



CHRONIC COMPLICATIONS OF CORROSIVE INGESTION. ENDOSCOPIC MANAGEMENT AND OUTCOME.

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ABSTRACT

BACKGROUND/AIMS: The objective of the present study is to describe the chronic complications of corrosive ingestion and to assess the safety and efficacy of endoscopic therapy.

MATERIALS & METHODS: This retrospective study was conducted in a tertiary care center. Records of patients with history of corrosive ingestion in last 10 years were reviewed. Data such as age, gender, caustic agent, site and degree of burn, types of treatment, complications, effectiveness and outcome of endoscopic therapy were analysed.

RESULTS: Out of 56 patients with history of corrosive ingestion, 34 patients (60.7%) developed chronic complications with esophageal stricture (ES) in 28 (50%) cases, ES with Gastric outlet obstruction (GOO) in 4 cases and GOO in 2 cases. 6 out of 19 patients with Grade IIa, and all 17 patients with Grade IIb burn developed stricture ($p < 0.001$). 1 out of 3 with Grade IIIa injury developed stricture (2 died). Endoscopic therapy was effective in 19 patients (59.4%) and was more effective in patients with short strictures (85.7% vs 9%). Gastric strictures didn't respond to dilatation and all patients went for surgery. Concomitant triamcinolone injection was done in 10 patients with refractory strictures but did not improve the overall outcome.

CONCLUSION: Severity of corrosive strictures depends upon the severity of mucosal injury and endoscopic dilatation is safe and effective in esophageal strictures.

KEYWORDS : Corrosive, Dilatation, Stricture

INTRODUCTION:

Corrosive ingestion is a common problem worldwide¹. Acid ingestion is more common in India than in United States as hydrochloric acid and sulfuric acid are cheaper and easily accessible^{2,3}. Alkali produces liquefaction necrosis and acid induces coagulation necrosis with eschar formation⁴. The endoscopic classification of caustic injury to the esophagus was given by Zargar et al in 1991⁵[Table 1]. The most common long-term complication following corrosive ingestion is upper gastrointestinal tract(UGI) strictures followed by gastric outlet obstruction, gastroesophageal reflux disease and rarely carcinoma. The degree of mucosal injury correlates directly with stricture formation and mortality⁶. Strictures are most commonly seen in esophagus followed by stomach and are more common when the endoscopy shows Grade IIb and III injury^{5,6}. Endoscopic dilatation is the treatment of choice and surgery is only reserved for those who don't respond to endoscopic methods. More advanced endoscopic treatment options such as local steroid injection, mitomycin C injection and the use of expandable stents have been developed with varied results^{7,8}. The objective of the present study was to describe the chronic complications of corrosive ingestion and to study their relation with the grade of injury and also to assess the safety and efficacy of endoscopic therapy.

Table 1. Endoscopic Grading Of Caustic Injury⁵

Grade	Endoscopic finding
Grade I	Edema and erythema
Grade IIa	Hemorrhage, erosions, blisters, ulcers with exudate
Grade IIb	Grade IIa plus circumferential ulcerations
Grade IIIa	Multiple deep ulcerations with brown, black or grey discoloration
Grade IIIb	Extensive Necrosis

MATERIAL AND METHODS:

This single center retrospective study was conducted in the Department of Gastroenterology, at a tertiary care hospital. We retrospectively reviewed the records of patients with history of corrosive ingestion in last 10 years. Inclusion criteria were as follows: (1) patients who developed chronic complications (esophageal or gastric stricture) after caustic agent ingestion; (2) patients who underwent endoscopic therapy for these complications; and (3) patients who had been followed up for at least 2 years. The patients where endoscopy was not possible due to severe cardiopulmonary disease or other serious disease were excluded. Data such as age, gender, caustic agent, site of burn, types of treatment, effectiveness and outcome of endoscopic therapy were recorded. Development of any

chronic complication was assessed by history, UGI radiology (Barium study) or UGI endoscopy. Grade of injury was assessed as per Zargar Classification (Table 1). When a stricture formed, these patients were treated at several-week intervals by endoscopic dilatation. Surgery was considered as second-line rescue therapy. Patients with Esophageal Stricture (ES) were managed with repeated esophageal dilatations under conscious sedation (under GA in pediatric age group). Dilatation was done either with balloon or bougies.

Each treatment session consisted of two or three dilations. After the final dilation, endoscopy was done to assess the efficacy of the dilatation and also to rule out any complications such as bleeding or perforation of the esophagus. Endoscopic therapy was considered effective when adequate lumen of >15mm was achieved and when patients were able to eat semi-solid or solid foods without dysphagia.

RESULTS:

Total of 62 patients had history of corrosive ingestion. Mean age was 19.5 ± 11.7 years (range 2-45y) with males constituting 53.2% (n=33) and females 46.8% (n=29) with male female ratio of 1.13:1. 39 patients had history of acid ingestion, 17 patients had ingested alkali and in 6 cases, nature of corrosive was unknown. Out of 62 patients, 3 patients died and 3 patients did not follow. Out of remaining 56, 34 patients (60.7%) of cases had developed chronic complication related to GI tract, with maximum percentage constituting esophageal stricture. Isolated esophageal stricture (ES) developed in 28 (50%) cases, ES with Gastric outlet obstruction (GOO) in 4 cases (7.2%) and GOO only in 2 cases (3.5%). Stricture formation were slightly more common in those patients who had ingested alkali (64.7% vs. 60.0%).

Development of chronic GI complication vs. Severity of injury to UGI (Table 2).

12 patients with Grade I esophageal injury recovered without any sequelae. Isolated esophageal stricture occurred in 6 patients out of 19 patients with Grade IIa (3 lost f/u), and all patients with Grade IIb burn (n=17) developed stricture formation (p<0.001). 1 out of 3 with Grade IIIa injury developed stricture (2 died). Significantly higher rate of stricture formation in Grade IIb injury clearly establishes the Zargar classification in terms of outcome. (Table 2) Eight cases with Grade I injury of duodenum had no sequelae, stricture (Gastric outlet obstruction) developed in 2 cases out of 6 patients with Grade IIb injury of duodenum.

Table 2. Correlation of Stricture Formation with Severity of Injury as per Zargar classification.

Degree of esophageal injury	Number of patients with stricture	S/S	S/M	L/S	L/M
Grade II (36)					
IIa (19)	6	5	--	1	--
IIb (17)	17	7	1	6	3
Grade III (3)					
IIIa (3)	1	--	--	--	1
IIIb	--	--	--	--	--

Type of stricture. (Table 2&3)

(Short stricture <3cm and long stricture \geq 3 cm long)

Esophageal stricture were short and single (S/S) in 19 patients, short and multiple (S/M) in 2 patients, long and single (L/S) in 7 cases and long/multiple (L/M) in 4 cases. Most of the patients had short and single stricture. Most common site of esophageal stricture was mid esophagus in n=21 cases, (65.6%), followed by upper 1/3rd and lower 1/3rd.

Table 3. Efficacy of dilatations Vs Severity of esophageal stricture.

Severity of stricture	Number of cases	Adequate lumen achieved in	Total number of dilatations required	Mean \pm S.D
Short and single	19	16(84.20)	357	18.79 \pm 9.8
Short and multiple	2	2(100)	57	19.0 \pm 13.22
Long and single	7	1(14.2)	279	39 \pm 12
Long and multiple	4	--	278	69 \pm 11.38
Total	32	19	971	

Management of patients with chronic GI complication (Table 3 & 4)

Total number of dilatations done were 971, with mean number of dilatations 15.66 ± 20.77 (range: 4-79). Number of dilatations required were directly proportional to severity of stricture as shown in Table 3. 10 patients with refractory ES were also adjuncted with Inj. triamcinolone, but it did not improve the dysphagia or didn't reduce the need of dilatation significantly. None of the patients with esophageal stricture was managed with primary surgery. One patient who did not respond to repeated dilatations underwent colonic interposition.

Table 3 illustrates that those patients with less severe stricture, most of them had achieved adequate lumen (defined lumen diameter \geq 15mm), or became asymptomatic. We observed that endoscopic dilatation was effective in 85.7% with short strictures in comparison to 9% with long strictures (p<0.001). Short strictures required significantly lesser number of dilatations in comparison to long strictures (p<0.01). Single or multiple strictures did not made any difference with respect to final outcome.

Out of 8 patients with corrosive injury of stomach (2 isolated and 6 along with esophagus), 6 cases had features of gastric outlet obstruction (GOO). All patients were initially managed with endoscopic balloon or bougie dilatation of both esophageal stricture and antral stricture, as primary modality of treatment. Total of 46 balloon dilatations were performed for antral stricture ranging from 2-11, with mean number of dilatations 7.6 ± 3.2 . All 6 patients with gastric / antral stricture underwent secondary surgery in the form of gastrojejunostomy (Table 4).

Table 4. Type of chronic GI complication and treatment received.

Type of Chronic complication	Treatment received	
	(n)	Primary treatment Secondary treatment
Esophageal stricture(ES)	28	dilatation Surgery*
ES with Gastric outlet obst.	4	dilatation Surgery
Isolated GOO	2	dilatation Surgery

* one patient with esophageal stricture underwent colonic interposition, later-on developed stricture of colonic segment. ES= esophageal stricture, GOO= gastric outlet obstruction

Complications related to the method of treatment.

No serious complication was seen in patients managed with esophageal dilatation, except one patient who had small esophageal perforation which was managed conservatively. One case of ES had colonic interposition, later on developed stricture of the colonic segment which was again managed with dilatation of the stenosed segment. Patients who underwent surgical correction of their gastric stricture had no operative/postoperative mortality.

DISCUSSION

After the corrosive ingestion, superficial epithelium is destroyed immediately and necrosis starts which can extend to a variable depth and stricture formation occurs by the 3rd week^{3,9,10}. In our study, 60.7% patients of corrosive ingestion developed chronic complications in the form of stricture either in esophagus alone (50%), stomach (5.9%) or both (11.7%). The development of chronic complications varies widely in the literature ranging from as low as 24.18% to as high as 80%^{5,6}. Our study showed that the stricture formation was more common in those patients who had ingested alkali (64.7% vs. 60.0%). Similar findings were observed by multiple studies¹⁰⁻¹². In our study, stricture formation directly correlated with the extent of esophageal or gastric injury as per the Zargar classification. All patients with Grade I esophageal injury recovered without any sequelae. Out of 19 patients with grade IIa injury, only 6 (31.6%) developed isolated short esophageal stricture (<3cms). All the 17 patients (100%) with Grade IIb burn (n=17) developed stricture formation (p<0.001). 1 out of 3 with Grade IIIa injury developed stricture (2 died). This difference in the outcome of Grade IIa and IIb and III was clearly significant and similar findings have been reported in the previous studies with incidence of stricture formation varying from 0-10% in grade IIa injury and 70-100% in grade IIb and grade III injury^{5,6,12-14}.

In our study, the most common site of esophageal involvement and stricture formation was mid esophagus followed by upper and lower end. The reason of more mid esophagus involvement in corrosive injury may be the failure of microcirculation at this level¹⁵.

We observed that response to endoscopic treatment of strictures was directly related to the severity of stricture with short strictures responding significantly better with endoscopic therapy and required significantly lesser number of dilatation sessions in comparison to long strictures. Similar efficacy data of endoscopic dilatation has been documented in both adults and children^{3,10,18,19}. We observed only one perforation out of total 971 dilatations which is much better than what is reported in literature(4.1%-18%)^{20,21,22}.

Others methods of treating refractory ES are adjunctive steroid injections and metallic stent placement with acceptable results^{7,8}. In our study, we didn't observe any significant benefit of giving local triamcinolone injection alongwith dilatation. Data regarding use of steroids in corrosive strictures is conflicting and still unclear⁸. Surgery is indicated when stricture cannot be dilated and if there is complication of dilatation like perforation. Surgical procedures for corrosive ES include substitution of esophagus with colon, stomach and jejunum [esophago-gastric anastomosis or colon or jejunum interposition]²³⁻²⁶.

We conclude that corrosive ingestion can result in disabling esophageal and gastric strictures whose severity depends upon the severity of mucosal injury. Short strictures respond better to endoscopic dilatation than long esophageal strictures and gastric strictures.

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