

**BILLROTH 1 FOR CORROSIVE ANTRAL STRICTURE- OUR EXPERIENCE**Hunasannahalli Giriappa Venugopal<sup>1</sup>, Boppasamudra Nanjegowda Vinay<sup>2</sup>, Mariappa Casaba Shilpa<sup>3</sup><sup>1</sup>Associate Professor, Department of Surgical Gastroenterology and Liver Transplant, Bangalore Medical College and Research Institute, Bangalore, Karnataka.<sup>2</sup>Professor, Department of Surgical Gastroenterology and Liver Transplant, Bangalore Medical College and Research Institute, Bangalore, Karnataka.<sup>3</sup>Assistant Professor, Department of Surgical Gastroenterology and Liver Transplant, Bangalore Medical College and Research Institute, Bangalore, Karnataka.**ABSTRACT****BACKGROUND**

Ingestion of caustic agents and injury to the alimentary tract remain an important issue in the public health domain. The spectrum of injury secondary to caustic ingestion can vary from a few erosions to full thickness necrosis and perforation. Stomach, an organ with reservoir function takes the brunt of the injury when larger quantities of alkali is ingested. Gastric cicatrisation is a well-known delayed complication of such an ingestion. Herein we present a single centre experience of 6 years of dealing with corrosive antral strictures in an elective surgical scenario.

**MATERIALS AND METHODS**

This was a retrospective study of a prospectively maintained database, obtained from hospital information record system, carried out at a tertiary referral centre in India. All records and surgical procedural notes of patients admitted between 2012 and 2018 were reviewed. A total of 26 patients who underwent reconstructive surgery for gastric antral cicatrisation were included in the study. Patients with a concomitant oesophageal reconstruction were excluded. Resection was preferred to a bypass procedure and the extent of resection was determined by a pre-operative oesophagogastroduodenoscopy and an intra operative assessment of the remnant stomach.

**RESULTS**

A total of 26 patients underwent surgery during the study period with a predominant male patient population (10F, 16M). The median age of the study group being 34.3 years (20- 56 years). The time interval between ingestion of corrosive to definitive management ranged between 1m to 11m with a median of 5.2 months. All patients underwent antrectomy and stapled end to side gastroduodenostomy procedure. The median post-operative hospital stay being 7.3 days (4-24 days). 2 patients had anastomotic stricture during follow up, 1 patient had an anastomotic leak and 1 patient had abdominal wound dehiscence. The median duration of follow up for all these patients was 18 months.

**CONCLUSION**

Antrectomy and Billroth 1 reconstruction for cicatrised antrum secondary to corrosive ingestion is an apt surgical procedure with a low complication rate and less morbidity especially when the timing of surgical intervention has been appropriate.

**KEYWORDS**

Corrosive Injury, Stomach, Antrum, Billroth 1.

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**BACKGROUND**

Gastric cicatrisation alone is a rare entity among this patient cohort and is usually associated with concomitant oesophageal injuries. However, it is one of the main delayed complications after a corrosive consumption.<sup>1,2</sup> It is known

to occur both after acid and alkali ingestion. The scarring can involve the entire stomach or can be segmental. Stasis of the caustic agent in the antral region makes it more vulnerable for more injuries compared to the rest of the stomach. The overall incidence of gastric outlet obstruction in this scenario varies between 5 and 8%.<sup>3,4</sup> Various surgical and endoscopic modalities exist for the management of such injuries with surgery being the main stay of treatment.<sup>5,6,7</sup> We aim to present our experience with surgical management of such gastric cicatrisation injuries.

**MATERIALS AND METHODS**

The present study is a 6 year retrospective review of the 26 cases of corrosive antropyloric stenosis managed surgically at a tertiary referral unit in India. Patients admitted with corrosive antral strictures during the period from 2012 to

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2018 were included in the study. All medical records and surgical notes of these patients were retrieved from the hospital information system and reviewed. Specific emphasis was laid on the corrosive agent consumed, the extent of injury, the time duration to definitive repair and the surgical outcomes and complications associated with it. The data collected was tabulated and analysed. Patients with a concomitant oesophageal reconstruction were excluded from the study. All patients in the study group underwent Antrectomy with a stapled Billroth 1 reconstruction.

**Inclusion Criteria**

All patients with corrosive injuries to the antropyloric region requiring surgical intervention with Billroth 1 reconstruction only

**Exclusion Criteria**

All patients who underwent simultaneous reconstruction of the oesophagus.

All patients needing more extensive gastric resections/ segmental resections/ total gastrectomies/ where Billroth 1 reconstruction was not feasible.

**RESULTS**

The time period of the study saw a total of 235 patients admitted with corrosive injuries of which 60 were transferred from another facility. Males outnumbered females and Hydrochloric acid was the most common caustic agent ingested. Initial endoscopic assessment was carried out for all patients who presented within 4 days of caustic consumption. (Table 1)

Organs Injured	Total Number
Oesophagus + Stomach	107
Oesophagus + Stomach + Duodenum	18
Pharynx + Oesophagus + Stomach + Duodenum	11
Oesophagus	12
Stomach	22
Unknown (Presented late)	60
Normal study	5

**Table 1**

Patients with a higher grade of injury and dysphagia were subjected to placement of a tube enterostomy. Patients with milder forms of injury and who could tolerate oral feeds were placed on a non-surgical / endoscopic follow up protocol immediately.

The demographics of the patient population included in the study is presented in Table 2.

Variable	Total Number
Males	16
Females	10
Mean Age (in years)	34.3 (24 – 56)

**Table 2**

All patients were placed on the institution’s endoscopic protocol for management of corrosive injuries to the upper gastrointestinal tract. A second look endoscopy was carried out at the end of 3 weeks to assess the healing and patients were subjected to endoscopic Savary Gilliard dilatations of the oesophageal strictures. Patients presenting with antropyloric involvement only and features of gastric outlet obstruction were subjected to surgical reconstruction with a Billroth 1 stapled gastroduodenostomy.

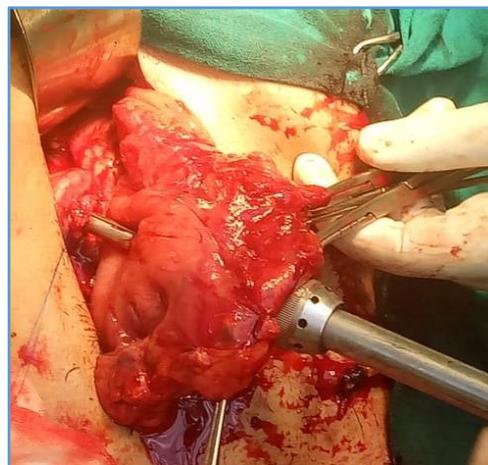
**Surgical Procedure**

All patients were subjected to an esophago-gastroduodenoscopy prior to surgical intervention.

All patients underwent an open surgical intervention. Midline vertical incision was used to enter the peritoneal cavity. In correlation with the endoscopic assessment of gastric stenosis and the intra operative assessment of the pliability and distensibility of the remnant stomach (Figure 1), the extent of resection of the distal stomach was made. Right Gastroepiploic vessel sparing antrectomy was done in all the patients in the study group. The stomach and the duodenum were transected with a surgical knife. A circular stapler was used to create the gastroduodenal anastomosis after assessing the adequate lumen size with help of sizers (Figure 2). Posterior wall of the stomach was anastomosed to the end of the duodenum using a circular stapler. The end of the stomach was then either closed sewn by hand or another linear stapler was used (Figure 3).



**Figure 1. Pyloric Stricture**



**Figure 2. Stapled Gastroduodenal Anastomosis**



**Figure 3. Final Reconstruction of Billroth 1**

**Surgical Outcomes**

The timing of intervention and the post-operative hospital stay are presented in Table 3.

Variable	Total Number
Time from consumption to reconstruction	5.2 months (1- 11)
Post-operative hospital stay	7.3 days (4- 24)

**Table 3**

All patients were started on oral feeds from post-operative day 2 and were discharged from the hospital once the patient was able to consume oral feeds adequately.

Complications in this patient cohort is tabulated in Table 4.

Variable	Total Number
Anastomotic Leak	1
Wound dehiscence	1
Anastomotic stricture	2
Bleeding	1
Death	0

**Table 4**

One patient developed a leak from the anastomotic site which was managed conservatively. The patient with the wound dehiscence underwent secondary suturing. 2 patients who underwent reconstructive surgery early (<3m) returned to us with features of gastric outlet obstruction necessitating another surgical intervention. Both patients were found to have an anastomotic stricture. A Roux- En- Y gastrojejunostomy was fashioned for both patients. One patient had to be re explored in view of bleeding. The study population did not witness any mortality. All patients gained weight post operatively.

**DISCUSSION**

Ingestion of acids or alkalis leads to oesophageal or gastric fibrosis and cicatrisation. Oesophageal involvement presents as dysphagia whilst antropyloric or diffuse gastric involvement results in gastric outlet obstruction. The median time interval to symptomatology after corrosive ingestion is about 26 days (range 15- 46 days).<sup>4</sup> Most patients present

within a month of ingestion although late onset antropyloric stenosis (20 years) has also been reported.

Gastric injuries are more common in the antropyloric region owing to stasis / pooling of the corrosive agent secondary to pyloric spasm. The prolonged contact time ensures maximum damage and the ensuing natural healing process of fibrosis renders the gastric outlet obstructed. However, a similar picture is also possible with a diffuse injury to the stomach making it indistensible and shrunken. Diffuse lesions are more common when the caustic agent is consumed on an empty stomach. The spectrum of gastric injuries ranges from antropyloric stenosis to segmental fibrosis and hour glass deformities to a completely shrunken stomach. In a study of 34 cases with corrosive induced gastric injury 53% had associated oesophageal stricture, 44% had features of gastric outlet obstruction, 82% had segmental lesions and 18% had diffuse gastric injury.<sup>8</sup>

In another study of 28 patients 46% had associated stricture of the oesophagus (responded to oesophageal dilatation), 78% had segmental lesions, and 21.4% had diffuse involvement.<sup>5</sup>

Patients undergoing an elective surgical reconstruction of the stomach need to be carefully selected in terms of time of reconstruction and extent of surgical resection. Fibrosis induced can continue for a period of 3 months. Any elective surgery before this time frame is prone to failure due to multiple adhesions around the antropyloric region rendering dissection difficult and the possibility of ongoing fibrosis at the anastomotic site.

The favoured intervention in such a patient cohort is surgical intervention which can be done laparoscopically also.<sup>9,10,11</sup> Though balloon dilatation of the antral stenosis has been attempted, the success rates are far inferior to surgical therapy (short term failure rate and long-term recurrence rate)<sup>12,13</sup> and surgery offers a one stop solution.

**CONCLUSION**

Antrectomy and Billroth 1 reconstruction is an apt and safe surgical procedure for antropyloric stenosis. However, the extent of gastric resection and the timing of repair are very crucial in determining successful surgical outcomes.

**REFERENCES**

- [1] Keh SM, Onyekwelu N, McManus K, et al. Corrosive injury to upper gastrointestinal tract: still a major surgical dilemma. *World J Gastroenterol* 2006;12(32):5223-5228.
- [2] Sharma S, Debnath PR, Agrawal LD, et al. Gastric outlet obstruction without esophageal involvement: a late sequelae of acid ingestion in children. *J Indian Assoc Pediatr Surg* 2007;12(1):47-49.
- [3] Ciftci AO, Senocak ME, Buyukpamukcu N, et al. Gastric outlet obstruction due to corrosive ingestion: incidence and outcome. *Pediatr Surg Int* 1999;15(2):88-91.
- [4] Ozcan C, Erqun O, Sen T, et al. Gastric outlet obstruction secondary to acid ingestion in children. *J Pediatr Surg* 2004;39(11):1651-1653.

- [5] Agarwal S, Sikora SS, Kumar A, et al. Surgical management of corrosive strictures of stomach. *Indian J Gastroenterol* 2004;23(5):178-180.
- [6] Tseng YL, Wu MH, Lin MY, et al. Early surgical correction for isolated gastric strictures following acid corrosion injury. *Dig Surg* 2002;19(4):276-280.
- [7] Kochhar R, Sethy PK, Nagi B, et al. Endoscopic balloon dilatation of benign gastric outlet obstruction. *J Gastroenterol Hepatol* 2004;19(4):418-422.
- [8] Chaudhary A, Puri AS, Dhar P, et al. Elective surgery for corrosive-induced gastric injury. *World J Surg* 1996;20(6):703-706.
- [9] Subbarao KS, Kakar AK, Chandrasekhar V, et al. Cicatricial gastric stenosis caused by corrosive ingestion. *Aust N Z J Surg* 1988;58(2):143-146.
- [10] Feng J, Gu W, Li M, et al. Rare causes of gastric outlet obstruction in children. *Pediatr Surg Int* 2005;21(8):635-640.
- [11] Tekant G, Eroglu E, Erdogan E, et al. Corrosive injury-induced gastric outlet obstruction: a changing spectrum of agents and treatment. *J Pediatr Surg* 2001;36(7):1004-1007.
- [12] Khullar SK, Disario JA. Gastric outlet obstruction. *Gastrointest Endosc Clin North Am* 1996;6(3):585-603.
- [13] Kuwada SK, Alexander GL. Long term outcome of endoscopic dilatation of nonmalignant pyloric stenosis. *Gastrointest Endosc* 1995;41(1):15-17.