

Management of Caustic Esophageal Injuries and Risk Factors for Stricture Formation at Bouaké University Hospital

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Abstract

Objective: To analyze the management of caustic esophagitis and to identify the factors associated with the development of esophageal stricture in a referral center in sub-Saharan Africa. **Patients and Methods:** We conducted a retrospective, descriptive and analytical study based on the medical records of patients managed in the Gastroenterology Department of Bouaké University Hospital from January 2015 to December 2024. Eligible patients were those hospitalized for caustic ingestion with a minimum follow-up of eight weeks. Initial management strategies and subsequent stricture formation were assessed. A p-value < 0.05 was considered statistically significant. **Results:** Sixty-eight patients were included. The mean age was 24.1 years, with a male predominance (sex ratio 1.34). Rural residents accounted for 30.9%, and farmers were the most represented occupation (26.5%). The mean delay to care was 3.5 days. Severe lesions (Zargar grade) were found in 54.4% of cases. Corticosteroids, antibiotics, and PPIs were administered in 35.3%, 58.8%, and 75% of patients, respectively. After follow-up, esophageal stricture occurred in 39.7%. On analysis, lack of PPI therapy in the initial management was the only therapeutic factor significantly associated with stricture formation. **Conclusion:** Caustic ingestion primarily affected young adults, with a slight male predominance. More than half of the patients presented with severe esophageal injuries, which were significantly associated with stricture formation. Medical management commonly included proton pump inhibitors (PPIs) and corticosteroids; however, only PPIs demonstrated a protective effect against the development of esophageal stricture.

Keywords

Caustic Ingestion, Management, Stenosis, Bouaké

1. Introduction

Caustic esophagitis from voluntary or accidental ingestion of corrosive substances is a relatively common problem worldwide [1]. In 2004, the World Health Organization estimated a global incidence of 110 cases per 100,000 population per year [2]. These injuries pose a major public health concern due to potentially life-threatening complications, especially in children, including acute perforation and long-term stricture formation [3]. The severity of initial lesions, classified by Zargar's system, depends on factors such as the type of substance (acid or base), concentration, quantity ingested, and duration of mucosal contact. Stricture development, however, appears to be influenced by the treatment administered at diagnosis. Proton pump inhibitors (PPIs), antibiotics, and corticosteroids have long been used in Western settings to mitigate this risk, with mixed results [1]. More recent studies have highlighted the effectiveness of sucralfate and mitomycin C, though their use remains limited [4]. In Africa, most research on caustic injury management and stricture prevention has focused on Maghreb countries [5] [6]. In sub-Saharan Africa, studies have emphasized clinical and endoscopic features [7] [8], with few addressing therapeutic strategies [9]. Our study aimed to evaluate the management of caustic esophagitis and identify factors associated with esophageal stricture in patients hospitalized at a referral center in sub-Saharan Africa.

2. Patients and Methods

This was a retrospective, descriptive, and analytical study conducted in the Gastroenterology Unit of the Department of Medicine at Bouaké University Hospital. The study covered a ten-year period, from January 1, 2015, to December 31, 2024. All patients hospitalized for caustic ingestion, confirmed by history and/or endoscopic findings, and who had a minimum follow-up of eight weeks after hospitalization were included. Patients with incomplete records, those who died, or those lost to follow-up before eight weeks were excluded. Data were extracted from archived medical records using a structured questionnaire. The variables analyzed included sociodemographic characteristics, circumstances of ingestion, endoscopic findings according to Zargar's classification, details of initial management, and clinical outcomes, with or without the development of endoscopically confirmed esophageal stricture. Esophageal involvement was considered severe when the grade, according to the Zargar classification, was equal to or greater than IIb. The primary outcome was the occurrence of esophageal stricture. Data were entered and analyzed using SPSS statistics 22. Quantitative variables were expressed as means \pm standard deviation, depending on their distribution. Qualitative variables were presented as counts and percentages. Univariate analysis was performed

using the Chi-square or Fisher's exact test, as appropriate, for categorical variables. Variables associated with esophageal stricture at $p < 0.20$ in univariate analysis were included in a logistic regression model for multivariate analysis. Statistical significance was set at $p < 0.05$. The study was conducted in accordance with confidentiality and anonymity standards. Ethical approval was obtained from the local ethics committee, represented by the Medical and Scientific Directorate of Bouaké University Hospital.

3. Results

A total of 68 patients with caustic ingestion were included in the study. The mean age was 24.12 ± 13.2 years, ranging from 3 to 63 years. Males accounted for 57.35% of the cohort, corresponding to a sex ratio of 1.34. Patients residing in the city of Bouaké represented 58.82% of the study population, while 30.88% came from rural areas. Farmers were the most common occupation (26.47%), followed by students (25%) (**Table 1**).

Table 1. Sociodemographic characteristics of patients.

	Frequency (n)	Percentage (%)
Age (years)		
<15	16	23.52
15 - 25	22	32.35
25 - 35	16	23.52
>35	14	20.59
Sex		
Male	39	57.35
Female	29	42.65
Place of Residence		
Bouaké	40	58.82
Outside Bouaké	28	41.18
Region of Origin		
Urban	47	69.12
Rural	21	30.88
Occupation		
Executives	4	5.88
Students	17	25
Workers	9	13.24
Merchants	5	7.35
Farmers	18	26.47
Housewives	7	10.29
Unemployed	8	11.76

Ingestion was intentional, occurring in the context of self-harm, in 63.23% of cases. The ingested substance was predominantly a base in 51.47% of patients. The mean time from caustic ingestion to the initiation of management was 3.48 ± 1.59 days (**Table 2**).

Table 2. Circumstances of caustic ingestion.

	Frequency (n)	Percentage (%)
Circumstance of Ingestion		
Voluntary	43	63.25
Accidental	25	36.76
Type of Caustic Substance		
Acid	33	48.53
Base	35	51.47
Psychiatric Disorder		
Yes	4	5.88
No	64	94.12
Induced Vomiting		
Yes	38	55.88
No	30	44.12

According to Zargar's classification, grade II lesions were the most frequently observed, accounting for 51.47% of cases, while severe lesions overall represented 54.41% of the cohort (**Table 3**).

Table 3. Distribution of endoscopic lesions according to the Zargar classification.

Stage		Frequency (n)	Percentage (%)
Grade 0		6	8.82
Grade I		9	13.24
Grade II	a	16	23.53
	b	19	27.94
Grade III	a	10	14.71
	b	8	11.76

Systemic corticosteroid therapy was prescribed for 24 patients (35.29%), antibiotics for 40 patients (58.82%), and proton pump inhibitors (PPIs) for 51 patients (75%). Enteral or parenteral nutritional support was provided to 13 patients (19.12%). At the end of the eight-week follow-up, esophageal stricture was observed in 27 patients (39.70%) (**Table 4**).

Table 4. Initial management.

	Frequency (n)	Percentage (%)
Time to first medical care		
<3 jours	37	54.41
>3 jours	31	45.59
Corticosteroids		
Yes	24	35.29
No	44	64.71
Proton Pump Inhibitors (PPIs)		
Yes	51	75
No	17	25
Antibiotics (ATB)		
Yes	40	58.82
No	28	41.12
Fasting		
Yes	41	60.29
No	27	39.71
Artificial Nutrition		
Yes	13	19.12
No	55	80.88

Univariate analysis revealed that the severity of endoscopic lesions (grade \geq IIb), a delay in management greater than 72 hours, and the absence of PPI therapy were significantly associated with the development of esophageal stricture (**Table 5**).

Table 5. Univariate analysis of factors associated with esophageal stricture.

Factor	OR	95% CI	p-value
Severe Zargar Grade	5.47	1.87 - 16.0	0.0023
Time to Care >3 days	3.46	1.33 - 9.01	0.0037
Corticosteroids	0.49	0.17 - 1.46	0.287
Proton Pump Inhibitors (PPIs)	0.35	0.13 - 0.93	0.028

Multivariate logistic regression analysis showed that the factors independently associated with esophageal stricture were the same as those identified in the univariate analysis (**Table 6**).

Table 6. Multivariate analysis of risk factors for stricture.

Variable	β Coefficient	Standard Error	Odds ratio	95% CI	p-Value
Severe Zargar Grade	1.81	0.64	6.12	1.71 - 21.93	0.005
Time to Care > 3 days	1.29	0.57	3.63	1.18 - 11.13	0.024
Corticosteroids	-0.89	0.62	0.41	0.12 - 1.41	0.157
Proton Pump Inhibitors (PPIs)	-1.18	0.59	0.31	0.10 - 0.95	0.041

4. Discussion

The mean age of the 68 patients included in the study was 24.12 ± 13.2 years, ranging from 3 to 63 years. Although some studies have been conducted in populations with different mean ages, such as in Nigeria (32.1 years) [10] and Mali (19.8 years) [9], this value is consistent with data from the subregional literature. For instance, Kouamé in Côte d'Ivoire [11] and Saké in Benin [8] reported mean ages of 27 and 25.54 years, respectively. Despite variations between studies, these findings consistently indicate that caustic ingestion predominantly affects a young population.

Males accounted for 57.35% of the study population, corresponding to a sex ratio of 1.34. This is similar to values reported in Western and Congolese series, which were 1.33 [12] and 1.3 [7], respectively. However, the literature shows considerable regional variability. Some studies reported a higher male predominance, with sex ratios of 2.2 in Ouagadougou [13] and 3.8 in Parakou, Benin [8]. Conversely, other studies highlighted a female predominance, as evidenced by a sex ratio of 0.7 in an Algerian study [6], and 0.8 and 0.52 in rural populations in Burkina Faso [14] and Pakistan [15], respectively.

In our study, 30.88% of patients were from rural areas, a notably higher proportion than the 4% reported in the Abidjan series [16]. This difference may reflect the demographic characteristics of the two cities: Abidjan, the country's economic capital, is predominantly urban, whereas Bouaké, although the second largest city, remains strongly influenced by surrounding rural populations. Internationally, the distribution of cases varies widely. For example, in Pakistan, 52.9% of patients came from rural areas [15]. This pattern may be associated with suboptimal management of caustic ingestions. Rural regions are often under-resourced, with limited access to trained and experienced healthcare personnel. Moreover, the reliance on traditional healers in these areas can further contribute to delays in seeking appropriate medical care.

Suicidal intent was confirmed in 63.23% of cases, a rate consistent with the wide variability reported in the literature. Local and African series, such as those conducted in Abidjan and Morocco, reported similar prevalences of 60.0% [16] and 68.42% [17], respectively. In contrast, studies from Senegal and Nigeria indicated higher rates of 72.7% [18] and 71.4% [10] among patients from major cities. In Asia, this proportion reached 95.6% [15], highlighting notable geographical and

cultural disparities, particularly in rural populations. However, this high prevalence of suicidal intent is not universal, especially among children. Indeed, all caustic ingestions reported in Nigerian and Spanish pediatric series were accidental [19] [20]. Overall, these observations suggest that caustic ingestion is generally intentional in adults but predominantly accidental in children.

The caustic substances most frequently involved in our series were bases, accounting for 51.47% of cases. This finding is consistent with studies conducted both in Western countries and in Africa, reporting proportions of 71.9% in Spain [20], 58.33% in Benin [8], and 54.4% in Congo [7]. Conversely, other studies have reported a predominance of acids, with varying proportions [6] [21]. This heterogeneity is primarily explained by differences in accessibility and use of caustic substances across regions.

A psychiatric disorder was identified in 5.88% of patients in our study, compared to 33.3% in Nigeria [10] and 61.9% in France [12]. These discrepancies may be due to the lack of comprehensive psychiatric evaluation in sub-Saharan African settings. To prevent recurrent suicidal behavior in any form, a systematic psychiatric evaluation should be incorporated into the management of patients with intentional caustic ingestion.

In our study, the mean time from caustic ingestion to initiation of management was 3.48 ± 1.59 days, almost identical to the 3-day delay reported in the Nigerian series [22]. This interval was shorter than that observed in the Beninese series [8], but considerably longer than the 12 hour delay reported in 70% of patients in the Moroccan series [17]. Such delays in care, frequently observed in sub-Saharan countries, may be attributed to self-medication with herbal decoctions and financial constraints that discourage timely hospital admission.

Although largely surpassed by CT scanning, upper gastrointestinal endoscopy remains essential in resource-limited settings with constrained financial means. According to Zargar's classification, 54.41% of lesions in our series were considered severe. This proportion was higher than the 38.5% reported in the Moroccan series [17] but lower than the 66.67% observed in the Burkinabe series [14]. The heterogeneity in the prevalence of severe lesions reported in the literature raises questions about the factors influencing these variations, including population characteristics, type and quantity of ingested substances, and delays in management.

Esophageal stricture, the most feared late complication of caustic esophagitis, was observed in 39.70% of our patients. This proportion is consistent with the literature, which reports rates ranging from 20% to 40% depending on the series [23] [24]. Several authors have investigated risk factors for stricture development [24] [25]. Voluntary ingestion, initial endoscopic severity (Zargar grade \geq III), and the presence of clinical severity signs such as dysphagia, hematemesis, or epigastric pain have all been associated with stricture formation. In our study, only the severity of the initial lesion was significantly associated with stricture ($p = 0.05$), likely due to methodological differences.

Regarding management, a delay exceeding three days, which affected 45.59% of our patients, was associated with a higher risk of stricture ($p = 0.024$; OR = 3.63), consistent with observations from other African studies where diagnostic delays are common. In our context, the mean time to perform upper gastrointestinal endoscopy, which guides appropriate management, was considerably longer than the recommended 24 hours, as reported in Niger [22] and Benin [8].

Our study highlights contextual determinants, such as the limited availability of endoscopic resources and low community awareness, which contribute to delayed diagnosis of severe lesions and suboptimal management. These findings suggest that prevention strategies in sub-Saharan Africa should be tailored to the local context, emphasizing family education, regulation of caustic substance sales, and strengthening diagnostic capacities in peripheral healthcare facilities.

Although their use remains controversial, systemic corticosteroids were prescribed in 35.29% of our patients. This proportion was higher in the Nigerian study (53%) [22] and lower in the Senegalese series (20%) [25]. Earlier studies, such as Boukthir's work in Tunisia, suggested that a short course of high-dose methylprednisolone (1 g/1.73 m²/day for 3 days) could reduce the risk of stricture formation [26]. However, a recent literature review found no significant benefit of corticosteroids in preventing caustic esophageal strictures [4], and their use is now generally limited to cases of airway threat, particularly in patients with laryngeal edema.

Similar to corticosteroids, the routine use of antibiotics is not recommended in the literature. Nevertheless, antibiotics were administered to 58.82% of patients in our series. Empirical antibiotic use is widespread in sub-Saharan Africa, as reported in studies by Gueye in Senegal and Sani in Niger, with respective proportions of 77% [18] and 71% [22]. These practices reflect concern about spontaneous or corticosteroid-associated infections, but there is no formal evidence that antibiotics prevent stricture formation [1]. The systemic administration of corticosteroids and antibiotics likely reflects the influence of outdated guidelines regarding corticosteroid use, as well as persistent concerns about secondary infections following caustic ingestion challenges that remain significant in resource-limited settings.

Proton pump inhibitors (PPIs) were given to three-quarters of our patients and demonstrated a protective effect against stricture development ($p = 0.041$; OR = 0.31). Although this proportion is substantial, it remains lower than that reported in subregional literature for instance, 100% in Niger [22] and 95% in Senegal [18]. In the literature, PPIs are considered a nearly systematic therapy aimed at reducing gastric acidity and limiting the progression of esophageal and gastric lesions. While their direct efficacy in preventing strictures has not been conclusively demonstrated [23] [27], their use in the acute phase is recommended to protect the mucosa and facilitate healing [23] [24]. Based on our findings, the systematic use of proton pump inhibitors (PPIs) should be recommended in the management of caustic ingestions, particularly in settings distant from specialized referral cen-

ters.

Our analyses showed that fasting and artificial nutrition were implemented in 60.29% and 19.12% of cases, respectively. In African series, artificial nutrition was primarily used in children with severe lesions or those unable to feed orally, with the aim of maintaining body weight and improving general condition, but without evidence of directly reducing the incidence of strictures [22].

The role of fasting and artificial nutrition in stricture prevention remains debated. Strict fasting is traditionally recommended to limit lesion progression, but prolonged fasting without adequate artificial nutrition may lead to malnutrition and delay healing, without reducing the risk of stricture [28] [29]. Early enteral nutrition, via nasogastric tube or temporary gastrostomy, is increasingly recommended to maintain nutritional status and support mucosal healing [22] [29].

5. Limitations

Despite a robust methodology, certain limitations may have negatively impacted the quality of our results. Notably, the quantity of ingested caustic substance was not quantified. Although this variable is important and may significantly influence stricture development, it remains difficult to assess objectively in our context. Additionally, the dosages of the various medications used during patient management were often missing, which could have allowed exploration of a potential dose-response relationship with stricture formation. We also note that patient fasting was not always strictly applied due to parental reluctance, and the administration of parenteral nutrition was irregular due to its high cost.

6. Conclusion

Caustic ingestion in the Bouaké population predominantly affected young individuals, with a male predominance. Severe lesions accounted for more than half of cases and were associated with stricture formation. Medical management of caustic burns in our context involved multiple interventions, notably proton pump inhibitors (PPIs) and corticosteroids, which are widely used both in the subregion and in Western countries. Among the various medications administered, only PPIs appeared to have a beneficial effect on stricture development in the medium term, despite divergent results in the literature. Further studies with larger sample sizes are needed to provide a more comprehensive analysis of caustic burn management in our region and its impact on stricture formation in the medium and long term.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

References

- [1] Meena, B.L., Narayan, K.S., Goyal, G., Sultania, S. and Nijhawan, S. (2017) Corrosive Injuries of the Upper Gastrointestinal Tract. *Journal of Digestive Endoscopy*, **8**, 165-

169. https://doi.org/10.4103/jde.jde_24_16
- [2] Lachaux, A., Mas, E., Breton, A., Barange, K., Heresbach, D. and Molard, B.R. (2011) Consensus en endoscopie digestive: Prise en charge des œsophagites caustiques. *Acta Endoscopica*, **41**, 303-308. <https://doi.org/10.1007/s10190-011-0191-7>
- [3] Rammohan, A. (2016) Corrosive Injury of the Upper Gastrointestinal Tract: A Review. *Archives of Clinical Gastroenterology*, **2**, 56-62. <https://doi.org/10.17352/2455-2283.000022>
- [4] Hoffman, R.S., Burns, M.M. and Gosselin, S. (2020) Ingestion of Caustic Substances. *New England Journal of Medicine*, **382**, 1739-1748. <https://doi.org/10.1056/nejmra1810769>
- [5] Zakaria, B. (2022) Les ingestions de Caustiques en Réanimation (À propos de 32 cas). Master's Thesis, Université SID Mohamed Ben Abdellah.
- [6] Douha, K. (2020) Caractéristiques des Brûlures Caustiques du Tractus Digestif Haut à Ouargla durant l'année 2019-2020. Ph.D. Thesis, Université KASDI Merbah.
- [7] Atipo-Ibara-Ollandzobo-Ikob, L.C., Ahoui-Apendi, C., Atipo-Ibara, B.I., Mabilia-Babela, J.R., Deby, G. and Ibara, J.R. (2017) Aspects Epidémiologiques des Ingestions de Produit, Caustique chez l'Enfant au CHU de Brazzaville. *Annales de l'Université Marien Ngouabi*, **17**, 24-32.
- [8] Khadidjatou, S., Denis, F.C., Falilatou, A.M., Alexandrine, H.A., Elie, T.S.B., Adélin, T.B., et al. (2023) Endoscopic Aspects of Caustic Injuries of the Upper Gastrointestinal Tract in Parakou, Benin Republic: A Multicenter Study. *Journal of Biosciences and Medicines*, **11**, 15-24. <https://doi.org/10.4236/jbm.2023.1110002>
- [9] Kanté, A. (2023) Aspect Thérapeutique et Evolutif des Brûlures Caustiques du Tractus Digestif Supérieur au Service d'Hépatogastro-Entérologie du CHU Gabriel Touré et de l'Hôpital du Mali. Master's Thesis, Université des Sciences, des Techniques et des Technologies Bamako
- [10] Adedeji, T.O., Tobih, J.E., Olaosun, A.O. and Sogebi, O.A. (2013) Corrosive Oesophageal Injuries: A Preventable Menace. *Pan African Medical Journal*, **15**, Article 11. <https://doi.org/10.11604/pamj.2013.15.11.2495>
- [11] Kouamé, H.G.D., Koffi, K.O.C., Yaogo, A., Kissi-Anzouan-Kacou, H.Y. and Yao-Bathaix, M.F. (2023) Lésions Endoscopiques dans les Tentatives d'Autolyse par Ingestion de Produits Caustiques chez l'Adulte à Abidjan (Côte d'Ivoire). *Revue Internationale des Sciences Médicales d'Abidjan*, **3**, 280-285.
- [12] Soumah, S.A., Ba, P.A., Brigand, C. and Meyer, C. (2011) Brûlures Caustiques de l'Œsophage de l'Adulte: L'expérience du CHU de Hautepierre (Strasbourg). *Journal Africain de Chirurgie*, **11**, 1221-1225.
- [13] Ouédraogo, S.F.M., Thiombiano, K., Damba, J.J., Ouedraogo, A., Doulkom, P.N., Ouedraogo, I., et al. (2023) Caustic Oesophageal Stricture Treated by Instrumental Dilatation: A Review of 6 Years of Practice at the Pediatric University Hospital Charles de Gaulle of Ouagadougou. *African Journal of Paediatric Surgery*, **20**, 116-119.
- [14] Mâli, K. (2018) Caustic Burns in Adults: Epidemiological, Clinical, Endoscopic and Evolutionary Aspects at Sourô Sanou University Hospital Center in Bobo-Dioulasso. *Journal of Diseases and Medicinal Plants*, **4**, 30-34. <https://doi.org/10.11648/jjdmp.20180401.14>
- [15] Hashmi, M.U., Ali, M., Ullah, K., Aleem, A. and Khan, I.H. (2018) Clinico-Epidemiological Characteristics of Corrosive Ingestion: A Cross-Sectional Study at a Tertiary Care Hospital of Multan, South-Punjab Pakistan. *Cureus*, **10**, e2704.

- <https://doi.org/10.7759/cureus.2704>
- [16] Tho' o, A.S., Mobio, M.P., Brouh, Y., Yapi, N. and da-Koffi, C.N. (2017) Intoxication par ingestion de produits caustiques dans un service de réanimation à Abidjan: Facteurs de gravité et de mortalité. *Journal Africain d'Hépatogastroentérologie*, **11**, 24-29. <https://doi.org/10.1007/s12157-017-0708-6>
- [17] Ndayikeza, L. (2022) Ingestion de Produits Caustiques: Fréquence et Résultats dans un Hôpital de Jour. Ph.D. Thesis, Université Mohammed V Rabat
- [18] Gueye, M.N., et al. (2020) Caustic Digestive Lesions in Adults: Epidemiological, Endoscopic and Therapeutic Aspects at Idrissa Pouye General Hospital (Dakar, Senegal). *Advanced Research in Gastroenterology & Hepatology*, **15**, Article ID: 555919. <https://doi.org/10.19080/argh.2020.15.555919>
- [19] Ekpe, E.E. and Ette, V. (2012) Morbidity and Mortality of Caustic Ingestion in Rural Children: Experience in a New Cardiothoracic Surgery Unit in Nigeria. *ISRN Pediatrics*, **2012**, Article ID: 210632. <https://doi.org/10.5402/2012/210632>
- [20] Ripoll Trujillo, N., Martínez Sánchez, L., Habimana Jordana, A., Trenchs Sainz de La Maza, V., Vila Miravet, V. and Luaces Cubells, C. (2019) Ingestion of Caustic Substances: An Analysis of the Safety and Benefit of a Less Aggressive Protocol. *Anales de Pediatría (English Edition)*, **90**, 207-212. <https://doi.org/10.1016/j.anpede.2018.03.014>
- [21] Sow-Coulibaly, H., Doumbia-Samaké, K., Sanogo-Sidibé S.D., Dicko, M.Y., Soumaré, G., Katilé, D., Mallé, O., et al. (2018) Brulures Caustiques du Tractus Digestif Supérieur Chez l'Adulte à Bamako: Aspects Epidémiologiques, Sémiologiques et Pronostiques. *Mali Médical*, **XXXIII**, 16-18.
- [22] Sani, R., Zabeirou, A., Salha, I., Issoufou Alzouma, I., Djafarou Abarchi B., James Didier, L., et al. (2023) Résultats de la Prise en Charge Médico-Chirurgicale en Urgence des Lésions Œsophagiennes liées aux Ingestions de Produits Caustiques chez l'Enfant dans le Service des Urgences de l'Hôpital Général de Référence de Niamey (Niger). *Médecine Tropicale et Santé Internationale*, **4**, mtsi.v4i1.2024.399.
- [23] Le Naoures, P., Hamy, A., Lerolle, N., Métivier, E., Lermite, E. and Venara, A. (2017) Risk Factors for Symptomatic Esophageal Stricture after Caustic Ingestion—A Retrospective Cohort Study. *Diseases of the Esophagus*, **30**, 1-6. <https://doi.org/10.1093/dote/dox029>
- [24] Nunes, A.C.R., Romãozinho, J.M., Pontes, J.M., Rodrigues, V., Ferreira, M., Gomes, D., et al. (2002) Risk Factors for Stricture Development after Caustic Ingestion. *Hepato-Gastroenterology*, **49**, 1563-1566.
- [25] Ly, F., Camara, B., Ngomna, F., Sakho-Kane, A., Sall-Diouf, A., Sow, A., et al. (2019) Intoxications Aiguës au Service de Pédiatrie du Centre Hospitalier National (CHN) de Pikine. A Propos de 34 cas Colligés. *Médecine d'Afrique Noire*, **6604**, 200-209.
- [26] Boukthir, S., Fetni, I., Mazigh Mrad, S., Mongalgi, M.A., Debbabi, A. and Barsaoui, S. (2004) Corticothérapie à forte dose dans le traitement des œsophagites caustiques sévères chez l'enfant. *Archives de Pédiatrie*, **11**, 13-17. <https://doi.org/10.1016/j.arcped.2003.10.011>
- [27] Zerbib, P., Lailheugue, A., Labreuche, J., Richa, Y., Cailliau, E., Onimus, T., et al. (2024) Can We Predict the Risk of Esophageal Stricture after Caustic Injury? *Diseases of the Esophagus*, **37**, doae001. <https://doi.org/10.1093/dote/doae001>
- [28] Kay, M. and Wyllie, R. (2009) Caustic Ingestions in Children. *Current Opinion in Pediatrics*, **21**, 651-654. <https://doi.org/10.1097/mop.0b013e32832e2764>
- [29] Bonavina, L., Chirica, M., Skrobic, O., Kluger, Y., Andreollo, N.A., Contini, S., et al.

(2015) Foregut Caustic Injuries: Results of the World Society of Emergency Surgery Consensus Conference. *World Journal of Emergency Surgery*, **10**, Article No. 44.
<https://doi.org/10.1186/s13017-015-0039-0>