

Case Report

A rare case report of oesophagocoloplasty with distal colo-jejunal anastomosis in the management of post corrosive strictures of the oesophagus

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Received: 15 December 2019

Accepted: 03 February 2020

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ABSTRACT

Ingestion of corrosive substances and chronic sequelae associated with it is the major public health problem in the developing countries. The most severe forms of injury can lead to mortality; however, the major concern with this type of injury is life-long morbidity. Colonic conduit for bypassing diseased oesophagus with distal anastomosis with stomach is well documented and practiced procedure. Authors have encountered a case of 21-year-old lady with corrosive injuries to oesophagus and stomach, later developed non dilatable oesophageal stricture with completely cicatrised and adherent stomach. Due to unavailability of stomach, authors have used colon as a conduit and colo-jejunal anastomosis bypassing the oesophagus, stomach and duodenum. Colo-jejunal anastomosis for chronic corrosive oesophageal stricture is not commonly practiced procedure which makes this case a rare one.

Keywords: Colo-jejunal anastomosis, Colonic conduit for corrosive poisoning, Oesophagocoloplasty, Post corrosive oesophageal stricture

INTRODUCTION

The chronic sequelae of corrosive ingestion such as oesophageal strictures continue to remain a significant public health problem in many developing countries due to poor regulatory control and unrestricted availability of caustic substances which are sold across the counter for domestic use.¹

Management of these strictures is very important since the endoscopic dilatation may cause perforation and surgical management needs expertise. Definitive surgery is offered to the patients with corrosive oesophageal strictures including long narrow strictures, multiple strictures, non-dilatable strictures, recurrent strictures

after repeated dilatation or previous oesophageal perforation.^{1,2}

Most common surgical procedure in cases of oesophageal strictures not responding to endoscopic dilatations is bypass procedure and most common conduit used is stomach to bypass the oesophagus. If stomach is not available for bypass then colon is used as a conduit with distal anastomosis is made with stomach.^{2,3} In this case, since the stomach was cicatrized and densely adherent to the peritoneal surface, colon was used as a conduit and distal anastomosis was made with jejunum. Colo-jejunal anastomosis bypassing oesophagus, stomach and duodenum, for chronic corrosive stricture makes this case a rare one.

CASE REPORT

A 21-year-old lady presented to the emergency department with dysphagia, epigastric pain, vomiting following accidental ingestion of toilet cleaner at home about 5 hours back. She was anxious, agitated with heart rate of 120 beats/min, blood pressure 100/70 mmHg in the absence of fever. On clinical examination, oropharyngeal burns and epigastric tenderness was noted. She had Hb of 11.4 g/dl, leukocytosis (WBC 16,160/ μ l), hyperglycemia, hypoalbuminemia. Her renal and liver function tests, serum electrolytes were normal. Initially she was stabilized in the intensive care unit with intravenous fluids, proton pump inhibitors, antibiotics and analgesics. Within 12 hours of presentation, she was subjected to upper gastrointestinal tract endoscopy for evaluation of the extent of injuries and for the placement of naso-jejunal feeding tube for prolonged enteral nutrition.

Endoscopic findings

Severe corrosive injury: Diffuse burns from oro-pharynx to duodenojejunal flexure with most areas of lower oesophagus and almost entire stomach showed 'black eschar'. Patient had resting tachycardia (>140/min), tachypnea (RR >35/min), SpO₂ (100%), hence quick guarded procedure planned. Under endoscopic-view-guidewire advanced into jejunum, proximal end re-routed through nostril with help of laryngoscope and Magille's forceps. 16 Fr naso-gastric tube advanced into jejunum.

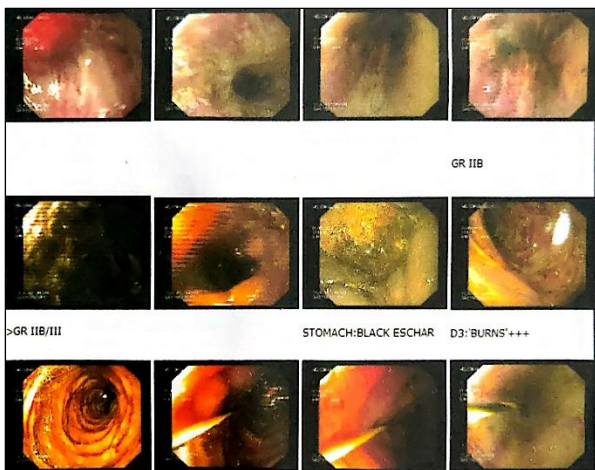


Figure 1: Upper gastrointestinal endoscopy findings and grading of injury.

Post procedure, she developed sudden increase in abdominal pain and chest pain. Contrast enhanced CT scan of chest and abdomen was done suggestive of "gross pneumoperitoneum secondary to a hollow viscus perforation, the site of which is the fundus, proximal body of the stomach with gross edema of the walls of almost the entire stomach with peritonitis and moderate ascites with bilateral pleural effusion, larger on the left."

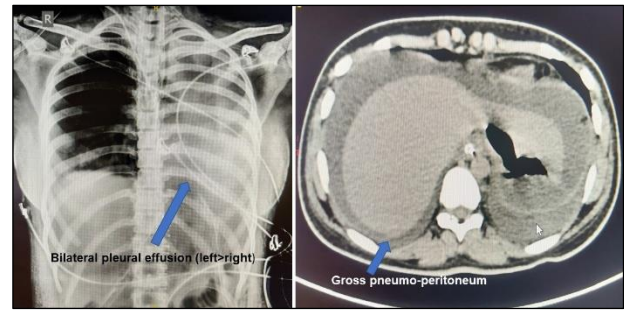


Figure 2: Radiological studies suggesting hollow viscus perforation.

Patient was then referred to surgical team and immediately taken up for exploration.

Intraoperative findings

Perforation at gastric antrum and fundus, and sloughing of gastric wall with fundic slough extending towards GE junction was observed.

Procedure

Closure of perforation at gastric antrum and fundus done with placement of peritoneal drains and feeding jejunostomy.

Post-operatively patient was on ventilatory and inotropic supports for 3 days and later started on jejunal feeds through feeding jejunostomy. Despite intensive care, she took 1 month to achieve complete hemodynamic stability. She was ambulatory with regular bladder and bowel habits, tolerating jejunal feeds but not able to take liquids orally at the time of discharge. In view of suspected suicidal ingestion of corrosive substance, psychiatric consultation was also done, underlying clinical depression was identified and antidepressants were started.

After discharging from the hospital, patient was on regular follow ups for next 6 months, during which regular weight charting, assessment of nutritional and mental status had been done. She underwent upper gastrointestinal endoscopy 2 times postoperatively to evaluate the extent of healing and therapeutic dilatation of the lower oesophageal stricture. Last endoscopy was done 6 months post-surgery suggestive of "presence of lower oesophageal stricture starting at 30 cm with pinpoint gastric outlet which could not be negotiated even with a guide wire and completely cicatrized stomach."

The patient had developed a stricture at lower oesophagus with completely cicatrized stomach and was not able to swallow any liquids or solids orally, also not gaining weight adequately. The decision of definitive surgery was taken after preoptimization. Preoperative contrast enhanced computed tomography of abdomen was done suggestive of "residual smooth concentric thickening with accentuated enhancement and edema of the walls of

infra-carinal oesophagus extending caudally to involve the gastro-oesophageal junction as well as the stomach predominantly in the region of distal body and pyloric antrum with areas of cicatrisation and loss of normal fat planes with feeding jejunostomy tube in situ”.

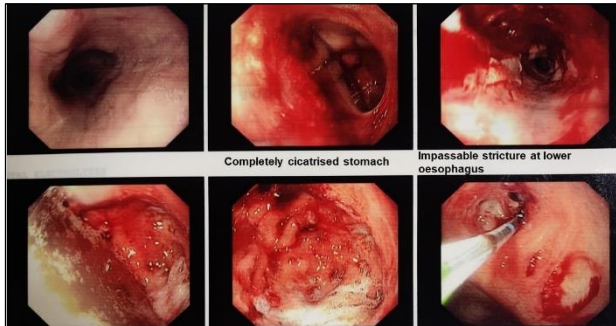


Figure 3: Upper gastrointestinal endoscopy showing lower oesophageal stricture with cicatrised stomach.

Oesophagocoloplasty procedure

The intraoperative findings confirmed that the stomach was cicatrized and densely adherent to the peritoneal surface of diaphragm and spleen. Stomach could not be used as a conduit for bypassing the oesophagus in this procedure. Hence, the decision was then taken to use the isoperistaltic segment of colon as a conduit based on the left colic pedicle. Neck dissection was done, proximal oesophagus was mobilized and divided. The proximal end of the colonic conduit was brought in the neck via retrosternal approach and anastomosed with the proximal cut end of the oesophagus in a single layer fashion. corrugated drain was kept, and neck incision was closed in layers. The distal end of the colonic conduit was anastomosed with jejunum bypassing rest of the oesophagus, stomach and duodenum. Colo-colic end to end anastomosis was done. Feeding jejunostomy was checked. Peritoneal drains were kept, and abdominal cavity closed in layers.



Figure 4: Gastrograffin dye study showing proximal esophago-colic anastomotic leak which was gradually decreased to zero.

Post operatively patient was extubated and shifted to intensive care unit for monitoring. Patient was started on

jejunal feeds via feeding jejunostomy after 48 hrs which were tolerated well. On postoperative day 7, gastrograffin dye study was done in view of suspected small lateral esophago-cutaneous fistula after removal neck drain. This study showed a leak at proximal esophago-colic anastomosis which was managed conservatively. Gastrograffin study was repeated when the fistula output gradually decreased to zero which showed no leak. Then, the patient was started on oral liquids.

Patient was taking liquids orally and regularly monitored for weight gain, nutritional status and psychiatric evaluation on out-patient basis for next 6 months. Patient had complaints of intermittent epigastric pain and multiple episodes of loose stools especially after consumption of semisolid solid food and after heavy meals. In view of sudden increase in upper abdominal pain, patient was subjected to contrast enhanced computed tomography of abdomen which was suggestive of considerable distension of the distal end of the oesophagus and stomach with fluid approximately 1.5-2 lts.

Hence, exploration was done. Intraoperative findings include dense adhesions between stomach and peritoneal surface of diaphragm and spleen with bulging greater curvature and anterior stomach wall. Stomach was aspirated and mucocele was confirmed and drained. Gastrojejunostomy 4 layered anastomosis was done with side to side jejunojejunosomy. Rest all the previous anastomosis were patent. Peritoneal drains were kept, and abdomen was closed in layers.

Postoperative recovery was uneventful. At the time of discharge, patient was tolerating liquids orally, passing urine and stools normally, ambulatory and asymptomatic.

Patient has been followed up for last 6 months post-surgery. She is tolerating liquids and soft smashed food in small quantities orally, gaining weight, good nutritional and mental status and without any active complaints.

DISCUSSION

The ingestion of corrosive substances is a common form of poisoning in developing countries, which may result in serious injuries of the upper gastrointestinal system and upper airways. The extent of injury depends on the nature of corrosive agent consumed (acid or alkali), it's physical state (solid or liquid), amount and concentration of the agent consumed and duration of contact with the mucosa.^{3,4}

Ingestion of solid corrosive materials usually produces damage to the lips, oral cavity and larynx. Oesophageal injury and strictures were less common because intense burning of lips or buccal mucosa limited the quantity of solid agent ingested. Liquids on the other hand, pass through the mouth and pharynx more quickly and causes maximum damage in the oesophagus and stomach.⁴

Table 1: Traditionally, ingested corrosive substances are either alkalis or acids.⁵

Caustic substances	Type	Commercially available form
Acids	Sulfuric	Batteries
		Industrial cleaning agents
		Metal plating
	Oxalic	Paint thinners, strippers
		Metal cleaners
	Hydrochloric	Solvents
		Metal cleaners
		Toilet and drain cleaners
		Antirust compounds
	Phosphoric	Toilet cleaners
Alkali	Sodium hydroxide	Drain cleaners
		Home soap manufacturing
	Potassium hydroxide	Oven cleaners
	Sodium carbonate	Washing powders
Ammonia	Commercial ammonia	Soap manufacturing
	Ammonium hydroxide	Fruits drying on farms
Detergents, bleach	Sodium hypochlorite	Household cleaners
	Sodium polyphosphate	Household bleach, cleaners
Condy's crystals	Potassium permanganate	Industrial detergents
		Disinfectants
		hair

Alkali ingestion may lead to more serious injury and complications, but this distinction is probably not clinically relevant in the setting of strong acid or base ingestion, both being able to penetrate tissues rapidly, potentially leading to full-thickness damage of the oesophageal/gastric wall.⁴

The relationship between symptoms and severity of the injury is uncertain, expectant management and thorough evaluation of injuries in such patient is necessary.⁵

In this case, patient was haemodynamically stable at the time of presentation, but injuries were much more extensive than expected. Since patient was worsening clinically and radiological evidence suggestive of hollow viscus perforation, patient had to undergo exploratory laparotomy. Closure of gastric perforation and insertion of feeding jejunostomy was done for long term enteral nutrition in the same sitting. Nutrition in the treatment of acute corrosive intoxications is one of the most important therapeutic processes that largely contribute to faster recovery, stabilization of biologic, immunologic and metabolic parameters and reduction of length of hospital stay.⁸

Later patient had developed long, tight and non-negotiable oesophageal stricture and was not able to take anything orally. In view of previous history of perforation, attempts of oesophageal dilatation were restricted. Since oral nutrition was not possible and total parental nutrition plays role mainly in early management, definitive surgery is the only option available in this patient to fulfil the increased nutritional demands due to high catabolic stress.

Definitive surgery

Oesophageal substitution is the surgical procedure of choice in this case. This surgical bypass procedure has high morbidity and mortality and several areas of disagreements: 1. Selecting most appropriate segment 2. Route of transposition 3. Direction of placement 4. Leaving the injured oesophagus or stomach in situ.³

Colon as a substitute

The decision of which organ to be used for oesophageal reconstruction is based on multiple factors: Oesophageal disease, length of reconstruction, digestive organ available and experience and preference of surgeon. At present, gastric graft is the first choice to reconstruct oesophagus and gastric reconstruction constitutes the standard procedure because of its simplicity. Stomach has the disadvantages of long-term gastroesophageal reflux which can lead to complications such oesophageal ulceration and anastomotic stenosis.

Many authors preferred colon reconstruction and considered that the colon is the best oesophageal substitute to restore deglutition function in light of its anatomic and physiologic features, including its relatively straight mesentery, increased length that can be mobilized on vascular pedicle, low incidence of disease, resistance to chronic gastric reflux and the long-term good functional results of colon reconstruction.² Colon reconstruction is relatively a complex surgical procedure hence experience and surgical skills are needed.^{2,3}

Since in this case, stomach was unavailable for use as a conduit or for distal anastomosis, colon was the second preferred substitute. The preferred conduit is the left colon based on the ascending branch of the left colic artery, provided there must be sufficient length of the middle colic artery. This use of the left colon is preferable as it gives more reliable blood supply and greater length.

The disadvantages of colonic interposition include that the colon may have or can develop native pathology and that loss of absorptive capacity of the colon may result in diarrhoea. The colon conduit may also lengthen over time leading to redundancy that may require surgical revision. The proximal anastomosis for colonic bypass is typically end-to-end with the oesophagus.

Table 2: Acids and alkali agents have contrasting characteristics and differ in how they cause tissue damage.^{4,5,7}

	Alkali	Acids
Pathophysiology	Liquefactive necrosis ↓ Saponification of fats and solubilization of proteins ↓ Emulsification and disruption of cellular membranes and cell death ↓ Higher surface tension permits a longer tissue contact time ↓ More chances of transmural injuries	Coagulation necrosis ↓ Desiccation or denaturation of superficial tissue proteins ↓ Eschar/ coagulum formation which protects underlying tissues, hence less chances of transmural injury ↓ Lower surface tension and eschar formation allows acids to bypass oesophagus rapidly and affects stomach more severely
Organs (most commonly affected)	Oropharynx, hypopharynx, oesophagus (most common)	Stomach (most common), small intestine (20%)
Progression of injury	1. Severe rapid deeper tissue injury within minutes- transmural injury 2. Tissue oedema- immediately occurs and persists for 48hrs causes airway obstruction 3. Granulation tissue replaces necrotic tissue causing scar leading to stricture within 2-4 weeks <ul style="list-style-type: none"> • Superficial burns cause stricture formation in <1% • Full thickness burns cause 100% stricture formation • Severe burns cause perforation 	They have pungent and unpleasant odour and hence, tends to be consumed in small amounts. <ol style="list-style-type: none"> 1. Eschar formation within minutes and sloughing in 3-4 days 2. Granulation tissues fills the defect in 3-4 days and chances of perforation highest 3. Gastric outlet obstruction in 2-4 weeks period
Clinical presentation	Hoarseness of voice, stridor due to laryngeal and epiglottic involvement ↓ Dysphagia and odynophagia due to oesophageal damage	Hematemesis or epigastric pain for gastric injury ↓ Appearance of sudden abdominal pain or worsening of already existing pain denotes oesophageal or gastric perforation
Complications	Short term: Perforation of oesophagus or stomach Airway compromise Systemic complications, disseminated intravascular coagulation, hemolysis, shock Death due to sepsis	Long term: Stricture formation Gastric outlet obstruction Malignant transformation

The distal anastomosis is often times to the stomach, can be done either posteriorly for short distal reconstructions or to the anterior aspect of the stomach if a long segment substernal replacement is chosen.³ In this case, due to unavailability of stomach authors did distal anastomosis with jejunum which makes this case a rare one compared to other similar cases.

Due to this colo-jejunal anastomosis, patient has a long tube of gastrointestinal tract and no gastric reservoir. Hence, the patient cannot tolerate solid food due to lack of gastric enzymes to breakdown the food.

In view of unavailability of gastric reservoir to store food and comparatively small bowel length, the patient has to

take food in small quantities. This may lead to increase the frequency of bowel movements and indigestion. She may have to take lifelong nutrient supplements.

The resection of diseased oesophagus and stomach can be performed since the incidence of development of malignant changes in lifelong period has been reported in the literature.

Conversely, the doubled mortality rate of resection vs bypass, the possible damage to the trachea and laryngeal nerve, and the low reported incidence of oesophageal malignancy, could support a conservative strategy.⁴

Hence, regular follow ups with routine blood tests, radiological evaluation lifelong is must in this patient.

Table 3: Management protocol.^{4,6,7}

History and physical examination	Time of ingestion and duration of contact, type of substance, concentration, form, volume of ingested substance, signs and symptoms at the presentation, systemic involvement
Laboratory tests ↓	Complete blood count including baseline Hb and white cell count and arterial blood gas, Blood grouping and cross matching, Liver function and renal function tests, Coagulation profile, electrolytes, Toxicology studies to know the substance involved.
Imaging studies ↓	Chest radiograph and abdominal radiograph Air in the mediastinum or air under the diaphragm suggestive of hollow viscus perforation.
	Computed tomography of chest and abdomen Non-invasive and more valuable to know threatened or established transmural damage and extent of necrosis and grading system to predict oesophageal stricture.
	Upper gastrointestinal endoscopy Crucial and usually recommended in the first 12-48hrs after caustic ingestion and should be attempted with great caution. It should be better avoided between 5-15 days due to tissue softening and friability during healing period. Endoscopic classification is important for prognosis and management and considered as an accurate predictor of systemic complications. Emergency surgery can be planned according to the endoscopic degree of burn, though an isolated black eschar does not always indicate full-thickness injury and the need for immediate surgical treatment.
Acute management ↓	Conservative management: Haemodynamic stability, adequacy of patient’s airway, close observation in intensive care unit and grading of injuries with clinical correlation and endoscopic plus imaging guidance.
	Gradual progression of diet and endoscopic guided nasoenteric feeding tube insertion.
	Emergency laparotomy: in case of hollow viscus perforation.
Delayed management	Long term nutrition.
	Psychiatric counselling.
	Pain management.
	Management of late sequelae of corrosive injuries like endoscopic dilatation of oesophageal stricture, definitive bypass surgeries in case of gastric outlet obstruction and long-term nutrition. Late reconstructive surgery after emergency esophagectomy or strictures not responding to endoscopic dilatations.

Table 4: Factors regarding surgical bypass procedure.

Oesophageal substitutes	Stomach
	Colon- based on left colic, right colic pedicle or both
Route of transport	Jejunum
	Substernal
	Retrosternal
Direction of placement	Subcutaneous
	Isoperistaltic
Leaving the injured oesophagus or stomach in situ	Antiperistaltic
	Chances of development of cancer in very high vs esophagectomy is a very morbid procedure especially in case of presence of highly adherent tissues. ^{2,3}

CONCLUSION

Corrosive poisoning is a serious social-medical issue, due to the difficult clinical presentation, extensive diagnostic protocol, extended hospitalization and possible permanent disability. Post corrosive stenosis is the latent

complication and bypass procedure is the permanent solution to the non-responding strictures to the endoscopic dilatations. Colon is used as a conduit preferably based on left colic pedicle. Colo-jejunal anastomosis for chronic corrosive oesophageal stricture is not commonly practiced procedure which makes this case a rare one. Patients undergoing colo-jejunal anastomosis have to take liquid diet or soft smashed food in small quantities lifelong. Risk of cancer in diseased bowel in lifelong period is reported but resection doubles up the mortality rate compared to bypass procedure.

ACKNOWLEDGEMENTS

This case report is supported by list of individuals listed below. Authors are thankful to their colleagues who provided expertise that greatly assisted for making this case report and appreciate their efforts. Authors are also grateful to institution for supporting us in this work.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: Not required

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Cite this article as: Kamat MM, Shetye SM, Singh NP, Nattey K, Barman S. A rare case report of oesophagocoloplasty with distal colo-jejunal anastomosis in the management of post corrosive strictures of the oesophagus. *Int Surg J* 2020;7:911-7.