



CLINICAL PROFILE AND OUTCOME OF CORROSIVE INJURIES OF GASTROINTESTINAL TRACT

Kishore Kumar R	Senior Resident, Department of Medical Gastroenterology, Tirunelveli Medical College, Tirunelveli
Shafique A	Assistant Professor, Department of Medical Gastroenterology, Tirunelveli Medical College, Tirunelveli
Geetha G	Assistant Professor, Department of Medical Gastroenterology, Tirunelveli Medical College, Tirunelveli
Kandasamy Alias Kumar E*	Professor and Head, Department of Medical Gastroenterology, Tirunelveli Medical College, Tirunelveli *Corresponding Author

ABSTRACT **Background:** Caustic ingestion is associated with long-term sequelae in the form of esophageal and/ or gastric stricture; is a source of considerable morbidity requiring endoscopic or surgical intervention. The spectrum of gastric injury may vary from acute to varying types of chronic involvement. **Materials & Methods:** This study was done on patients with a history of acute corrosive injury by the Department of Medical Gastroenterology, Tirunelveli Medical College from 2021 to 2022. A detailed history was recorded & endoscopy was also done within 24 to 72 hours of admission. The grade 2B & 3 injury patients were followed up and subjected to repeat endoscopy after 6 weeks and the results were analyzed. **Result:** Based on this study, the incidence of corrosive poisoning was higher in females 64.36% (n=56). The intention of corrosive ingestion was suicidal in 98.86% (n=86). Acid ingestion was more common than alkali ingestion. Out of 87, 24 patients had Grade 2B & 3 Zargar injuries and were managed with Ryle's tube feeding for 6 weeks. 10 out of 24 developed strictures at 6 weeks. 8 patients had an esophageal stricture and were subjected to esophageal dilatation. One patient had refractory stricture for which she had undergone esophagectomy with colonic interposition. 2 patients were subjected to antrectomy for antral stricture. **Conclusion:** The concentration and quantity of substance consumed are the most important determinant of the outcome. The management of corrosive injury depends on the site of the lesion and severity of the injury, the presence of co-existent esophageal or gastric stricture, and the patient's general condition.

KEYWORDS : Caustics, Stricture, Weight loss

INTRODUCTION:

Ingestion of corrosive substances is an important public health issue. Consumption of corrosive agents usually involves suicidal intent in adults; Accidental/ unintentional in children. The release of thermal energy for neutralizing the corrosive on contact with tissues is responsible for tissue damage. Esophagogastroduodenoscopy is crucial and recommended in the first 12-48 h after caustic ingestion. Though it is safe and reliable up to 72 h after the injury for permitting more precise therapeutic regimens. Zargar's modified endoscopic classification of corrosive ingestion is useful in grading endoscopic lesions. Stricture is one of the most common sequelae of caustic injury. This study was conducted to assess the outcome following caustic ingestion in our center.

MATERIALS AND METHODS:

After approval of the Institutional Ethics Committee, we prospectively collected data from March 2021 - March 2022 in the Department of Medical Gastroenterology, Tirunelveli Medical College, Tamil Nadu. Data regarding age, sex, type & quantity of corrosive consumed, and outcomes associated with it were collected after getting informed consent from the study subjects.

Inclusion criteria:

1. Patients with a history of corrosive ingestion irrespective of age

Exclusion criteria:

1. Delayed presentation (>72hours)
2. Signs of perforation
3. Hemodynamic instability
4. Not willing to endoscopic assessment

Procedure:

All patients were hospitalized and received local anesthetic lignocaine spray at the time of the procedure. All endoscopic procedures were performed using Upper Gastrointestinal Endoscopy (Olympus Medical Systems Co., Ltd, Tokyo, Japan. Fujifilm Corporation, Japan).

The patient was kept on fasting from the time of consumption of the corrosive till the assessment of injury by Upper Gastrointestinal endoscopy. The diagnostic endoscope is done to assess the site &

severity of the lesion within 72 hours from the time of consumption. The severity of the injury was assessed using the Zargar classification of corrosive injury.

If Zargar's Grade 1 & 2A are in the esophagus or stomach, the patient can be started on oral feeds & advised to review in Medical Gastroenterology OPD after 6 weeks. For Zargar 2B & 3 esophagus, the patient will be kept on Ryles tube feed for 6 weeks.

If the patient has extensive necrosis in the antrum, then the Ryles tube will be placed deep in the duodenum. The Upper Gastrointestinal tract was reassessed after 6 weeks to rule out stricture or fistula in the esophagus/stomach

In case of the presence of Esophageal stricture at the time of reassessment, Esophageal dilatation using a Savory Gilliard dilator will be performed & oral feeds are started the next day. Then the patient will be advised to review after 1 month or if dysphagia develops whichever is earlier. In the case of antral stricture, delayed Antrectomy with Gastrojejunostomy is the preferred treatment till then the patient will be on feeding jejunostomy.

Statistical method:

The information collected regarding all the selected cases was recorded in a Master Chart. Data analysis was done with the help of a computer by using SPSS 16 software. By using this software mean, SD, and percentage were calculated. Using this software, 'p' values were calculated through the student's t-test for raw data and the chi-square test for consolidated data to test the significance of the difference between variables. A 'p-value less than 0.05 is taken to denote a significant relationship.

RESULTS:

During one year period, we had 87 cases of corrosive injury.

Table 1: Gender, Age, Corrosive consumption data

Variables	Number
Total cases	87
Gender M: F	31 (35.63%): 56 (64.36%)

Age:	
<12 yrs.	1 (1.14%)
12- 20 yrs.	30 (34.48%)
20-40 yrs.	49 (56.32%)
>40 yrs.	7 (8.04%)
Substance:	
Acid	73 (83.90%)
Alkali	12 (13.97%)
Mixed	2 (2.29%)
Reason:	
Accidental	1 (1.14%)
Suicidal	86 (98.86%)
Method of Consumption:	
Diluted	40 (45.97%)
Undiluted	47 (54.02%)
Quantity consumed:	
<50ml	53 (60.91%)
>50 ml	34 (39.08%)

Age-wise Distribution:

Out of 87 cases, most patients were between 20 and 40 years old. i.e., 49 cases (56.42%). The minimum age of the patient in the study was 5 years and the maximum was 55 years.

Gender distribution:

Nearly 64.36 % (56 cases) are of the female gender. Males occupied 35.64% of cases in our study.

Substance:

The majority of patients consumed acids i.e., 83.90% (73 cases). 12 cases consumed alkali & 2 consumed mixed substances i.e., phenol & kerosene, and Kerosene with the bleaching agent.

Intention:

Most of the patients consumed the substance with suicidal intentions (98.86%). Only one patient consumed the corrosive substance by accidental means.

Method of Consumption:

47 patients consumed the substance in an undiluted manner & only 34 patients consumed more than 50 ml quantity of corrosive substance.

External Injuries:

Oral lesions were seen in 66.66% (58 cases) with corrosive poisoning. But among the stricture cases, only 3 had oral lesions & all the others cases had no significant oral ulcers/lesions.

Endoscopic features:

Out of 87 cases, 85 patients underwent endoscopy. Two patients were not subjected to endoscopy because of the high chance of aspiration due to hydrocarbons mixed with a corrosive substance. Endoscopy of acid poisoning reveals 21 patients & 14 patients with Grade 2B & 3 injuries in the esophagus & stomach respectively. Alkali poisoning had 3 patients with Grade 2B & 3 injuries in both the esophagus & stomach.

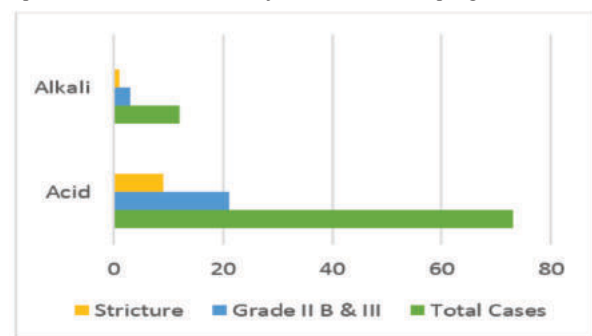


Fig 1: Severity of Corrosive Injury

These 24 patients were kept on nil per oral & feeding was provided through Ryle's tube for 6 weeks due to high grades of injury to the esophagus & stomach by corrosives. Patients who are on Ryle's tube feeding underwent a relook endoscopy after 6 weeks. 10 out of 24 patients developed stricture. Among 10 strictures, 9 were due to acid poisoning. Only two had stricture at the antrum of the stomach, all others had Esophageal stricture. These strictures were common among

the patients who consumed corrosive substances in undiluted form irrespective of quantity consumed.

The mean weight of patients with stricture at the end of 6 weeks of Ryles's feed was 45.8 ± 7.78 . when compared to the patients with Severe injury without stricture formation, there was significant weight loss in stricture patients.

Treatment:

8 patients were subjected to stricture dilatation with Savory Gilliard dilator. Only one patient needed multiple numbers of dilatations (9 times). 4 needed dilatation once & 3 others needed twice to maintain a patent esophageal lumen. One patient was taken for colonic interposition because of refractory stricture. Two patients were started on Feeding jejunostomy for nutritional therapy because of antral stricture, later they underwent antrectomy.

DISCUSSION:

The term "corrosion" derived from the Latin verb *corrodere* which translates as "to gnaw" underscores how corrosive substances "gnaw" their way through the flesh. Commonly ingested corrosives are broadly classified into acids and alkalis (1). The injury occurs when a substance with pH < 2 or pH > 12 is ingested (2)

A study by Chuan-Mei Chen et., al showed that females are more likely to consume caustics (4). In our study, more than 60% are female. Overall, 78.1% of patients are between 11-30 years old. Chaitanya Mittal et., al study had similar results that young & middle-aged females are vulnerable to the consumption of corrosive poison (5). But one single-centered prospective study showed a high incidence of male corrosive injury around 67% (6).

One cross-sectional study observed that acid poisonings are more common than alkali & majority of patients consume bathroom cleaner as a caustic agent (3). In our study, nearly 84% consumed acid when compared to alkali.

Consumption of corrosive substances with suicidal intentions is more common than accidental reasons. Uday Shankar Baluni et., al in their study had suicidal intent as the cause for corrosive consumption (8). But one study conducted by Thomas et al. showed varying results such as that caustic ingestion was accidental in 62 of 78 patients (7). However, accidental ingestion is common in younger children < 5 years (10). Riffat and Cheng et., al reported in a retrospective study on 50 cases of pediatric corrosive ingestions, most of these cases were unintentional accidental ingestions mainly alkalis (11). A meta-analysis by Mandana Rafeey et., al reported that accidental ingestion of caustics particularly alkali is more common in the pediatric age group when compared to the adult age group. He also stated that due to unknown reasons this accidental ingestion is more among boys (55.33%) (9).

The degree of mucosal damage depends on the nature of the agent, its amount and concentration, as well as the amount of food in the stomach during ingestion (12). The clinical presentation of corrosive ingestion varies greatly; the initial presentation usually does not give adequate information about the severity of the damage. The oral lesion is seen in 11 out of 58 cases in a prospective study conducted in a tertiary care center, but more than 50% of patients had a severe injury (6). Another study by Uday Shankar Baluni et al. showed that 80.5% (n=33) of cases had oral lesions (8). Chittinad Havanond et. al from their prospective study concluded that drooling saliva, buccal mucosa burns, and white blood cell count were independent predictors for high-grade injury (13). A retrospective study conducted by Aleksandra Boskovic et. al comprised 176 children with ingestion of alkali in 96 cases (54.5%) Positive clinical findings were observed in 34.1% of patients. But 45.9% had mild – severe corrosive injury on endoscopy. He emphasizes that the absence of any clinical findings does not rule out a severe esophageal or gastric injury (14).

Endoscopic evaluation has been the mainstay of prognosis since the publication of the Zargar series. Endoscopy is usually done within 24-48 h after ingestion (2). Early endoscopy, within less than 6 hours following ingestion, may not demonstrate the full picture of injury, and late endoscopy, after 4 days of exposure, increases the risk of perforation (15). In our study, only 18.3% (n= 16) underwent endoscopy within 24 hours. More than 50% of patients were subjected to endoscopy after 24 hours because of delayed presentation.

Acids induce tissue injury through tissue protein desiccation to produce coagulative necrosis. Cellular protein desiccation, denaturation, and precipitation result in eschar formation. So, thus the injury is limited to the more superficial layers. Ingestion of acid causes more damage to the stomach than the esophagus, because of rapid oesophageal transit. Pyloric and antrum is the commonest site owing to reflex pylorospasm(16). But in our study, a greater number of injuries with high severity are seen in the esophagus than in the stomach with acid ingestion. None of our patients had Grade IV injuries.

Alkalis produce liquefaction necrosis which results in extensive penetrating damage because of the saponification of fats and solubilization of proteins. Esophagus is more severely affected than the stomach in contrast to acids. Similar results were obtained in our study, with more injuries to the esophagus by alkali poison. The major drawback of endoscopy is its inability to determine the depth of necrosis & grading is observer-dependent(1). The isolated endoscopic evaluation may falsely estimate severity by failing to consider systemic involvement(17)

Out of 87 patients with corrosive poisoning, only 24 patients had a severe caustic injury and they were initiated on Ryle's tube feeding for 6 weeks. Rakesh Kochhar et. al in their retrospective study concluded that Nasoenteral tube feeding is as effective as Jejunostomy feeding in maintaining in patients with severe corrosive injury. The stricture development rate is also similar in both groups (18). Nutrition is one of the most important therapeutic processes that largely contribute to faster recovery, inadequacy in nutritional supplementation can result in fatal outcomes(19)

Stricture is a late sequela. Following grade 2B and a grade 3 esophageal burn, stricture incidence may be 71% and 100% respectively (20). The cut-off level of the DROOL score ≤ 5.5 achieved 88 % sensitivity with 69.1 % specificity to predict the development of stricture (21). 10 patients developed stricture among 24 cases. Among 10, 2 developed strictures at the antrum and all others in the esophagus. Endoscopic dilatation using either Savary–Gilliard dilators or balloon dilators is recommended in patients with esophageal strictures(22). The interval between dilatations varies from less than 1 to 2-3 weeks and usually, 3-4 sessions are considered sufficient for durable results, although the number of dilatations required may be unpredictable and quite high(20). 8 patients were subjected to esophageal dilatation & only one patient required > 3 dilatations to maintain a patent lumen. Naveen Anand in his study “the patients with esophageal stricture due to caustic ingestion on long-term endoscopic dilatation will have poor QoL, high prevalence of psychological morbidity, and disability” (23). 2 patients were referred for feeding jejunostomy due to gastric outlet obstruction to maintain nutrition status before the definitive procedure. If dilatation is not feasible, then definitive surgical treatment is performed after 6–12 months(1) till then nutrition will be provided via feeding jejunostomy. The timing and type of elective surgery for gastric outlet obstruction are still controversial(19). Early surgery has been advised to decrease mortality and morbidity. Definitive surgery is usually recommended for 3 to 24 months after the date of ingestion for gastric stricture(16).

We conclude that Corrosive poison (acid or alkali) can cause injury to both the esophagus & stomach. The injury's severity is greater if substances are consumed in undiluted form (pH low). Patient symptoms and external injury markers are unreliable in predicting/grading the severity of internal mucosal injuries. The chance of stricture formation is increased in patients with nutritional deprivation when compared to Grade IIB & III injury without stricture. So, nutrition is another factor that places a role in the corrosive outcome. Nutritional supplementation should be given much importance thereby favoring the outcome.

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