# **Original Research Article**

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# Study of definitive surgical management of patients with corrosive stricture of upper gastrointestinal tract

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## **ABSTRACT**

**Background**: Corrosive injury of the oesophagus and stomach is a cause of major morbidity and mortality and is usually seen in the younger age group. Although definitive surgical procedures are available, there is a considerable debate on the timing of a definitive surgery and its electiveness. This study aims to document the benefits of elective surgery and the outcomes of various surgical procedures.

**Methods**: A retrospective observational study of 25 cases of corrosive stricture of upper gastrointestinal tract who underwent definitive surgical procedure was conducted in the department of general surgery at the new civil hospital and government medical college, Surat during a period of 60 months from July 2014 to July 2019. Patients were followed up till a period of 6 months post definitive surgical procedure and were evaluated.

**Results**: Out of 25 patients in our study subjected to definitive surgical procedure in the form of either gastrojejunostomy (GJ) or colonic transposition, 18 patients (72%) could take fully oral and required no further intervention till 6 months post-operative follow up; 3 patients (12%) due to post-operative oesophageal stricture required serial 3 monthly oesophageal dilatation with controlled radial expansion (CRE) balloon; 4 patients (16%) had expired.

**Conclusions**: The choice of definitive surgical procedure according to the level of oesophageal stricture and its optimal timing gives good outcomes with less morbidity and mortality in patients with corrosive substance ingestion.

Keywords: Corrosive stricture, Oesophagus, Gastrojejunostomy, Colonic transposition

# INTRODUCTION

Corrosive substance intake causes damage to the wall of the oesophagus due to direct contact with an acid or base, through inflammatory response. Acid causes coagulation necrosis leading to pylorus spasm and therefore, more injury to stomach especially in pre-pyloric region while alkali causes liquefaction necrosis damaging mostly oesophagus, however, it is more dangerous if in stomach.<sup>1,2</sup>

Management of caustic ingestion injuries requires experienced surgical judgment.<sup>3</sup> An accurate history and careful assessment of the patient is very much important part of the management. Initial resuscitation is very much important after assessing the patient. Proper history

taking, physical examination, laboratory investigations, radiological findings, and endoscopic evaluation will be used to take decisions for a patient with a corrosive injury.

Patients with extensive necrosis or perforation on esophagoscopy, usually adults committing deliberate ingestion, require an emergency operation.4 Cervical esophagectomy with gastrostomy and jejunostomy is usually done. All necrosed organs should be resected at surgery. However, oesophageal resection is a negative survival predictor. Survival has been reported upper abdominal exenteration including oesophogastrectomy, total pancreatectomy, duodenectomy.5

Patients with oesophageal ulcerations and focal necrosis on esophagoscopy requires nutritional support and stricture prophylaxis as strictures predominantly affect these patients. Management of strictures involves mostly mechanical dilation or stenting. Triamcinolone, a corticosteroid, has been injected into strictures to prevent progression. Weekly scheduled dilatations with Savary dilators with injection of intralesional triamcinolone, reporting improvements in dysphagia scores and less ondemand dilatations after completing this regimen. Intraluminal stents have been advocated to avoid serial dilatations. A study described antegrade insertion of stent for 2 to 3 months with success in 80% of patients. So, stenting is a good option to avoid serial dilations.

Chronically strictures are reported to occur in patients with corrosive substance intake. Surgical intervention is necessary when there is lumen obliteration and stricture is not dilatable. We can go for resection or bypass of strictures, and optimal conduits for reconstruction. Resection has the benefit of preventing the formation of mucoceles and development of cancer in the injured organ and hence total esophagectomy is justified. 10 However chances of injuries are more due to inflammatory response.11 If only oesophagus is injured then reconstruction with a gastric conduit or a colonic interposition graft is possible. Incidence of reflux and aspiration is more with gastric conduit and hence colon is preferred.<sup>12</sup> Ante sternal colonic interposition graft for persistent strictures to restore gastrointestinal conduit after esophagectomy has good outcomes.11 However if only pyloric of the stomach is affected then gastrojejunostomy will do best for the patient.

Here we made an attempt to find out the results of definitive surgical management in oesophageal stricture and its outcome in our setup of government hospital catering poor patients.

# **METHODS**

A retrospective observational study of 25 cases of corrosive stricture of upper gastrointestinal tract was conducted in the department of general surgery at the new civil hospital and government medical college Surat during a period of 60 months from July 2014 to July 2019. Prior approval for the study was obtained from the scientific review committee and institutional ethics committee for human research, government medical college and new civil hospital Surat. Patients with history of corrosive intake not responding to endoscopic therapy were included in study while patients with non-corrosive strictures and responding to endoscopic dilatation of corrosive strictures were excluded from study.

# Procedure

All patients admitted in different units of department of general surgery, new civil hospital Surat with history of corrosive ingestion were taken into study. They were primarily investigated in the form of detailed history and routine investigations.

In cases of a fresh ingestion, after resuscitation and stabilising patient, pilot endoscopy was performed after a duration of 15-20 days and need for any enteral feeding procedure decided on the basis of grade and level of injury. Patients with isolated pyloric stenosis or pyloric stenosis with 1-3 partial Oesophageal strictures were subjected to gastrojejunostomy as early as 3 months post-corrosive ingestion. The patients if required were given 3-6 monthly Oesophageal dilatations with or without intra lesioned corticosteroid injection.

Patients with dense non passable oesophageal strictures or patients not responding to endoscopic dilatation, were considered for colonic transposition after a period of at least 5-6 months post-corrosive ingestion.

Patients were followed up till a period of 6 months post definitive surgical procedure and were evaluated in the form of weight gain compared to pre-definitive surgery, the need for any endoscopic dilatations or any revision surgery and complications post definitive surgery.

## Data management and analysis

After the completion of data collection, data entry was done into the Excel data file. Data analysis was done by Epi info version 6.04 software.

#### **RESULTS**

# Age wise distribution

In our clinical observation study, 25 cases were selected. Out of these, most of the patients belonged to the mean age group between 21 years to 30 years. i.e., 14 cases (56%). The minimum age of the patient in the study was 14 years and the maximum was 67 years. Mean age of the population was 29 years.

#### Gender distribution

Out of 25 patients, 14 were males and 11 females.

#### Corrosive substance ingested

Out of 25 patients in our study, 23 had ingested acid (commercially available HCL) as the corrosive agent, while 2 had ingested alkali (phenyl) as corrosive agent.

# Oral intake on admission

Out of 25 patients in our study, at the time of admission 7 patients could take liquids per orally while the other 18 were not able to take anything orally.

#### **Blood** investigations

Out of 25 patients, 7 patients had haemoglobin levels less than 10 mg/dl while 22 patients had serum albumin levels less than 3.5 gm/dl.

# Radiological findings

Chest X-ray and X-ray abdomen standing along with ultrasonography abdomen and pelvis were done as basic investigation in all patients. Out of 25 patients, 5 patients with pyloric obstruction had positive sonography findings suggestive of distended stomach with pyloric stenosis. All patients had normal X-ray findings on admission.

# Duration of 1st endoscopy from ingestion

The patients in the study were subjected to upper GI endoscopy as a direct primary investigation to visualise the disease. Out of 25 patients, 6 patients were subjected to endoscopy within 7 days of ingestion of corrosive agent, 14 patients underwent endoscopy within 1 week to a month after ingestion of corrosive agent, 1 patient underwent endoscopy at 2 months post corrosive ingestion while 4 patients underwent endoscopy after 2 months of corrosive ingestion.

#### Level of stricture on endoscopy

Out of 25 patients in our study, 7 patients had stricture in upper oesophagus from upper oesophageal sphincter (15 cm from incisors) till thoracic inlet (20 cm from incisors); 5 patients had stricture in mid oesophagus from thoracic inlet till 30 cm from incisors; 3 patients had stricture in lower oesophagus till level of GE junction while 10 patients had stricture at pylorus with or without concomitant partial oesophageal strictures.

Table 1: Patient details.

Variables	No. of patients (n=25)
Median age (years)	29
Sex (male: female)	1.27
Acid:alkali ingestion	11.5
Oral intake on admission (NBM:liquids)	0.39
Anaemic	7
Hypoalbuminemia	22
Median duration of 1 <sup>st</sup> scopy from ingestion (weeks)	5
Level of stricture at 1st endoscopy C:UT:LT:P	2.8: 2: 1.2: 4
Mean number of endoscopies before definitive surgery	3

\*C=Cervical Oesophagus, UT= Upper and mid thoracic Oesophagus, LT=lower thoracic and abdominal Oesophagus, P= Pylorus

#### Interventional procedures before definitive surgery

Out of 25 patients taken for the study, 11 patients had multiple partial oesophageal strictures with or without pyloric stenosis, these patients were given trial by oesophageal dilatations. Those who responded were given serial oesophageal dilatations to avoid invasive surgery. Non responders were planned for a definitive procedure as per the level of stricture. 19 patients underwent feeding jejunostomy as an enteral feeding procedure to build up the patient for a definitive procedure.

Table 2: Interventional procedures before definitive surgery.

Interventional procedure	No. of patients
Oesophageal dilatation	11
Feeding jejunostomy	19

# Duration from ingestion to definitive surgery

In our study of 25 patients the average duration from ingestion of corrosive agent to definitive surgery was 8 months; the maximum being 36 months (3 years) and the minimum being 1 month.

## No of endoscopies before definitive surgery

Out of 25 patients in our study, all patients had undergone endoscopies variable number of times before definitive surgery for diagnostic purpose or for endoscopic dilatation. The minimum being a single endoscopy while the maximum being 6 endoscopies. The mean no of endoscopies before a definitive procedure was 3 endoscopies.

# Definitive surgery

Out of 25 patients in our study, 10 patients required gastrojejunostomy as a definitive surgery; out of which 9 patients underwent Open gastrojejunostomy from which 3 patients had undergone Loop GJ and 6 patients Rouxen-Y GJ; 1 patient underwent laparoscopic gastrojejunostomy. 15 patients from our study required colonic transposition as a definitive surgery.

**Table 3: Definitive surgery.** 

Definitive surgery	No. of patients (%)
Gastrojejunostomy	10 (40)
Colonic transposition	15 (60)

# Post-operative days to full oral

Out of 25 patients in our study, 11 patients were made fully oral within 5 to 10 days post-surgery, 8 patients were made fully oral within 11 to 15 days post-surgery and 3 patients was made fully oral on post-operative day 17.

#### Post-operative complications

Out of 25 patients taken for our study, 1 patient developed anastomotic stricture, 1 patient had oesophageal stricture post gastrojejunostomy, 7 patients had cervical anastomotic leak. There was a single patient each who had developed, oesophageal rupture, multi organ dysfunctional syndrome, cervical anastomotic graft necrosis and Anastomotic leak, all of whom had expired.

**Table 4: Post-operative complications.** 

Post-operative complications	No of patients
Anastomotic stricture	1
Oesophageal rupture	1
Oesophageal stricture	1
Cervical anastomotic leak	7
MODS	1
Graft necrosis	1
Anastomotic leak	1

## Outcome post definitive surgery

Out of 25 patients in our study subjected to definitive surgical procedure in the form of gastrojejunostomy or colonic transposition, 3 patients due to post-operative oesophageal stricture required serial 3 monthly oesophageal dilatation with CRE balloon; 4 patients had expired while the other 18 patients could take fully oral and required no further intervention till 6 months' post-operative follow up.

Out of 25 patients in our study 4 patients had expired, out of which 1 patient was of gastrojejunostomy who had oesophageal rupture and mediastinal leak; the other 3 patients had undergone colonic transposition from which 1 patient developed multi-organ dysfunction syndrome, 1 patient had anastomotic leak and 1 patient had graft necrosis who was re-explored and anastomosis was refashioned but the patient expired due to anastomotic leak.

Table 5: Outcome post definitive surgery.

Outcome	No of patients
Serial oesophageal dilatation	3
No intervention required	18
Expired (GJ:colonic)	4 (1:3)

\*GJ= Gastrojejunostomy, Colonic= Colonic Transposition

# Weight gain at the end of 6 months follow up

Majority of patients i.e., 6 had weight gain in the range of 10 to 15%, while 5 patients had weight gain from 1 to 5%, 5 patients had weight gain from 5 to 10% and 3 patients had weight gain from 15 to 20%. The average weight gain was 11% at end of 6 months follow up.

#### **DISCUSSION**

Corrosive poisoning is a common condition in India and worldwide. It remains an important public health issue despite education and efforts to reduce its occurrence. The patients also present with a wide range of injuries from oesophagus to pylorus which may be isolated or concomitant. To study the timing of endoscopy, interventional procedures and timing and choice of definitive surgery in these patients is of great clinical importance.

Majority of patients with corrosive stricture of the upper gastrointestinal tract seeking definitive management were from younger age group with a slightly higher incidence in males than females with a ratio of 1.3:1. The most common corrosive substance ingested was acid i.e., commercially available hydrochloric acid due to its easy availability and low price.

In this study most common symptom on presentation was complete dysphagia, while a few 7 (28%) were able to take liquids orally partially. Those with pyloric stenosis without a complete oesophageal stricture presented with symptoms of vomiting 5-10 minutes after ingestion of liquids.

In this study majority of patients had stricture in the upper and mid part of oesophagus on endoscopic study. Patients with low haemoglobin and albumin levels required to be built up before undertaking a definitive surgical procedure by means of haematinics and proper nutrition. Patients with pyloric stenosis showed positive sonography findings suggestive of distended stomach.

Majority of patients underwent the first endoscopy after at least 15 days of corrosive ingestion to allow the acute phase to resolve. All patients had undergone endoscopies variable number of times before definitive surgery for diagnostic purpose or for endoscopic dilatation. The minimum being a single endoscopy while the maximum being 6 endoscopies.

11 patients had multiple partial oesophageal strictures with or without pyloric stenosis and these patients were given trial by oesophageal dilatations. Those who responded were given serial oesophageal dilatations to avoid invasive surgery. Non responders were planned for a definitive procedure as per the level of stricture. 19 patients underwent feeding jejunostomy as an enteral feeding procedure to build up the patient for a definitive procedure.

The average duration from ingestion of corrosive agent to definitive surgery was 8 months; the maximum being 36 months (3 years) and the minimum being 1 month.

#### Definitive surgery

Out of 25 patients in our study, 10 patients (40%) required gastrojejunostomy as a definitive surgery; out of which 9 patients (36%) underwent Open gastrojejunostomy from which 3 (12%) patients had undergone Loop GJ and 6 patients (24%) Roux-en-Y GJ; 1 patient (4%) underwent laparoscopic gastrojejunostomy.15 patients (60%) from our study required Colonic Transposition as a definitive surgery.

Out of 25 patients in our study, 11 patients (45%) were made fully oral within 5 to 10 days post-surgery, 8 patients (35%) were made fully oral within 11 to 15 days post-surgery and 3 patients (5%) were made fully oral on post-operative day 17. The patients operated for pyloric stenosis with gastrojejunostomy were made oral by 5 days post operatively while those operated with Colonic transposition were made oral earliest by 10th postoperative day which was prolonged in case of anastomotic leak

# Post-operative complications

Out of 25 patients taken for our study, 1 patient (4%) developed anastomotic stricture who was managed by serial oesophageal dilatations, 1 patient (4%) had oesophageal rupture who expired, 1 patient (4%) developed oesophageal stricture post gastrojejunostomy who was managed by serial oesophageal dilatations, 7 patients (28%) had cervical anastomotic leak who were managed by enteral or parenteral nutrition for a period of 7-10 days and then shifted to oral intake, 1 patient (4%) developed multiple-organ dysfunction syndrome who had expired, 1 patient (4%) developed cervical anastomotic graft necrosis who required re-exploration and refashioning of the anastomosis who later expired and 1 patient (4%) had anastomotic leak from intra-abdominal anastomosis who later expired.

Patients of minor leak from cervical anastomosis were managed conservatively by keeping the patient nil by mouth for an extended period of time i.e., 7-10 days while patient was supported during that time by enteral nutrition via feeding jejunostomy tube or by total parenteral nutrition.

## Outcome post definitive surgery

Out of 25 patients in our study subjected to definitive surgical procedure in the form of gastrojejunostomy or colonic transposition, 3 patients (12%) due to post-operative oesophageal stricture required serial 3 monthly oesophageal dilatations with CRE balloon; 4 patients (16%) had expired while the other 18 patients (72%) could take fully oral and required no further intervention till 6 months post-operative follow up.

Out of 25 patients in our study 4 patients (16%) had expired.

All patients were followed up till a period of 6 months post definitive surgery and all surviving patients showed varying degrees of weight gain as compared to their pre surgery weight. At the end of follow up period of 6 months post definitive surgery majority of patients, i.e., 7 patients (38%) showed a weight gain of 2 kg. The maximum gain was 5 kg of 1 patient and minimum was 1 kg of 2 patients.

The rate of complication in the study was 52%. The rate of mortality was 16%.

## **CONCLUSION**

From our study of 25 cases of corrosive stricture of upper gastrointestinal tract who had undergone definitive management for corrosive stricture we could come to the following conclusions:

Patients with corrosive substance ingestion may develop stricture at any point along the upper gastrointestinal tract.

The presentation of the patient depends on the level of stricture present and the completeness of the stricture present.

Interventional procedures like oesophageal dilatation and feeding procedures (feeding jejunostomy) help to build up the patient for a definitive surgical procedure to improve the outcome of surgery.

The choice of the definitive procedure depends on the level of stricture present; for patients with isolated pyloric stenosis gastrojejunostomy is the procedure of choice, while there has not been found any difference between Loop or Roux-en-Y GJ in terms of patient morbidity and hospital stay.

Gastrojejunostomy is a less invasive surgical procedure than colonic transposition and is associated with less morbidity and mortality, so in cases of pyloric stenosis with 1-2 short oesophageal strictures, GJ with serial oesophageal dilatations if required is better than preferring a more invasive procedure directly.

Colonic transposition is the procedure of choice in patients with strictures of oesophagus not responding to oesophageal dilatation, the choice of the graft depends on the blood supply of colon, most commonly which is the ascending and transverse colon based on left colic artery.

In our study we have a short duration of follow up of 6 months post definitive surgery where all patients show weight gain of 2-3 kg than their pre-surgery weight.

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Ethical approval: The study was approved by the Institutional Ethics Committee by Human research of Government Medical College, Surat.

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