

# Clinical and Endoscopic Study of Upper GI Manifestation in Corrosive Acid Ingestion

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**Abstract-** The potentially catastrophic presentation and lifelong complications that result from corrosive ingestion make it one of the most challenging clinical situations. In this study we review clinical features and Endoscopic results of 50 patients admitted in Acute Medical Care of Osmania General Hospital with Corrosive Acid Ingestion. In our study commonest corrosive acid ingested was hydrochloric acid (n = 33) followed by phenyl (n=9), sulphuric acid (n=7) and nitric acid (n=1). The mean interval time of admission after ingestion of corrosive acid was 5.5 hrs.

The extent and severity of Upper Gastrointestinal injury was determined by fiber optic endoscopy within 48 hrs. All the patients had esophageal and gastric injuries. 27 patients had severe grade III injuries, 10 patients had grade II moderate injuries 10 patients had Grade I injuries and 3 patients had no injuries.

Complications and mortality occurred only in patients with grade III injury. Feeding jejunostomy was done in 6 patients of grade III injury with good results. FOB endoscopy is an accurate, safe and reliable method for assessing corrosive injury of Upper GI no complications were encountered during early endoscopy. Burns were graded according to modified Zargar et al classifications.

**Index Terms-** Endoscopic, Upper GI, Corrosive acid Ingestion

## I. INTRODUCTION

Caustic injury is usually produced by strong alkaline or acidic agents. Acid ingestion is common in India where hydrochloric acid and sulphuric acid are easily available as toilet cleaners<sup>1</sup>.

The Poison Prevention packaging Acts of 1970 and 1973, which require child proof containers for household caustic agents with concentration of 10% or greater and for liquid alkaline products of 2% or greater, have reduced but not eliminated severe caustic injuries in the United States<sup>2,3,4</sup>. In the 12 year period 1988 to 2000, data from the U.S. poison control centre reveal that both the number of household ingestions and number of related deaths have risen, despite public education efforts<sup>5</sup>.

Symptoms and signs are poor indicators of degree and extent of damage to the gastrointestinal tract. Radiological studies are also not sensitive. The best method to stratify patients with acute corrosive ingestion is upper gastro duodenal endoscopy whose

safety has been well established. Flexible endoscopy can be performed safely at any time from 6 to 96 hours of ingestion, provided the patient is stable and there is no evidence of perforation. However, it should be avoided in the sub-acute phase (5 to 15 days) after corrosive intake when the tissues slough and there is increased danger of perforation. On the basis of endoscopic findings, corrosive burns have been classified into grade 0,1,2 and 3 (table 1). Most perforations and fatalities in the acute phase occur in patients with grade 3b injury, while stricture develop in patients with grade 3b injury, while strictures develop in patients with grade 2b or worse injury. Therefore, such patients need to be kept under close supervision<sup>6</sup>.

This is a prospective study of 50 patients with Corrosive Acid ingestion reviewing the extend of injury, clinical outcome and response to treatment.

## II. MATERIAL & METHODS

A total number of 50 patients who were admitted to the Acute Medical Care Ward of Osmania General Hospital, Hyderabad with a history of corrosive acid ingestion were studied.

The initial history was directed towards ascertaining details regarding the corrosive acid consumed i.e. type of acid, concentration, amount and whether the ingestion was suicidal, accidental or otherwise.

The patient was then subjected to a clinical examination including vital signs, oropharyngeal evaluation, chest and abdominal examination. After routine serum chemistry and blood grouping each patient was subjected to plain radiographs of chest and abdomen for evidence of perforation. viz. Pneumo peritoneum, Pneumo mediastinum & pneumo thorax.

When the condition of patient has been stabilized each patient with no clinical evidence of perforation will be subjected within the next 48 hours, under local xylocaine anesthesia esophago gastroduodenoscopy using a flexible Olympus GIF20 endoscope was attempted in all patients, to assess the location, extent and severity of the injury to the upper G.I.tract. The injury was graded according to the modified criteria given by Zargar and colleagues into I, IIa, IIb, IIIa, IIIb, and IV.

**Endoscopic grading of corrosive esophageal and gastric burns is:**

Grade I : edema and erythema

Grade IIA : Hemorrhages, erosions, blisters, superficial ulcer, exudates (patchy or linear)  
 Grade IIB : Circumferential lesions  
 Grade IIIA : Small scattered areas of necrosis.  
 Grade IIIB : Multiple deep brownish-black or gray ulcers with extensive necrosis.  
 Grade IV : Perforation

Endoscopy was possible in all patients except patient No. 7 & 2 who had perforated and in whom injury was assessed at surgery, and patient who died within 6 hours, where autopsy was performed.

Upper gastrointestinal endoscopy was repeated at the end of 2 – 4 weeks in all patients with grade IIB injury or more to assess the degree of healing. These patients were also subjected to barium studies (barium swallow and meals) during the early follow up period of up to 2 months to look for development of strictures.

### III. OBSERVATIONS, RESULTS AND DATA ANALYSIS

50 Patients with definite history of Corrosive Acid ingestion of were included in the present study. There were 26 women and 24 men. Their ages ranges from 03 years to 65 years with mean age of 35 years .They are distributed as above.

**CAUSE FOR INGESTION:-** In 9 Patients the injury was accidental while in 41 Patients it was a suicidal attempt, all for the first time.

**NATURE AND AMOUNT INGESTED :-** All Patients had consumed acid in the liquid form. However, the nature of the acid consumed differed. Commonest Corrosive acid ingested was Hydrochloric acid (n = 33) followed by phenyl (n = 9), Sulphuric acid (n = 7) and Nitric acid (n = 1). It was difficult to ascertain the exact volume ingested in each case, but ranged apparently from 20 ml to 100 ml. All patients presented between 1 hour to 10 hours after ingestion with a mean interval of 5.5 hours. Out of 50 patients more than 50% of the Patients presented with Sialorrhoea (n = 45), Epigastric pain (n = 30), Burning sensation in the Oral cavity (n = 28), Odynophagea (n = 29) and Vomiting (n = 27). 50 % of the patients presented with haematemesis (n = 25), less than 50% of the patients presented with other symptoms like dysphagia (n = 22), and heart burn (n = 17). Only one patient presented with respiratory distress.

**PHYSICAL SIGNS :- Oropharyngeal burns:** 66 % of patients (n = 3) presented with burns of either lips, tongue, buccal mucosa, soft palate, hard palate or pharynx.

**Abdominal signs:** 60% of patients had epigastric tenderness (n = 30), 10% patients had diffuse tenderness (n = 5) of which 2 had guarding & 30% had normal abdomen (n = 15).

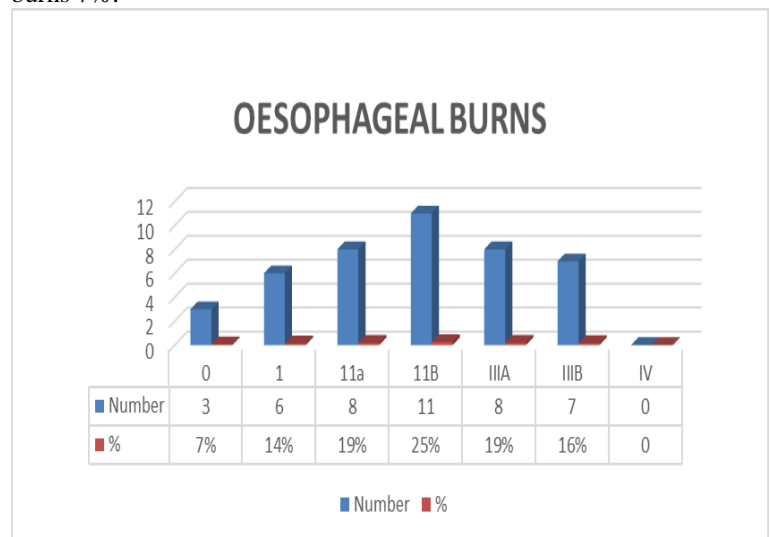
**Endoscopy findings:** Upper GI endoscopy to assess the extent of injury & severity of burns was possible in 43 patients, 2 patients presented with gastric perforation in whom assessment

was done at surgery, in 4 individuals due to severe edema & friability of esophageal mucosa endoscope could not be passed and injuries were assessed at surgery. One patient died & assessed at necropsy.

### OESOPHAGEAL BURNS

Grade	Number	%
0	3	7%
1	6	14%
11a	8	19%
11B	11	25%
IIIA	8	19%
IIIB	7	16%
IV	0	0

60% (n = 26) had severe esophageal burns ( $\geq$  IIB), 19% (n=8) had moderate burns to mild (n = 6), and 14% (n = 3) had no burns 7%.

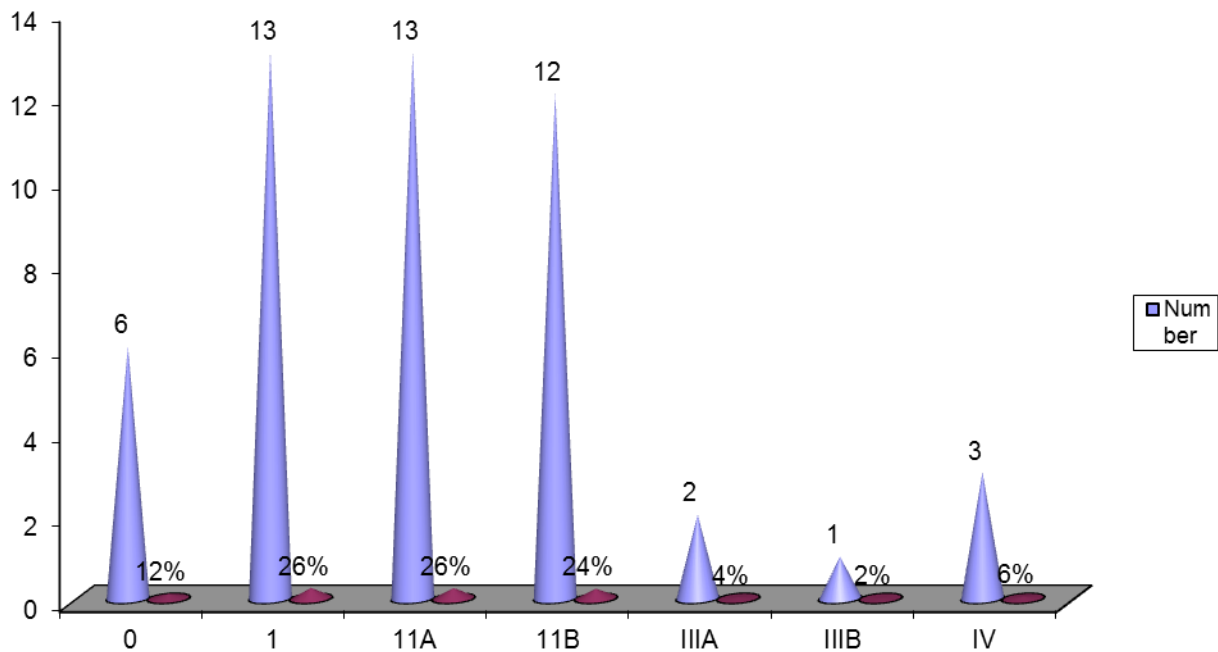


### GASTRIC BURNS

Grade	Number	%
0	6	12%
1	13	26%
11A	13	26%
11B	12	24%
IIIA	02	04%
IIIB	01	02%
IV	03	06%

Severe gastric burns were less when compared with esophageal burns (n = 18). Most of the patients had mild to moderate injuries (n = 26). 3 patients had perforation. 6 patients had no gastric burns.

### Gastric burns



**Duodenal burns:** Scope could not be passed into duodenum in 10 patients due to pylorospasm. 22 patients had no duodenal burns. 15 patients had mild to moderate injuries (I & II) & only 3 patients subjected to surgery had severe duodenal injury (grade III).

17 patients with full stomach had severe esophageal burns, while only 10 had severe esophageal burns with empty stomach. 8 patients on full stomach had severe gastric burns, while 9 patients on empty stomach had severe gastric burns of whom 2 patients presented with perforation. 15 of the 17 patients with no oral cavity burns had esophageal gastric burns, of which 7 had severe injury.

Thus, a normal oral cavity may not exclude upper gastro intestinal injury. 80% of patients (n = 24) with Odynophagia & 83% of patients (n = 26) having dysphagia had severe oesophageal injury (IIB or more). **Haemetemesis:-** 16 patients of 25 patients with haemetemesis had severe injury of esophagus & stomach. **Epigastric pain:-** 19 of 30 patients with severe epigastric pain had severe injury of esophagus or stomach. Of 30 patients with epigastric tenderness 20 patients had esophageal burns & 16 patients had severe gastric burns. One patient with epigastric tenderness and 2 patients with diffuse tenderness had gastric perforation. However, 2 patients with normal abdominal findings had grade IIIA esophageal injury.

#### Management, Complications & Mortality

**Mild to moderate injury:** 23 patients had mild to moderate burns who were kept on IV fluids, nil orally, (soft oral feeds with no evidence of burns) Ampicillin 500mg IV 6<sup>th</sup> hrly. (H2 receptor blockers in symptomatic patients) for first 48 – 72 hours. Gradually put on oral feeds starting with liquids & discharged subsequently.

**Severe injury:** 27 patients had severe burns of esophageas / stomach or both. All the patients were kept on nil orally, IV fluids, Ampicillin IV 500mg 6<sup>th</sup> hrly, proton pump inhibitors 40mg IV BD, and Sucralfate with those IIB & IIIA burns, started oral feeds after 48 hours of which 17 patients did not tolerate oral feeds who were given Naso gastric for 2 weeks. 4 patients with grade IIIB injury were subjected to feeding jejunostomy; of 3 patients with perforation 2 were subjected to laparotomy closure perforation with feeding jejunostomy. One patient died prior to endoscopy. **Mortality:** Overall one patient died with mortality of 2%. No endoscopy related complications were encountered in any patient.

Autopsy was performed in patient who died before initial endoscopy and revealed grade III D esophageal burns and severe lung congestion.

**Repeat Endoscopy after 4 Weeks:-** Of 50 patients – one died before initial endoscopy, after excluding patients with initial normal endoscopy only 20 patients turned up for repeat endoscopy.

**Esophageal :-** 4 of 5 patients with grade IIIB esophageal injury developed stricture lower 1/3 while in one grade IIA injury was found. 3 of 9 patients with IIIA injury developed stricture lower 1/3; in 2 patients there was complete healing in remaining there is decrease in 1 or 2 grades. One of 5 patients with IIB burns developed stricture, in 3 it was normal, in one there is a grade IIA injury. Patient with IIA burns showed normal study.

**Gastric:-** In most of the patients with initial grade IIIB esophageal injuries scope could not be passed down to delineate gastric burns. In most of the patients in whom scope passed showed either normal study or grade IIA injuries.

**Barium Swallow:** - Of 14 patients, with grade IIIA & IIIB injury 11 patients developed stricture lower 1/3 of esophageas. 3 of 5 patients with IIB injury had stricture lower 1/3 of

esophageas. All esophageas stricture occurred in lower 1/3 of esophageas. 2 patients with grade 4 injury had stricture antrum & body. Patient with grade IIIA injury who had stricture antrum & body. 5 of 11 patients with grade IIB injury had stricture antrum. Only one out of 6 patients of IIA injury had stricture antrum. 8 patients developed simultaneous stricture esophagus and stomach. By the end of 8 weeks, 17 patients developed stricture & patients developed stricture antrum or body.

#### IV. DISCUSSION

Corrosive acid injury to upper GI tract due to ingestion is common in India. Most of the patients in present study consumed toilet bowl cleansers which are cheap & easily available. In the present study HCL was the commonest agent ingested 66% (33/50). In studies by zargar et al from Chandigarh HCL<sup>7</sup> (19/41) commonest acid ingested, where as in series of Dilwali et al<sup>8</sup> H2SO4 was the commonest.

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Most of the patients presented to the hospital quite early with mean interval between ingestion and admission being 5.5 hours; in contrast to mean interval of 14 hours by Dilwari et al<sup>8</sup>.

54% had severe esophageal injury of which 50% had diffuse involvement & 42% had diffused gastric involvement. Where in study by Shiva Kumar et al<sup>9</sup> of Chennai 69.2% & 65.4% had diffuse esophageal & gastric involvement respectively. Duodenum was relatively spared in majority of patients & in those involved they were mostly of minor grade & this can be attributed to pylorospasm & alkaline PH of duodenum.

Sailorhea (90%) epigastric pain (60%) & dysphagia (62%) were the commonest symptoms encountered. Where as in study by Shiva Kumar et al<sup>9</sup> dysphagia was the commonest symptom (97.1%) encountered.

Grade IIIa injuries & IIIb injuries were present in 16% & 14% of patients, where 46.2% grade III injuries were present in study by Shiva Kumar et al<sup>9</sup>. All the patients with grade IIIb injuries were needed to be subjected for feeding jejunostomy

In this study there is no great difference in severity of injuries in those who consumed on either on full stomach or on empty stomach. However the two patients who presented with perforation consumed acid on empty stomach.

Presence of epigastric tenderness was associated with severe burns of esophagus (64%) & stomach (53%) however 14% of patients with normal abdomen had severe upper gastrointestinal injury, so symptoms & physical examination were unreliable in all cases in determining the severity or extent of injury.

Flexible fiber optic endoscopy made the assessment of upper gastrointestinal injuries accurate, safe, and reliable & practicable. In present study no complications were encountered during early endoscopy. Endoscopy was not only used for evaluating burns, but was also used in deciding treatment & in

assessing healing of burns. Burns were graded according to modified Zargar et al<sup>7</sup> classification.

All patients with minor injuries recovered without any sequel, where as those with sever burns developed acute & late complications.

In present study nasogastric feeding was employed in most patients with severe burns. Feeding jejunostomy was done in six patients of four with grade IIIb injury, two with perforation all these survived through surgery.

Grade III injuries required intensive care & monitoring. There were three patients with gastric perforation of which one died before one day. Site of perforation was cardia in one & greater curvature in two.

Laryngeal edema was present only in child who died before initial endoscopy. Overall mortality was 2% (1 of 50) as compared to (12.2%) & (18.7%) in studies by Zargar et al<sup>7</sup> & Dilwari et al<sup>8</sup>.

Steroids were not used in our study. Mucosal protectants & proton pump inhibitors were used in those with severe injuries for mucosal covering action over ulcer surface & for decreasing acid reflux respectively.

In present study 4 of 5 patients with grade IIIb injury, 3 of 9 patients with grade IIIa injury and 1 of 5 patients with grade IIb injury developed oesophageal stricture and significantly all strictures encountered involved only lower 1/3 of oesophagus. Gastric strictures occurred in two patients with grade IV injury, one with grade III injury, 5 of 11 patients with grade IIb injury and 1 with grade IIa injury as compared to 2 of 6 patients with grade III burns in study by Dilwari et al<sup>8</sup>.

Thus, corrosive acid ingestion though a serious condition with subsequent high degree morbidity and mortality which when attended can be reduced to a certain level.

#### V. CONCLUSION

- (i) Corrosive acid is one of the commonest suicidal agents ingested.
- (ii) Signs and symptoms are unreliable guide to estimate severity in all cases.
- (iii) Early flexible fibre optic endoscopy has a crucial role in both diagnosing the severity of injury as well as in management.
- (iv) Main principle in managing the patients with corrosive injury to upper gastric intestinal tract is that patient should be evaluated individually.
- (v) Diligent follow up is needed to ensure patients to have satisfactory gastro intestinal function.

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