

Patterns of Upper Gastrointestinal Tract Injuries Secondary to Corrosive Intake and their Association with Stricture Formation Observed through Esophagogastroscopy

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Abstract

Introduction: In developing countries corrosive intake is a common health problem most commonly seen in children [1]. In adults it is seen frequently in attempted suicide cases [2]. The corrosive ingestion causes erythema, ulcers, necrosis and perforation in the stomach and esophagus. OGD usually done in corrosive ingestion is regarded not only as an innocuous procedure but also offers information concerning the extent and severity of the injury which ultimately helps in treatment and prognosis [5-7].

Aim and Objective: To determine the distribution, extension and severity of injuries produced by the ingestion of caustic substances in the upper gastrointestinal tract, and to assess the relationship of these factors with the age and sex and the appearance of strictures.

Materials and Methods: It is a retro prospective descriptive study of patients who presented with history of corrosive intake to "Department of Endoscopy and Internal Medicine Benazir Bhutto Hospital, Rawalpindi" between 2013 and 2017. Total of 173 patients (56 males and 116 females) presented and underwent OGD in our unit. Median age was 25 years (20 - 30 years). Most of them were attempted suicidal cases. Results were assessed according to ZARGAR's. SPSS (Version-22) for windows was used for analysis through frequencies, percentages and cross tabulations.

Result: Out of 173 cases 56(32.37%) were males and 117(67.63%) were females. Mean age was 25 years. In most cases (78.1%) OGD was performed within 24 hours. OGD was carried out in 173 patients who came in Medical emergency. The endoscopic findings clearly showed grade 2a injury was common in upper 1/3rd, grade 2a in middle 1/3rd and grade 2b in lower 1/3rd of esophagus. Our retro prospective study showed that 23.1% (40 out of 173) had esophageal stricture which was common in patients suffering from grade 2b, 3a injury of esophagus while 12.1% (21 out of 173) had stomach stricture with most of them suffering from grade 3a injury of pylorus. Severance of injury is correlated with occurrence of stricture.

Conclusion: Acid ingestion is more common in third decade adults. the lower 1/3rd of esophagus is more frequently damaged while the lesser curvature and pylorus are mostly damaged in corrosive intake, the greater the grade of injury greater are the chances to develop stricture(esophageal/gastric).

Keywords: Esophagogastroscopy; Benazir Bhutto Hospital (BBH); Corrosives Intake; Esophageal and Stomach Strictures

Abbreviations

OGD: Oesophagogastroscopy; GJ: Gastroesophageal Junction; N: Frequency; %: Percentage; SD: Standard Deviation; GIT: Gastrointestinal Tract; GI Endoscopy: Gastro-Intestinal Endoscopy; SPSS: Statistical Package for the Social Sciences; Hr: Hour

Introduction

Intake of corrosive substances is a devastating health issue seen predominantly in developing countries [1]. Even in United States about 5000 to 15000 per annum cases of corrosive ingestion are reported [2]. A report presented in 2013 by American Association of Poison Control Centers which included 175,594 subjects showed that deliberate ingestion of corrosive substance among adults ranks third among other causes [3]. Although, its accidental ingestion has been frequently reported in children, but its use in cases of attempted suicide among adults is increasing worldwide. In addition to its perilous socioeconomic effects, it also has an enormous medical-legal significance [4] Acids having pH less than 3 or bases with pH greater than 11 are more at high risk for causing corrosive burns of soft tissues [5]. Ingestion of many corrosive substances have been reported in the literature including house hold cleaning products which includes grease cleaners, lime scale removers, drain cleaners and battery acids. Among these, Sulphuric acid is the most commonly ingested item because of its easy availability [4]. The corrosive ingestion causes erythema, ulcers, necrosis and perforation in the stomach and esophagus. Our aim is to present the injuries of gastrointestinal tract observed on repeated OGDs in patients presenting to our department. Substance penetration and injury depth is usually limited with acid ingestion compared to caustic ingestion because it causes coagulation necrosis, with eschar formation [6] OGD usually done in corrosive ingestion is regarded not only as a innocuous procedure In addition, it provides us detailed information regarding the extent and severity of the injury, which ultimately improves the treatment and prognosis of the disease [7-9]. Our aim was to present the pattern of injuries in GIT secondary to corrosive intake observed through upper GI endoscopies done in patients presenting to our department .We conducted this study with an objective To determine the distribution, extension and severity of injuries produced by the ingestion of caustic substances in the upper gastrointestinal tract, and to assess the relationship with appearance of strictures.

Materials and Methods

It is a retro prospective descriptive study of patients who presented with history of corrosive intake to “Department of Endoscopy and Internal Medicine Benazir Bhutto Hospital, Rawalpindi” between 2013 and 2017. Total of 173 patients (56 males and 116 females) presented and underwent OGD in our unit. Median age was 25 years (20 - 30 years). Patients above 18 years old and who intentionally got corrosive injuries of Upper Git were included in this study while pregnant ladies and those having corrosive burns other than acidic ingestion were excluded. Results were assessed according to ZARGAR’s CLASSIFICATION. Follow-up OGD were performed as per required. The concentration ingested by our patients is not known. Analysis was done by using SPSS version 22.0 on Microsoft Windows. Chi-square was applied using standard 0.05. All the graphs were primed using Microsoft Excel.

Grade 0	Normal examination
Grade 1	Edema and hyperaemia of the mucosa
Grade 2a	Superficial ulceration, erosions, friability, blisters, exudates, hemorrhages, whitish membranes
Grade 2b	Grade 2a plus deep discrete or circumferential ulcerations
Grade 3a	Small scattered areas of multiple ulceration and areas of necrosis with brown-black or greyish discoloration
Grade 3b	Extensive necrosis

Table 1: Zargar’s grading classification of mucosal injury caused by ingestion of caustic substances.

Results

Age and sex

The mean age was 25 years (Std. deviation = 1.095). There were total 173 patients out of which 56 (32.4%) were males and 117 (67.6%) females.

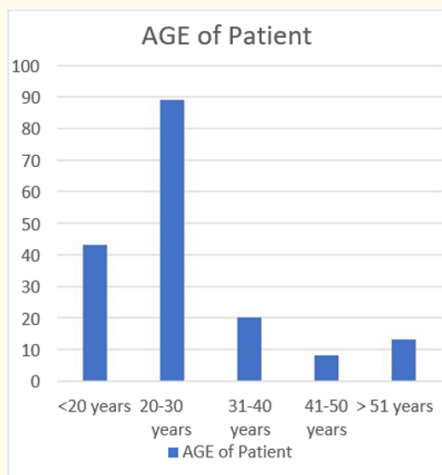


Figure 1

OGD timings and total OGD performed

All patients underwent OGD with mean interval first 48 hours (range 1 - 72 hours) after corrosive intake. In 78.1% cases OGD was performed within 24 hours while 9.2% within 48 hours and 12.7% within 72 hours. OGD was performed in most of the patients with mean value 2.33 having a range of 0-18 with standard deviation of 2.604 on average. During OGD it was found that mean value Gastroesophageal Junction (cm) from incisors is 37.65 (range 30 - 41).

Endoscopic findings

It usually recommended to underwent OGD within the first 24 hours after corrosive intake, no doubt its safe and reliable procedure up to 96 hour after the injury [10,11]; gentle insufflations and great caution should be taken during the procedure.

OGD was carried out in 173 patients who came in Medical emergency. The endoscopic findings showed that 32.9% and 33.5% of the patients had grade 2a injury in upper and middle 1/3rd of the esophagus, respectively. However, in the lower 1/3rd, 28.9% of the patients had a grade 2b injury. Through endoscopic study of stomach it was found that among lesions grade 2b injury of occurred frequently affecting fundus and lesser curvature in 10.4% and 15.4%. While grade 3a of pylorus in 25.4% while Duodenum showed grade 2a injury of 2.7% patients admitted to Emergency. Thus, the statistics show that among all parts the maximum damage was along lesser curvature and pylorus while duodenum was spared most of the time in 71.1%.



Figure 2

Grading	Upper 1/3 rd	Middle 1/3 rd	Lower	Fundus	Body	Lesser curvature	Greater curvature	Pylorus	Duodenum
Grade 0	88	79	62	116	141	98	124	89	124
Grade 1	11	10	8	12	10	8	10	8	17
Grade 2a	57	58	40	16	5	16	8	17	22
Grade 2b	14	24	50	18	9	27	15	14	6
Grade 3a	3	2	13	11	8	24	16	44	3

Table 2: Grade-wise frequency of injuries occurring in upper GIT.

Stricture-appearance

Stricture appearance was also being observed during OGD after corrosive intake and stricture of esophagus is more common than stomach. Our retro prospective study showed that 23.1% (40 out of 173) had esophageal stricture which was common in patients suffering from grade 2b, 3a injury of esophagus while 12.1% (21 out of 173) had stomach stricture with most of them suffering from grade 3a injury of pylorus. Severance of injury is correlated with occurrence of stricture.

Type of Structure	Grade of Injury	N	% Age
Esophagus	2a, 2b	15	37.5
Stomach	3a	13	61.9

Table 3: Frequency and Percentage of stricture occurrence in esophagus and stomach.

Discussion

Corrosive ingestion is a wide-reaching health problem that involves adequate and prompt attention [12]. Ingestion of a corrosive substance can produce severe injury to the gastrointestinal tract and can even result in death In the acute stage, perforation and necrosis may occur. Long-term complications include stricture formation in the esophagus, antral stenosis and the development of esophageal carcinoma. OGD should be attempted and can be safely performed in most cases to assess the extent of damage [13].

According to the literature, a higher incidence of corrosive intake has been reported in males as compared to females. In contrast, we found a female predominance in our study, with a female to male ratio of 4.5:1 [14,15]. In contradiction to a previous study that reported a high incidence of corrosive ingestion in the second decade of life, our study revealed a high prevalence among adults in their thirty’s with majority of females [15]. In our setup, various factors such as financial strain and household responsibilities might contribute to an increased suicidal rate among middle age adults. Qureshi., *et al.* also found suicidal intent (68.75%) more so in females (7/11) leading to corrosive injuries following subsequent strictures [16]. Cheng., *et al.* found 53% females with 71% suicidal intent majority in fourth decade [17].

In our study, 63.6% of the patients had an esophageal injury, with stricture formation in 23.1%. Similarly, a study from India also reported a large majority (87.85%) of patients with esophageal damage secondary to corrosive intake, with 38.3% of the patients developing a stricture later on [4]. The endoscopic study of esophagus revealed, that the lower one third of the esophagus is the most vulnerable part to be damaged after corrosive intake. This finding is in complete accordance with the results of a study done in India [18]. Previously, it was thought that acidic substances only damage the stomach, sparing the esophagus at the same time. However, after a thorough investigation, it has been concluded that esophagus is equally susceptible to acidic injury. This is because acid preparations pass quickly through esophagus as compared to alkalis thus causing less damage to esophagus then moving along the lesser curvature damaging and finally causing irritation of antrum resulting pyloric spasm protecting duodenum from injuries [19,20]. But this has been recently put into consideration because acids do extensive damage to esophagus as well [12].

A retrospective study carried out in Chang Gung university college of medicine evaluated 273 patients with corrosive injury and revealed 42.50% patients with stomach injury. Likewise, our endoscopic study also found 48% of the patients presenting with stomach injury after acidic ingestion [17]. We found lesser curvature and pylorus of the stomach as the two most commonly damaged regions, a finding similar to the study done in India [18]. If an injury causes metaplasia, it probably occurs at the cellular or sub-cellular level and regenerating cells are undoubtedly vulnerable to this change. The increased frequency and intensity of metaplasia at sites where tissue patterns change from one to another form, as at the corpus-pyloric junctions suggest that these sites carry multi-potential codes for cytological differentiation and that they are excessively sensitive to stimuli which might alter these code [21-23].

Duodenum was found to be least affected by corrosive ingestion, accounting for only 27.9% of the total injuries. This relative sparing of the duodenum in contrast to the esophagus and stomach, is mainly due to the pyloric spasm tempted by the irritant acid present in the antrum [4,18].

Acid ingestion typically produces a superficial coagulation necrosis that thrombosed the under lying mucosal Blood vessels and consolidates the connective tissue, thereby forming a protective eschar A study done in Nigeria reported it 40% [24] compared to that our showed 23.1%. In our study, we found that stricture formation was more common in patients who had a grade 2b and 3a esophageal injury. Similar correlation was also found in a study done at Holy Family Hospital, Rawalpindi in which they stated that, the development of stricture was common in grades 2a, 2b and 3a injury of esophagus [25]. Similar results showing appearance of stricture with grades greater than 2a were also found [26]. Thus, we can conclude by suggesting to perform this retrospective study on larger scale so that whenever a patient with corrosive intake appears in emergency follow-up could be decided on spot and to insure whether there appears urgency for dilatation or not.

Conclusion

Acid ingestion was found to be more common in females and third decade adults. The lower 1/3rd of the esophagus was more frequently damaged, while the lesser curvature and pylorus of the stomach were more susceptible to corrosive injury. In corrosive intake, the greater the grade of injury, greater are the chances to develop a stricture(esophageal/gastric) later in the course of the disease.

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