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Original Research Article

Study of the medium term outcome in corrosive upper gastrointestinal strictures managed in one unit by combined endoscopic and surgical modalities

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ABSTRACT

Background: Corrosive substances can cause serious injuries of the upper gastrointestinal tract and may lead to death. Acute corrosive poisonings are caused by ingestion of corrosive chemicals which are mostly used as household agents and are ingested accidentally or suicidal intentionally. The objectives of the present study were to evaluate and compare the medium term outcomes of the multi modal treatment used for patients presenting with corrosive upper gastrointestinal strictures and to study the demographic and clinico-pathological profile of the patients of corrosive upper gastro intestinal tract strictures.
Methods: A combined retrospective and prospective study was carried out on departmental database and patient presenting with corrosive upper gastrointestinal stricture from December 2010 to July 2019 in the Department of Surgical Gastroenterology at King George's Medical University for a period of 9 years.
Results: Corrosive ingestion was found to be more prevalent in age group of 15-65 years with higher incidence to be found in females compared to males. Majority of ingestion of corrosive substances are found to be suicidal by adults.
Conclusions: India has high incidence of corrosive ingestion mainly suicidal and homicidal indent. Endoscopic dilatation of esophageal strictures is safe and effective therapy and should be first line therapy in patients with esophageal strictures and surgery should be considered only in patients who have technical and clinical failure on endoscopic dilatation.

Keywords: Corrosive substances, Esophageal stricture, Gastric outlet obstruction, Endoscopic dilatation

INTRODUCTION

Corrosive substances when ingested still continue to be an important public health concern in Western education, despite the education and regulatory efforts which have been put forward to reduce its occurrence. These injuries are still increasing in developing countries.[1] According to the American Association of Poison Control, there were approximately 2,00,000 caustic poisonings, most frequently used are cleaning substances in the households.[2,3] Worldwide, children represent ingestion of caustic substances accidentally, while ingestion in adults is suicidal with intent and is life-threatening.[4,5] Caustic agents they can be either acidic or alkaline in nature. Acid containing agents includes toilet bowl cleaners, anti-rust compounds (oxalic acids), swimming pool cleaners, formic acid; and alkali containing caustic agents are household bleaches (5% of sodium hydrochloride), drain openers, toilet bowl cleaners, dish washing agents and detergents. The most commonly used acid is hydrochloric

acid which is used by developing country like India as it is cheap and easily available.[6] Acid when reacts with tissue proteins, are converted to acid proteins and the mode of tissue injury is coagulum necrosis.[7] The countries like Denmark, UK, Spain, Australia, Peru showed that alkaline agents were most commonly included as caustic injury.[6] Alkaline substances when ingested reacts with proteins and fats and are transformed into proteinases and soaps which results into liquefaction necrosis which leads to transmural injury.[7]

The goal for treatment of corrosive esophageal stricture (CES) is to preserve the oesophagus and restore its function. The management for CES includes oesophageal dilatation, retrievable stent replacement, surgical resection of short segment stricture and oesophageal replacement. Dilatation has been considered as the treatment of choice for CES and can be treated endoscopically or fluoroscopically using a balloon dilator or rigid dilator.[8] In this study, we would analyze the medium term results of combined (endoscopic and surgical intervention) in corrosive gastrointestinal (GI) strictures in one unit.

Objectives

The objectives of the present study were to evaluate and compare the medium term outcomes of the multi modal treatment used for patients presenting with corrosive upper GI strictures and to study the demographic and clinico-pathological profile of the patients of corrosive upper GI tract strictures.

METHODS

A combined retrospective and prospective study was carried out on departmental database and patient presenting with corrosive upper GI stricture between December 2010 to July 2019 in the Department of Surgical Gastroenterology at King George's Medical University.

Patients aged between 15-65 years with chronic corrosive upper GI injury undergoing definitive intervention with hematological, biochemical and radiological investigation following a detailed clinical examination was done for following parameters as relief of symptoms particularly dysphagia, recurrence of stricture, development of malignancy and other complications and medium term follow-up results; documented corrosive intake was presented with UGI stricture and underwent either surgical or endoscopic treatment were included in the study. Patients presented with acute corrosive injury, GI perforation, bleeding, or underwent dilatation and not completed 3 year follow up or lost to follow-up were excluded from the study. All patients with gastric stricture underwent surgery either by resection (distal gastrectomy, total gastrectomy) or by bypass procedures (gastrojejunostomy) and who underwent anastomotic strictures on follow-up underwent endoscopic dilatation. Total patients included in the study were 76.

The data was collected and tabulated in MS Excel.

RESULTS

Seventy-six patients underwent surgical or endoscopic treatment for chronic corrosive strictures of upper digestive tract. The gender wise distribution is presented in Figure 1. Among the total patients, females were more than males. Females were 45 whereas males were 31. Table 1 presents most of the patients were young with mean age of 28.8 years. Acid was the most common corrosive substance, ingested in around 80% of the cases. Suicidal intent was present in 63.2% of cases while 27.6% ingested corrosives accidently. All of these patients were malnourished with mean weight of 34.2 kg and median BMI of 14.8 kg/m^2. Oesophagus was the most common organ involved in 64 (84.2%) followed by stomach in 51 patients (67.1%). In current study dysphagia was the most common presentation in 64 patients. Gastric outlet obstruction (GOO) was present in 20 patients. The location of esophageal stricture (ES) of upper oesophagus was found to be in 20 (26.31%) cases, middle in 21 (27.63%) and lower oesophagus in 23 (30.26%) cases. ES were evenly distributed throughout the esophagus. Most of strictures were shorter than 6 cm (<2 cm in 44%, 2-6 cm in 55%) and only 15% of patients had long strictures >6 cm. Long strictures were difficult to dilate. Only 2 patients with >6 cm strictures were dilated successfully, rest required gastric pull or pharyngocoloplasty. Multiple strictures were seen in 15% of cases. Patients with more than 4 strictures could not be successfully dilated and required gastric pull up.

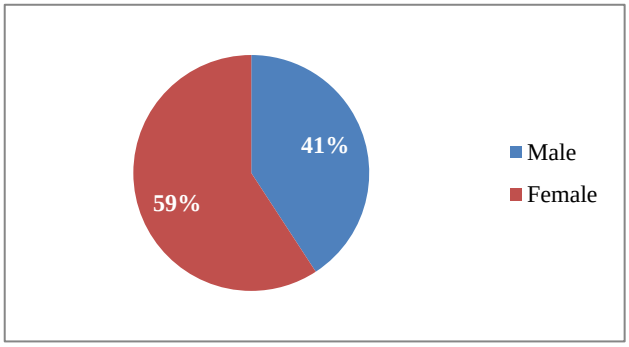

Figure 1: Gender wise distribution of patients.

Endoscopic dilatation was technically successful in 20 patients with isolated esophageal involvement and was successful in 18 patients in achieving 15 mm dilatation or long term symptom remission. Two patients failed on endoscopic therapy and underwent gastric pull up surgery along with 5 other patients with isolated esophageal involvement. Two of these patients develop anastomotic stricture, both were successfully dilated endoscopically (Table 2). No operative mortality was present.

Table 1: Baseline characteristics (n=76).

Characteristics	N (%)
Mean age (in years)	
15-65	28.8
Corrosive substance	
Acid	60 (78.9)
Alkali	2 (2.6)
Not known	14 (18.4)
Intent	
Suicidal	48 (63.2)
Accidental	21 (27.6)
Homicidal	3 (3.9)
Not known	3 (3.9)
Weight	34.2 kg (mean)
BMI	14.8 kg/m^2
Organ involvement	
Oesophagus only	25 (32.89)
Oesophagus+stomach	39 (51.31)
Stomach only	12 (15.78)
Presenting complaints	
Dysphagia	64 (84.21)
GOO	20 (26.31)
Location of stricture (oesophagus)	
Upper	20 (31.25)
Middle	21 (32.81)
Lower	23 (35.93)
Length of strictures in oesophagus (in cms)	
<2	24 (37.50)
2-6	30 (46.87)
>6	10 (15.63)
Single strictures	56 (87.50)
Multiple strictures (>2 strictures)	8 (12.50)

GOO: Gastric outlet obstruction.

Table 2: Surgery of ES.

Surgery	Indication	Intra op time (mean)	Blood loss (mean)	Post op leak	Mortality	Follow up
Gastric pull up (n=7)	Failed dilatation-1 Complication of dilatation-1 Consent not given for dilatation-3 Dilatation not possible-2	140 min	280 ml	1 case	Nil	Anastomotic stricture- 2 (managed by dilatation) Pyloric stricture-1 (managed by surgery)
Pharyngocolo plasty (n=4)	Dilatation not possible-4	312 min	456 ml	2 cases	Nil	Anastmotic stricture- 2 (1 case managed with dilatation, 2nd failed dilatation- redo surgery was done. Recurrent stricture managed with dilatation

Table 3: Treatment of gastric strictures by surgery.

Types	Features	N (%)	Treatment
Type 1	Short ring stricture of the stomach within 1-2 cms of the pylorus	34 (67)	30 gastro-jejunostomy
			4 pharyngo-coloplasty
Type 2	Stricture extending proximally up to the antrum	14 (27.4)	9 gastro-jejunostomy
			5 distal gastrectomy
Type 3	Mid gastric stricture involving the body of the stomach and sparing the proximal and distal parts of the stomach	1 (1.9)	Near total gastrectomy
Type 4	Diffuse gastric involvement producing a linitis plastica like appearance	1 (1.9)	Total gastrectomy
Type 5	Gastric stricture associated with a stricture of the first part of the duodenum	1 (1.9)	

In Table 3, gastric strictures presented with GOO were managed surgically. Most were short ring strictures of pylorus (type 1), present in 34 patients, extending upto antrum (type 2) in 14 patients. Type 3, 4 and 5 were present in 1 patient each. These strictures were managed with gastro-jejunostomy in 48 patients, gastrectomy in 2 patients. Among 38 patients with concomitant esophageal and gastric strictures, 30 patients had successful endoscopic dilatation of ES along with gastro-jejunostomy for GOO. Another 3 required ES dilatation along gastric resections. A total of 4 patients underwent pharyngo-coloplasty for strictures involving pharynx, esophagus and stomach. Two of these required endoscopic dilatation of anastomotic strictures.

Table 4: Treatment by endoscopic dilatation.

Total patient subjected to ES dilatation	**n=54**
	***ES (n=20)**
	****ES+GOO (n=34)**
	N (%)
Achieving persistent symptom relief	18 out of 20 (90.0)
Overall	33 out of 34 (97)
Major complications (esophageal perforation)	1 (5.0) ES
	1 (2.9) ES+GOO
Lost to follow up (ES-20)	1 (5.0)
Session of dilatation	
ES alone	5.2±1.26
ES+GOO	8.0±3.4

Overall endoscopic dilatation was technically successful in 54 patients and clinically successful in 94% cases (51 patients) in achieving persistent symptom relief. There were 2 esophageal perforations during dilatation. A total of 358 sessions of dilatation using Savary-Gilliard dilators was performed in 51 patients over 2 years. ES dilatation was successful in 51 patients with no need for further dilatation. Two patients required polyflex stent placement after which no further dilatation were required. The success rate was 88.6% after mean dilatation of 5.2±1.2 sessions in ES alone. In patients with both ES+GOO, 33/34 (97% of patients underwent successful ES dilatations along with surgical therapy for GOO.

DISCUSSION

The present study was analysed to study the medium term results of combined (endoscopic and surgical intervention) in corrosive GI strictures in one unit. 76 patients underwent surgical or endoscopic treatment for corrosive strictures of upper digestive tract.

The present study was carried out in 31 (41%) males and 45 (59%) females, therefore the study findings by Velayudham et al are somewhat different as the higher incidence of corrosive ingestion was found to be more in males with a ratio of 2.5:1.[9] The patients were mostly young with mean age of 28.8 (range 15-65) years. The present study was supported by Velayudham et al in which the mean age was found to be 32.88±12.74 years.[9] Acid was the most common corrosive substance with 60 (78.9%) patients had ingested corrosive substance. Most patients (n=48, 63.2%) had ingested the corrosive with a suicidal intent, 21 (27.6%) had ingested it accidentally. The study carried out by Chibishev et al observed that majority of the patients ingested corrosive substances intentionally with 50 being suicidal cases and 27 being accidental.[10]

For <2 cm stricture length, 24 patients were reported and 2-6 cm, majority i.e., 30 patients were reported. The study was similar to the study by Geng et al where <2 cm had 17 patients and >2 cm had 26 patients.[11] The present study had majority number of patients for the location of the stricture in lower esophagus which was in contrast to the study reported by Geng et al.[11] A total of 358 sessions of dilatation using Savary-Gilliard dilators was performed in 53 patients as compared to the study by Wang et al in which, a total of 401 dilations in 55 patients in 177 sessions was done.[12]

Limitation

The study was carried out at the single center without any blind method, hence there might be chances of bias in the study.

CONCLUSION

Corrosive injuries are one of the most morbid injuries causing significant impairment of social, physical, emotional health and quality of life. India has high incidence of corrosive ingestion mainly suicidal and homicidal indent. The management of corrosive gastric injuries is quite straight forward, however long term prognosis depends on esophageal involvement. Endoscopic dilatation of esophageal strictures is safe and effective therapy and should be first line therapy in patients with esophageal strictures and surgery should be considered only in patients who have technical and clinical failure on endoscopic dilatation.

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Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

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