

Ingestion of Caustics Products: Frequency and Results in a Day Hospital

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Abstract

Ingestion of caustic products is a potentially serious medical and surgical emergency that can be life-threatening if not treated early. The oesogastroduodenal Fibroscopy (EGDF) is an essential examination for the lesion assessment and the therapeutic management. The aim of our work is to describe the epidemiological, clinical and endoscopic characteristics of patients who have ingested a caustic product.

Material and methods: This is a study over a period of 5 years (July 2015-July 2020). Were included 57 patients hospitalized for ingestion of caustic products and explored for FOGD. We collected demographic data, circumstances of ingestion, nature and quantity of the ingested product, clinical data and FOGD data from the patients' files. The classification of endoscopic lesions used was that of Zargar.

Results: Of the 57 patients included, 36 were men (64%) and 21 were women (36%) with a sex ratio of 1.7. The mean age was 35 years with extremes ranging from 15-69 years. The most frequent age range of caustic ingestion was 20-29 years (47%) of cases. Psychiatric history was found in 22% (n=12). Ingestion was voluntary in 69.4% (n=39).

The caustic products ingested were dominated by HCL in 35 patients (61.1%) of cases, followed by bleach in 16 patients (27.7%) of cases; hydrogen peroxide in 1 patient (2.7%), battery water in 1 patient (2.7%), the product was not specified in 7% of cases. Spontaneous vomiting and retrosternal and epigastric pain were the dominant clinical signs in our patients.

FOGD was performed in all our patients, before 24 h in 41 patients (72.2%) and after 24 h in 16 patients (27.7%). The organs affected by corrosion were dominated by the oesophagus and the stomach in 30 patients (52.7%), followed by the oesophagus, stomach and duodenum in 16 patients (27.7%) and the stomach alone in 11 patients (19.2%). Endoscopy showed caustic esophagitis in 38 cases (stage I=6, stage IIa=17, IIb=8, IIIa=3 and IIIb=3), caustic gastritis in 47 cases (stage I=11, IIa=12, IIb=3, IIIa=14 and IIIb=6), caustic bulbo-duodenitis in 6 cases (stage I=3, IIa=1, IIIa=1 and IIIb=1).

Conclusion: The ingestion of caustic products remains a public health problem in Morocco and concerns a young population, predominantly male. Although the endoscopic lesions are mostly mild to moderate, psychological care of these patients is necessary in addition to education of the general population.

Keywords: Caustics; Esophageal fibroscopy; Ingestion; Stages of injury

Introduction

By definition, a caustic is "a substance or mixture of substances that induces immediate tissue destruction or disintegration by direct contact with healthy mucous membranes" [1,2]. The occurrence of a severe burn involves the vital and functional prognosis in 10% to 20% of patients, with an immediate and delayed mortality close to 10% [3]. For severe burns, the time elapsed between ingestion and appropriate management is an important prognostic factor. It is a medical-surgical emergency and their management is multidisciplinary involving emergency physicians, resuscitators, otolaryngologists, gastroenterologists, visceral surgeons and psychiatrists [4,5].

According to the World Health Organization (WHO) in 2004, their incidence was estimated at 110/100,000 people per year worldwide [4].

Ingestions of corrosive chemicals are a problem, especially in developing countries, but also in developed countries such as the United States, France and Belgium [6]. In the United States, poison control centers have recorded approximately 26,000 ingestions of toxic products per year, 17,000 of which are children [5]. In France, the average annual number of cases of poisoning is 15,000 [5].

In Morocco, the ingestion of caustic products represented 3.5% of hospitalizations [8]. It remains a frequent emergency responsible for serious lesions, engaging the vital prognosis, in the immediate and in the severe forms and poses a problem of restoration of continuity of the digestive tract secondarily.

The most frequently ingested product is hydrochloric acid, often with the aim of autolysis [9]. In adults, almost 90% of ingestions of caustic products are for the purpose of suicidal. It is sometimes part of a psychiatric pathology, known or not. But it is most often a less characteristic picture in which one finds a disturbed socio-affective context (family

or marital conflicts, unemployment or professional problems. The accident comes from the fact that the product is often transferred in a bottle to facilitate its use. It is exceptional that accidental ingestions result in severe burns. If this is the case, the diagnosis should be questioned and if this is the case, the diagnosis should be questioned and a masked suicide attempt should be sought [10].

The FOGD is the reference examination to classify the lesions and to guide the treatment. The treatment ranges from food abstinence with digestive rest in order to prevent complications such as digestive stenosis. Surgery may be performed within the first few hours in case of immediate perforation in order to reduce mortality. Nevertheless, the best treatment remains preventive and relies on the awareness of the general public of the danger of hydrochloric acid and on the enforcement of rules concerning the marketing of these products [9, 14, 15,16].

The aim of our work is to describe the epidemiological, clinical and endoscopic characteristics in case of ingestion of caustic products in adult emergency patients.

Materials and Methods

This is a 5-year study (July 2015-July 2020). We included 57 patients hospitalized for ingestion of caustic products and explored by a FOGD. We collected demographic data, circumstances of ingestion, nature of the ingested product, clinical data and FOGD data from the patients' files. The classification of endoscopic lesions used was that of Zargar. All patients underwent FOGD under propofol sedation, performed within 8 to 24 hours.

Results

Of the 57 patients included, 36 were men (64%), and 21 were women (36%) with a sex ratio of 1.7. The mean age was 35 years with extremes ranging from 15-69 years. The most

frequent age range of caustic ingestion was 20-29 years (47%) of cases.

Psychiatric history was found in 22% (n=12). Ingestion was voluntary in 69.4% (n=39)

The caustic products ingested were dominated by HCL in 35 patients (61.1%) of cases, followed by bleach in 16 patients (27.7%) of cases; hydrogen peroxide in 1 patient (2.7%), battery water in 1 patient (2.7%), the product was not specified in 4 patients (7%) of cases. Spontaneous vomiting and retrosternal and epigastric pain were the functional signs dominating the clinical picture of our patients.

FOGD was performed in all our patients, before 24 h in 41 patients (72.2%) and after 24 h in 16 patients (27.7%) because of the arrival at the emergency room and the late hospitalization of these patients. The organs affected by corrosion were dominated by the oesophagus and the stomach in 30 patients (52.7%), followed by the oesophagus, the esophagus and the stomach in 30 patients (52.7%) followed by the esophagus, stomach and duodenum in 16 patients (27.7%), the stomach alone in 11 patients (19.2%). Caustic esophagitis was observed in 38 cases (66.6%) (stage I=6, stage IIa=17, IIb=8, IIIa=3 and IIIb=3), caustic gastritis in 82.4% or 47 cases (stage I=11, IIa=12, IIb=3, IIIa=14 and IIIb=6), caustic bulbo-duodenitis in 6 cases (10.5%) (stage I=3, IIa=1, IIIa=1 and IIIb=1) (Tables 1,2, Figures 1-3).

Table 1: Nature of the ingested product. The ingestion of Hydrochloric Acid dominates with a frequency of 61.11%.

Product ingested	No. of cases (n)	Percentage (%)
Salt spirit	35	61,11 %
Bleach	16	27,77 %
Hydrogen peroxide	1	2,77 %
Battery water	1	2,77 %
Unspecified product	4	7 %

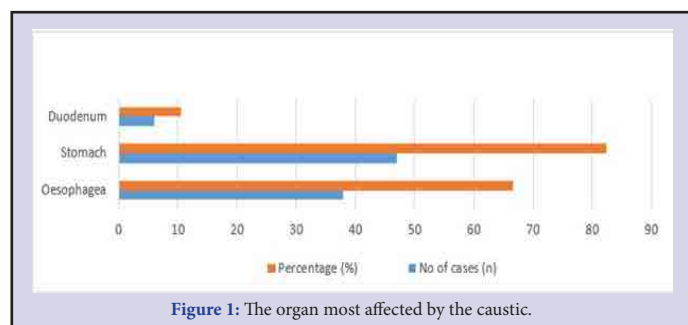


Figure 1: The organ most affected by the caustic.

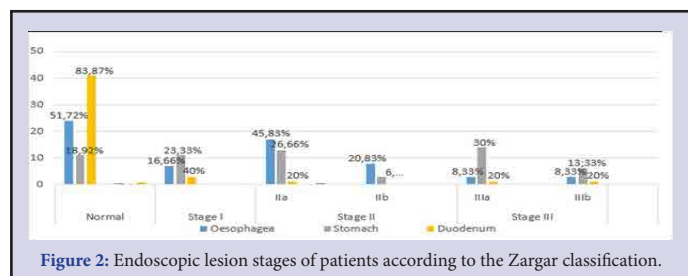


Figure 2: Endoscopic lesion stages of patients according to the Zargar classification.

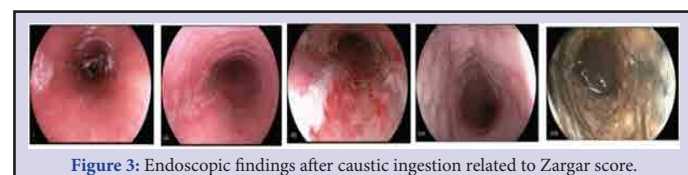


Figure 3: Endoscopic findings after caustic ingestion related to Zargar score.

Discussion

True emergency in the true sense of the Latin word "urgere" (without delay), the ingestion of caustics is an absorption by the digestive tract of substances with defined physicochemical properties [17]. These caustics present in many industrial, household and domestic products have the capacity to destroy more or less rapidly the tissues with which they come into contact, due to their PH or their oxidizing power [5,18].

Known for a long time, it is their availability to individuals that has led to an increase in ingestions, whether accidental or voluntary, used in many everyday activities, it is their availability that generates the most serious situations [17].

The frequency of ingestions of caustics is variable and variously reported in the world.

During the 5-year period (July 2015 to July 2020), we identified 57 cases of caustic ingestions, a sample that could be limited by the fact that other victims of caustic ingestion were admitted to other health care facilities and according to the rotation of on-call services of endoscopic emergencies. Poison control centers in the United States recorded approximately 26,000 ingestions of toxic products per year in 2002, including 17,000 children. In France between 15000 and 20000 cases per year were reported in 1995 [5]. Between 2007 and 2013, Yung-Hung Chang in Taiwan conducted a study whose results were published in 2018, reported 150 cases over 7 years [19]. In Mali, Sow H Epouse Colibaly reported 20 cases of caustic burns from January 2013 to February 2014 [20]. In Morocco, many works have highlighted a high frequency of caustic ingestion. Thus, the Poison Control Center of Morocco recorded 6336 cases of caustic ingestions reported between 1980 and 2011 [5]. At the University Hospital of Casablanca, Belkacem reported 100 cases in 3 years [21] and Tadimi in 5 years reported 171 cases [22], at the University Hospital of Fez, Bedou conducted a study over 9 years (2000-2009) and reported 83 patients [23]. El Hamoumim in 2016 reported 58 cases in 5 years at the University Hospital of Rabat [24] and at the University Hospital of Marrakech, L'Kbir recorded 112 cases during 10 years in 2018 [25].

According to the literature, the average age of patients at the time of caustic ingestion is 40 years with extremes of age varying according to the series [16,26]. In our study, the average age was 35 years with extremes ranging from 15-69 years; and the age group most affected is that of young adults (20-29 years) or 47% of cases can be explained by the existence of socio-economic problems and especially family that affect this age group and a male predominance; results similar to those of the series of Zargar and Tohda [27,28].

Concerning the circumstances of ingestion of caustics, they occur in adults with the aim of autolysis, about 75% of the cases [29] and the percentage of voluntary acts varies from 57.3% to 85.5% according to the series [30,31]. In our study, ingestion was voluntary in 69.4% of cases (n=39), which proves that our study is within this average; and agrees with the series of Marrakech where the rate of voluntary acts was 79.31% of cases [25]. Psychiatric history was associated with 22% of the cases. This psychiatric condition must be systematically sought in order to plan for possible psychiatric treatment in order to prevent a recurrence of suicide attempts [25,29]. In the management of cases of ingestion of caustics, certain important data must be taken into consideration, in particular: the nature of the product, the precise time of ingestion, whether the product was swallowed or not and the notion of spontaneous vomiting. It is also important to know the concentration, the form of the product (solid, liquid, gel...) and the volume ingested. In our study, the products ingested were dominated by HCl in 61.1% of cases followed by bleach (27.7%) and hydrogen peroxide and battery water in 2.7% of cases. Our results are close to those of the French series where bleach comes first (51.5%) followed by hydrochloric acid and ammonia; and salt spirit represents less than 20% of the ingested products [31,32]. Our results are also similar to those of other Moroccan series: Abidin L'Kbir in his medical thesis in 2018 on caustic burns of the digestive tract shows that salt spirit is the majority caustic at 56.50% of cases followed by bleach at 35.84% of cases [25]; M. Bedou found that the most frequent ingested product was hydrochloric acid (40%) of cases followed by salt spirit (24%) of cases and oxidants (bleach) in 20.4% of cases [23].

Clinically, because the majority of studies are retrospective, clinical data are inconsistently reported and incomplete.

The presence of symptoms has been reported variably between series. In our study, vomiting and retrosternal pain as well as epigastralgia were the functional signs dominating the clinical picture of our patients. In Western series, a rich semiological picture of caustic ingestion is reported; thus, in the study of the French association of surgery, in 382 patients: 62.4% of cases with abdominal pain, 69% of cases of vomiting and hematemesis in 11.3% of patients, oral-pharyngeal lesions were reported in 43.2% of cases [33]. In Di Costanzo's series, more than 90% of patients had abdominal pain and more than 75% in Portugal [34,35]. In the Moroccan study, abdominal pain was noted in 60.1%, vomiting in 69.4%, and the physical examination found mostly oral-pharyngeal lesions in 28.15% of cases [25]. However, the presence or absence of a symptom does not allow to affirm with certainty the existence or not of a lesion, nor its localization, nevertheless, it remains a major complement of endoscopy in the therapeutic decision [36].

From a Para clinical point of view, upper gastrointestinal endoscopy using a video, in expert hands, is a decisive act for the management of victims of caustic ingestion, the initial challenge being to identify patients who require emergency surgical resection for transmural necrosis of the gastrointestinal tract that may jeopardize their vital prognosis [34,33,53]. The therapeutic attitude is based on the endoscopic observation of the lesions and is fundamental in the early phase in the absence of signs of perforation indicating the performance of an injected CT scan [37-39]. It is the best way to observe the type and topography of the lesions, to judge their extent, their degree and their evolution; thus endoscopy is an essential element of diagnosis and prognosis [40]. It should be performed between the third and twenty-fourth hour after ingestion: an endoscopy that is too early may underestimate the lesions, while a late one is difficult to perform, as it may be hampered by the presence of lesions of the oro-pharyngeal carrefour such as edema or hemorrhage [41]. However, this delay is variable according to the series. In our study, the FOGD was performed in all patients; before 24 hours in 41 patients (72.2%) and after 24 hours in 16 patients (27.7%). In the series of Feron and Zargar, 100% of fibroscopies were performed within the first 24 to 36 hours [42,27]. In a study by Poley, which included 179 patients, it was performed within 24 hours of ingestion for 90% of cases [43]. In L'Kbir's series, 38.83% of patients had FOGD within 24 hours, 61.16% performed it after 24 hours but the majority of them performed it within 48 hours of ingestion [25]. Bedou's series shows that 68.6% of the patients under-

Table 2: Endoscopic stages according to the topography of the lesion.

	Normal		Stage I IIa		Stage II				Stage III				Stage IV	Total
					IIb		IIa		IIIb					
Oesophagea	24	51,72%	7	16,66%	17	45,83%	8	20,83%	3	8,33%	3	8,33%	0	38
Stomach	11	18,92%	11	23,33%	13	26,66%	3	6,66%	14	30%	6	13,33%	0	47
Duodenum	41	83,87%	3	40%	1	20%	0	0%	1	20%	1	20%	0	6

Table 3: Distribution of lesion stages.

Lesion stages	Our series 2020 N=57	M.Bedou [23] 2020 N=83	L'Kbir [25] 2018 N=212	El Hamoumim [24] 2016 N=58	Poley [43] 2004 N=179	Redriguez [50] 2003 N=45	Rigo [51] 2002 N=210
Stage I	22,03%	13,25%	21,90%	34,48%	26%	46,70%	68,50
Stage II	45,76%	25,3%	52,00%	72,41%	30%	15,60%	17,50%
Stage III	32,20%	63,14%	7,8%	51,72%	35,50%	4,40%	0,14%
Stage IV	0%	1,02%	0%	0%	9,5%	0%	0%

went FOGD within 24 hours [23]. The most severe lesions were found in the oesophagus and stomach, with a greater severity of gastric damage due to the retention of the caustic in the gastric cavity, which increased both the parietal destruction and the irritation of the mucosa. In our study, the organs affected by corrosion were dominated by the oesophagus and stomach in 30 patients (52.7% of cases), followed by the oesophagus, stomach and duodenum in 16 patients (27.7%), and the stomach alone in 11 patients (19.4%). The analysis of the endoscopic data carried out in the series of L'Kbir shows that all his patients had simultaneous involvement of the oesophagus and the stomach, and duodenal involvement was found in 21.8% of cases. The predominance of gastric involvement has been emphasized by most authors: 87.9% for Di Costanzo [34]; in L'Kbir's series, the incidence of gastric involvement was 80.6% of cases [25]. In the different series, oesophageal involvement often comes second: 59.5% for Ribet [44], and 57.5% for El Hamoumim [45]. Duodenal involvement is classically rare or exceptional and can be explained by the occurrence of a pyloric spasm limiting the extension of the lesions downstream [46-48].

The classification used in the description of endoscopic lesions due to the ingestion of caustics is that established by Di Costanzo. She distinguishes 4 stages of increasing severity.

Zargar's grading classification of mucosal injury caused by ingestion of caustic substances [49].

Grade 0: Normal examination.

Grade 1: Edema and hyperemia of the mucosa.

Grade 2a: Superficial ulceration, erosions, friability, blisters, exsudates, hemorrhages, whitish membranes.

Grade 2b: Circumferential ulcerations.

Grade 3a: Small scattered areas of multiple ulceration and areas of necrosis with brown-black or greyish discoloration.

Grade 3b: Extensive necrosis.

Grade 4: Perforation.

In our series, the FOGD in all our patients allowed to objectify stage I lesions in 22.03% of the cases, stage II in 45.76% of the cases, stage III in 32.20% of the cases and we did not note any case classified in stage IV (Table 3).

According to the different series of the literature consulted, we have the following distribution of lesion stages

In the various Moroccan series, as in our own, severe forms classified as stage III are frequent [23-25]; this could be explained by the predominance of salt spirit intoxications in our context and the fact that the bleach marketed in Morocco contains, in addition to sodium hypochlorite, a non-negligible quantity of HCl (salt spirit). The prognosis of ingestions of caustic products is conditioned by the highest grade of esophageal or gastric lesions. It should be noted that some limited lesions have a poor prognosis; tight esophageal strictures almost always originate from ulcerations located face to face in the same esophageal stage and also from circular ulcerations [34,27,52].

Conclusion

Caustic ingestions remain a frequent condition. It is a diagnostic and therapeutic emergency requiring multidisciplinary management. An initial FOGD allows an inventory of the lesions and conditions the prognosis and the therapeutic strategy. In addition to the management of organic lesions, psychiatric management is often necessary for cases with suicidal intent. The study of these cases of caustic ingestion also allows us to insist on the interest of sensitizing and informing the population on the serious consequences of these products on health, on the importance of packaging, labeling and storage of these products in order to avoid any accidental ingestion.

References

- Feron J, Briot R (2017) Occupational and environmental pathology. EMC, Elsevier Masson SAS, Issy-les-Moulineaux., 12(3) ; 16-063-A-10,7
- Pr Bouledroua, Pr Souilamas, Dr Hannache. Consensus meeting on caustic lesions of the digestive tract. Algiers, El Aurassi, 5-6 May 1999
- Fioux F, Chirica M, Villa A, Losser MR, Cottan P. Ingestion of caustic products in adults. Réanimation 2009;18 :606-16
- Gornet JM, Muna-Bougrand N, Sarfati E (2002) Diagnostic and therapeutic management of digestive burns by caustic. J Chir. 139: 72-76.
- Mourey F, Martin L, Jacob L (1996) Caustic burns of the esophagus. Conférence d'actualisation. FAR Paris : Elsevier 1996: 595-606.
- Alan H Hall, Denise Jacquemin, Danielle Henny, Laurence Mathieu, Patrice Josset, Bernard Meyer. Ingestion of corrosive substances: a review. Critical reviews in toxicology 49(8) ,637-669,2019
- Gen CA, Mtaf Q (2002) Oesophageal motility changes in acute and late periods of caustic esophageal burns and their relation to prognosis in children. J Pediatric Surg. 37(11): 1526-1528.
- Jalal G, Badrane N, Rhalem N, et al. (2013) Intoxication by toxic and irritant products: data from the poison control center of Morocco (1980-2011). Toxicol Maroc. 18: 5-6.
- Bouaggad A, Abassi O, Bouderkha MA, El Idrissi DA (1999) Medical hope 6: 182-185.
- Oakes DD (1995) Reconsidering the diagnosis and treatment of patients following ingestion of liquid yle. J Clin Gastroenterol. 21: 85-86.
- Fioux F, Chirica M, Villa A, Losser M (2009) Ingestion of caustic products in adults. EMC. 18: 606-616.
- Danel V, Bismuth C (1990) Acute non-drug intoxications. Editions techniques. EMC Paris P: 11-4.
- Ouammi L, Rhalem N, Aghandous R, Semlali I, Badri M, et al. (2009) Epidemiological profile of intoxications in Morocco from 1980-2007. Toxicol Maroc 1: 8-13.
- Chirica M, Fioux F, Villa A, Munoz-Bougrand N, Sarfati E, et al. (2011) Medical and surgical management of caustic ingestions of the upper digestive tract. EMC, Elsevier Masson SAS, Paris. Gastroenterology. 9-200-A-10.
- Charico M, Cde Chaisemartin, Munoz-bougrand N, Halimi B, Celerier M, et al. (2009) Esophageal reconstruction for sequelae of caustic burns. Coloplasties, instructions for use. EMC. Journal of surgery. 146: 240-249.
- Landru J, Jacob L (2003) Anesthesia-resuscitation for esophageal injury after caustic ingestion. EMC (scientific and medical editions. Elsevier Masson SAS, Paris. A-R, 36-726-A-10.
- Marthe D, Magret B (2007) Ingestion of caustic products. EMC Elsevier Masson SAS, Paris; Emergency medicine.
- Rabary O, Jadad R, Falkam H, Eurim B (1987) Resuscitation and anesthesia of patients with caustic burns of the gastrointestinal tract during the first days. Resuscitation and emergency medicine. Paris: French scientific expansion. p: 373-388.
- Yung-Hung Chang, Chi-Hsunhsieh, Chien-Hung Liao (2018) The surgical strategy in digestive tract: Is the extensive surgery appropriate? World J Surg International Society of Surgery. 42: 2028-2035.
- Sow H, Epouse Colibaly (2018) Uper digestive Tracts caustic injuries in adult patients in Bamako. Mali Medical.

21. Bekacem R (1988) Caustic lesions of the upper gastrointestinal tract: a review of 100 cases. Thesis of Medicine, Casablanca; n°289.
22. Tadimi A (1986) Burns of the upper digestive tract after ingestion of salt spirit: surgeon's point of view. Thesis of Medicine, Casablanca.
23. Bedou M, Lahmidaoui N, Figuigui M, Lhlali M, Lamine A, et al. (2020) Management of caustic ingestion: University Hospital Hassan II Experience. *Int J Adv Res.* 8: 205-214.
24. El Hamoumim R (2016) Caustic lesions of the upper digestive tract about 58 cases. Thesis of Medicine. Rabat n°60.
25. Abidine L'Kbir (2018) Caustic burns of the digestive tract. Thesis of Medicine Marrakech. n° 054.
26. Consensus in digestive endoscopy: management of caustic esophagitis. *Acta endosc* 41: 303-308.
27. Zargar SA, Kachhar R, Mehta S (1991) The role of fiberoptic endoscopy in the management of ingestion and modified endoscopic classification of burns. *Gastro intest endosc* 37: 165-169.
28. Tohda G, Sugawa C, Gayer C, Chino A, McGuire TW, et al. (2008) Clinical evaluation and management of caustic injuries in the upper gastrointestinal tract in 95 adult patients in an urban center. *Surgical Endoscopy.* 22: 1119-1125.
29. Fieux F, Chirica M, Villa A, Losser MR, Cottan P (2009) Ingestion of caustic products in adults. *Réanimation.* 18: 606-616.
30. Mamede RC, De Melo Filho FV (2002) Treatment of caustic ingestion; an analysis of 239 cases. *Diseases of Esophagus.* 15: 210-213.
31. Zargar SA, KO Chahhar R, Nagi B, Metha SK (1989) Ingestion of corrosive acids. Spectrum of injury to upper gastrointestinal tract and natural history. *Gastroenterology.* 97: 702-710.
32. Celerier M (2001) Caustic lesions of the esophagus in adults. *Ann Chier.* 126: 945-949.
33. Celerier M, Gayet B (1995) Burns by ingestion of caustics. In Celerier M, Gayet B, editions. *The trauma of the esophagus.* Paris : Arnette-Blackwell. p: 9-64.
34. Di Costanzo J, Noircler M, Jougard J, Escoffier JM, Cano N, et al. (1980) New therapeutic approach to corrosive burns of the upper gastrointestinal tract. *Gut* 21: 370-375.
35. Acr Nunes, JM Romazinho, JM Pontes, Rodriguez V, Ferreira M, et al. (2002) Risk factors for stricture development after caustic ingestion. *Hepato-Gastroenterology* 49: 1563-1566.
36. Gumasteve VV, Dave PB (1984) Ingestion of corrosive substances by adults. *Am J Surg.* 71: 698-700.
37. WWW.facmed-aanaba.com/medicine/anatomy/duodeno
38. Brun JG, Celerier M, Koskas F, Dubost C (1984) Brunt. Thorax oesophageal stripping: an emergency procedure for caustic ingestion. *Br J Surg.* 71: 698-700.
39. Ibara JR, Mbemba MI, Okowo M, Atipo-Ibara BI, Ngoma PH, et al. (1997) Caustic lesions of the upper digestive tract in adults. Etiological and endoscopic aspects about 104 cases. *Ann Gastroenterol Hepatol* 33: 136-139.
40. Gahenno P, Guedon C, March C, Lallemand Y (1978) Experimental model for the study of caustic esophageal strictures and their prevention. *Trial of D-penicillamine.* *Ann Oto-laryngol* 95: 373-378.
41. Andrieu-Guitrancourt J, Coul G. *Anatomy of the pharynx, EMC, Paris-ORL.* 20845 A10.
42. De Ferron, Gossot D, Sarfati E, Celerier M (1987) Esophageal lesions by ingestion of bleach in adults. *Presse Méd.* 16: 2110-2112.
43. Poley J, Steyerberg E, Kwipers E, Dees J, Hartmans R, et al. (2004) Ingestion of acid and alkaline agents: outcome and prognostic value of early upper endoscopy. *Gastro intestinal endoscopy.* 60: 372-377.
44. Ribet M, Lagez B, Gosselin B (1978) Gastrointestinal lesions secondary to the ingestion of caustics. *Emergency surgery problem (Paris).* 104: 656-667.
45. El Moussaoui A (1985) Caustic lesions of the upper digestive tract. Thesis of Medicine-Rabat- n°220.
46. Noircler M, Chawvin G, Jon glard J, Garbe Oircler L, Di Costanzo J (1978) Burns of the upper digestive tract. EMC, Paris, estomac-intestin; 9200a: 10.1-14.
47. Noircler M, Di Costanzo J, Sastre B, Durif L, Fulachier V, et al. (1984) Reconstructive operation for esophago-gastric corrosive lesions. *USA.* 87: 291-294.
48. Peix J, Barth X, Gadard J, Motin J (1985) Severe burns of the upper digestive tract by Destop-Lyon-Chir. 4: 241-244.
49. Hao-Tsai Cheng (2008) Caustic ingestion in adults: The role of endoscopic classification in predicting outcome. *BMC Gastroenterology.* 8: 31.
50. Rodriguez MA, Meza Flores JL (2003) Clinical epidemiological characteristics in caustics ingestion patients in the Hipolito Unanne National Hospital. *Rev Gastroenterology Peru.* 23: 115-125.
51. Rigo GP, Camellini L, Azzalini F, Guazzetti S, Bedogni G, et al. (2002) Wath is the utility of selected clinical and endoscopic parameters in predicting the risk death after caustic ingestion? *Endoscopy* 34: 304-310.
52. Sarfati P, Assens M, Celerier R, Jadat J Delcros (1985) Treatment of digestive lesions after caustic ingestion. *Sem. Hop.* 61: 2122-2129.
53. Hammoudi N (2020) Management of caustic ingestions : No more room for emergency endoscopy. *Mini-revue Hépatogastroentérologie et oncologie digestive.* 27: 882-889.