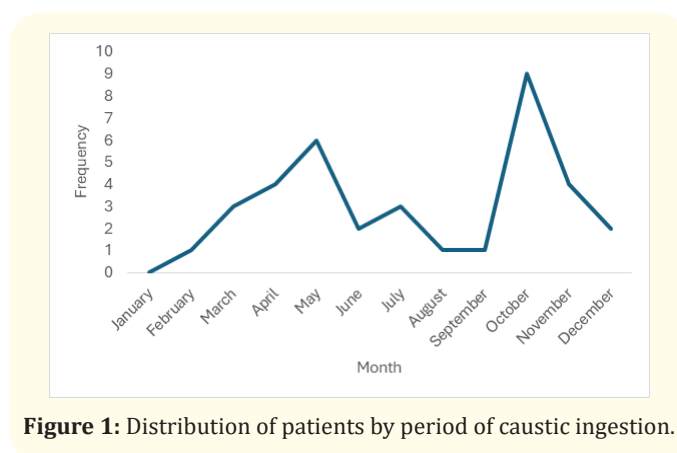


Figure 1: Distribution of patients by period of caustic ingestion.

The amount ingested could not be determined in the majority of cases. Table 1 shows the distribution of patients according to the type of ingested caustic. Incoercive vomiting was the main functional sign, present in 100% of the patients. It was spontaneous in all patients. None of the patients had dysphagia. The most common physical signs were pallor, dehydration, and malnutrition. Pallor was present in 18 patients, dehydration in 19, and malnutrition in 38. Of the malnourished patients, 29 had a Z score of P/T < -3ET. Anemia was present in 33 (76.7%) patients, hyponatremia in 80% and acidosis in 52%. Esogastroduodenal fibroscopy was performed in only one patient. the oesogastroduodenal transit was performed in all patients. It showed pyloric stenosis, gastric dilatation in 100% of cases and gastroesophageal reflux in 9.3% of cases.

Table 1: Distribution of patients by type of caustic ingested n = 41.

Nature of caustic		Frequency	%
Base	Potash	32	80,5
	Soda	7	17,1
Oxidizer	Bleach	1	2,4
Acid		0	0
Total		41	100

Therapeutic and developmental aspects

Preoperative medical preparation consisted of correction of fluid and electrolyte imbalances in all patients. Red blood cells were transfused in 07 patients (16.28%). Injectable amino acids were administered to 18 patients (41.9%); 12 patients received injectable omeprazole.

Surgically, a midline supraumbilical incision was performed in 09 patients (20.9%) and a transverse right supraumbilical incision in 33 patients (76.7%). All patients underwent a Heineke-Mikulicz pyloroplasty. Posterior trans-mesocolic gastroenteroanastomosis was performed in 02 patients for recurrence. The mean time from admission to surgery was 16.6 days, with extremes of 02 and 35 days. The mean time from admission to surgery was 50 days, with extremes of 15 and 99 days. Figure 2 shows the distribution of patients by time to hospital. Postoperative management was uncomplicated in 37 patients (86% of cases). Feeding was resumed 06 hours after surgery, exclusively through a trans-anastomotic nasogastric tube. Six (06) patients had postoperative complications. These were vomiting (n = 01), dysphagia (n = 01), eschar (n = 01), recurrence (n = 02).

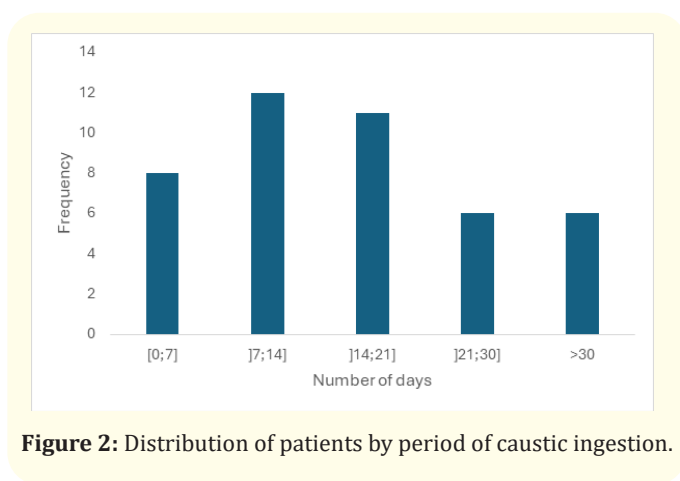


Figure 2: Distribution of patients by period of caustic ingestion.

We recorded 02 deaths, or 4.7% of patients, including one patient who died on the fourth postoperative day. The average cost of treatment was 331991 FCFA, including consultation, hospitalization, medication and paraclinical examination for potassium ingestion at a cost of 25 FCFA.

Discussion

The presence of caustics in the home, and their storage in containers intended for food, especially drink, would facilitate accidental ingestion of these substances at this developmental stage. Almost all patients (97%) had ingested bases in liquid form, particularly cooking potash. None of the children had ingested acid. In Africa, particularly Burkina Faso, potash is used in the preparation of local dishes (gonré, beans, tô, etc.). It reduces or completely eliminates the acidity of these dishes. It also facilitates the cooking of leaves. Additionally, potash is utilized in traditional therapy to treat skin ailments [14]. The location of lesions at the antropyloric level appears to be highly unusual when compared to the findings in the literature, which indicate a prevalence of acids in cases of pyloric stenosis [6,15-18]. In our study, potassium was administered in an aqueous solution. In the stomach, with a relatively prolonged contact time, it induces liquefaction and necrosis, which allows deep diffusion of the toxic agent. Subsequently, notable inflammatory processes and tissue reconstruction—which are often retractile and pseudohypertrophic—occur. Between the fourth and sixth weeks, these processes result in a reduction in the antral lumen and, to varying degrees, complete obstruction of the pylorus, thereby impeding gastric emptying [1,19,20]. The clinical signs observed in our study were predominantly vomiting of food, which was never bilious, given the site of the obstruction, namely above the ampulla of Vater. Although vomiting is a common symptom, its absence should not delay the diagnosis.

A single patient underwent oesogastroduodenal fibroscopy for antipyloric dysmotility. Ideally, this procedure should be performed within the first 48 to 72 hours after ingestion [21,22]. The delay in consultation and the unavailability of a small-caliber fibroscope in our context make it challenging to perform this examination. The study revealed a significant postponement in surgical intervention due to the extended consultation period in our context, consequently extending the preoperative preparation period. Nevertheless, surgical intervention should not be undertaken until at least three weeks have elapsed since ingestion, as this may result in the perpetuation of the inflammatory process and an elevated risk of recurrence. In a study conducted in Pakistan, Imran [15] observed a longer delay than that observed in our study, with a mean duration of 55 days. The optimal surgical approach for stenosis remains a topic of debate in the medical community [23,24]. Given the extent of the lesions observed in our patients, we elected to pursue Heineke Mikulicz pyloroplasty as the primary course of treatment. Some authors have proposed gastric resection with anastomosis as a preferred treatment option, citing the reported cases of gastric carcinoma following acid ingestion as a rationale for this approach [25]. The mortality rate in our series (n = 2) was 4.88%, including one postoperative death. These deaths were secondary to hydroelectrolytic disorders and reduced immunity caused by undernutrition. Our results are lower than those reported by El Asmar (11.5%) and higher than those reported by Özokutan, who did not record any surgical mortality [16,18].

Conclusion

The storage of caustic substances in drinking vessels in dissolved form within households, coupled with the presence of processing units in the home, serves to facilitate the occurrence of caustic ingestion accidents. The clinical manifestations are characterized by vomiting and severe acute malnutrition. H-M pyloroplasty remains the preferred treatment option in this context, with favorable outcomes. Prevention entails raising awareness among households of the hazards associated with caustic products and ensuring their secure storage to prevent access by children. In view of the risk of malignant degeneration, patients who have undergone pyloroplasty should be monitored into adulthood. Furthermore, a chemical analysis, complemented by an experimental investigation of the potassium chloride utilized in domestic kitchens, would facilitate a more comprehensive understanding of the proclivity for damage when this potassium chloride is ingested.

Conflict of Interest

None.

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