Journal of Neonatal Surgery
ISSN(Online): 2226-0439
Vol. 14, Issue 19s (2025)
https://www.jneonatalsurg.com

OPEN ACCESS

A Case Of Esophagitis Cicatricial Accompanied By Pyloric Stenosis Due To Strong Acid Ingestion

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Cite this paper as: Sony Gunawan, Ummi Maimunah, (2025) A Case Of Esophagitis Cicatricial Accompanied By Pyloric Stenosis Due To Strong Acid Ingestion. *Journal of Neonatal Surgery*, 14 (19s), 109-121.

ABSTRACT

Corrosive chemical ingestion is still a big problem, being the most common cause of toxic exposure, especially in developing and even developed countries. It was reported that a 32-year-old female patient with advanced caustic injury accompanied by moderate-severe dehydration complications due to nausea and vomiting, profuse, malnutrition, anaemia, hypo albumin and electrolyte disorders (hypokalaemia and hyponatremia) with a history of ingestion of corrosive substances with strong acids (toilet cleaning liquid) 10 months ago. The patient underwent endoscopy as a diagnostic and therapeutic procedure, a picture of cervical erosion of the distal oesophagus (zargar degree 2B) was obtained accompanied by a gastric wide cervical injury *(zargar degree 3B).* Dilatation w */ CRE Balooning* and installation of NBD as nutrient access was carried out 5 time after a few weeks, but the stricture did not give a good enough response. With this condition, definitive therapeutic action with surgical measures is considered. Clinical and nutritional improvements through the insertion of the NBD tube and the application of the jejunostomy tube before the procedure aim to minimize the risk of complications of operative actions due to anastomosis leakage.

Keywords: *Spondyloarthritis; Deep vein thrombosis, Treatment, Complication*

1. INTRODUCTION

Corrosive chemical ingestion is still a big problem, being the most common cause of toxic exposure, especially in developing and even developed countries. Based on WHO, it is estimated 110/100,000 people every year around the world. Meanwhile, the proportion of Asia is around 243/100,000 population. The impact of corrosive ingestion provides a high mortality rate of around 310,000 people worldwide, or 4.8 per 100,000 people per year. Ingestion may be intentional as a suicide attempt (mostly in the case of adolescents and adults) or inadvertently (mostly in children).(Hall *et al.*, 2019)

Common ingested corrosive chemicals are strong acids or strong bases (pH <2 or >12) that can quickly penetrate a wide variety of gastrointestinal mucosal layers. (Hall *et al.*, 2019) strong alkaline causes liquefactive necrosis that diffuses into the deeper layers of the injured mucosa, fat saponification, protein denaturation, and vascular thrombosis will occur during the injury process. The most frequent long-term sequelae are strictures in the oesophagus which is around 30% in strong alkaline ingestion(Forgot *et al.*, 2009) however, the occurrence of gastric outlet obstruction (GOO) such as pyloric stenosis needs to be considered, especially in advanced/chronic conditions, although the incidence rate is much rarer.(Irani *et al.*, 2017)(Hall *et al.*, 2019) In contrast to alkalis that are viscous and tend to stick to the esophageal mucosa, acidic substances quickly pass through the esophagus, causing pyloric spasm, this leads to a longer duration of mucosal contact, coagulative necrosis, and gastric stricture. The formation of complex strictures is more difficult to handle and tends to be refractory even though dilation has been carried out, (Everett, 2019) This can increase the risk of malnutrition which further increases mortality and morbidity rates. (Kluger *et al.*, 2015)

The prevention and management of strictures with stents and surgical procedures seem promising, but experience in this field is still limited and not widely available.(Irani *et al.*, 2017) Endoscopic dilation is used for restrictive lumen patency efforts, but in complex strictures, more effort is needed. Improvement in nutritional status, stricture patency or surgical procedures need to be considered as therapeutic success. (Meena, Narayan and Goyal, 2019)

2. CASE

The woman, 32 years old, came to the emergency department on 26th December 2023 with the chief complaint of nausea and vomiting which was felt about 6 months before being admitted to the hospital. Vomited more than 10 times a day every time she ate and drank, appetite was still good but always vomited after eating, weight lost 35 kg in 6 months.

The patient admitted to drinking a large amount of cleansing liquid (strong alkaline) 10 months ago (February) because committed suicide. Immediately felt nausea and vomit and was brought to the hospital. She was observed but no specific therapy was taken. 1 month after that, nausea and vomiting worsened, and there was significant weight loss.

History of the disease. History of hypertension, diabetes mellitus, heart disease, liver disease, kidney disease denied. Underwent 4 hospitalizations with nauseated and vomited accompanied by recurrent hypokalemia. There were mental issues related to family problems since several years, but have not been further examined by mental health experts. There was a history of complete TB treatment when she was 3.

Physical examination: On 17Th December 2023, she was good awareness, GCS E4M6V5, blood pressure 89/63 mmHg, heart rate 110x/min regular rhythm, respiratory rate 22x/min, SaO2 98% free air, and temperature 36.5 oC, the nutritional status of the patient was malnutrition (moderate acute malnutrition) with a body weight of 40 kg and a height of 155 cm (BMI 16 kg/m2). On head examination, there was minimal conjunctiva anemic, no scleral jaundice, there was no oral candidiasis nor cyanosis. On the neck examination, no enlarged lymph nodes were found, and the jugular vein pressure did not increase. On thoracic examination of symmetrical inspection, the chest shape is also normal, there is no retraction of the breathing aid muscles and there is no dilation of the intercostal ribs. Palpation of symmetrical breath movements, normal palpation fremitus, chorus ictus in the midclavicular line of the sinistra, examination of sonar percussion in both pulmonary fields, examination of vesicular breath sound auscultation no rhonchi nor wheezing, single regular heart sounds 1 and 2, no murmur nor gallop. The abdominal examination was carried out with a flat inspection, no venous dilation in the abdominal wall area, no epigastric pulsation, examination of intestinal noise auscultation within normal limits, examination of palpation of the abdominal palpation, there was no enlargement of the liver, lien nor kidneys, no tenderness, on the examination of the fourth quadrant tympanic percussion. On examination of the extremities, all four limbs were warmly palpable, motor and sensory examinations were within normal limits, CRT < 2 seconds and no edema was found.

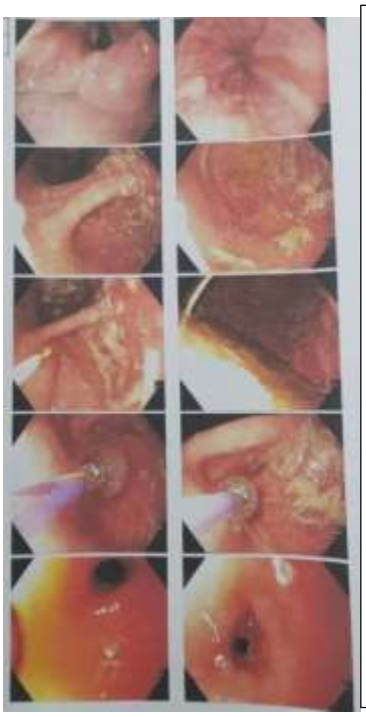
Laboratory tests: Haemoglobin (Hb) 8.1 g/dl, Haematocrit (Ht) 24%, MCV 93 fl, MCH 31.4 pg, MCHC 33.8, leukocytes (WBC) 8.72 x 10^3, neutrophils (NET) 66.2%, lymphocytes (LYM) 22%, platelets (PLT) 188.000, BUN 15.9, serum creatinine (SK) 0.8 mg/dl, sodium 121 meq/L, potassium 2.2 meq/L, chloride 57 meq/L, random glucose level (GDA) 73 mg/dl, SGOT 18 U/L, SGPT 17 U/L, albumin 2.21 mg/dl, non-reactive HbsAg, non-reactive anti-HIV, antigen and negative COVID-19 PCR swabs. Blood gas analysis pH 7.61, pCO2 47, pO2 54, HCO3 47.2, base excess (BE) 25.8, SO2 93%. On the urine examination, a yellowish clear color was obtained, BJ 1.015, pH 8.0, Prot +1, Albumin: create 80 mg/gCr, for glucose, ketones, bilirubin, nitrites, leukocytes and erythrocytes were not found.

Supporting examination: AP thoracic X-ray (17Th December 2023) normal heart size and shape, no pulmonary infiltrates appear. The overall radiological impression of cast and pulmo did not appear abnormal. ECG (17th, December 2023) impression of sinus tachycardia. The results of the abdominal ultrasound at West Sidoarjo Hospital (December 11, 2023) obtained multiple classified liver (can be a manifestation of TB).

Based on anamnesis, physical examination, and supporting examination, the patient was diagnosed with moderate-severe dehydration of hypokalaemia 2.2 due to profuse vomiting, hypo albumin 2.21 mg/dl, hypomagnesemia 1.5 mg/dl, normochromic anemia (Hb 8.1 g/dl), hypovolemic hypotonic hyponatremia 121 meq/L, metabolic alkalosis, suspected oesophageal stricture due to corrosive injury ingestion of strong acids pro consideration Esophagogastroduodenoscopy (EGD) and oesophageal dilatation. The patient is planned to supportive care to anemia, electrolyte imbalance, hypoalbumin and metabolic alkalosis. In the initial treatment, the administration of rehydration of NaCl 0.9% 1000 cc in 1 hour was followed by potassium correction of 50 meq every 12 hours. Central venous access is installed to consider the correction of existing electrolyte disorders. In the follow-up operation in the inpatient room, hypomagnesemia correction with 20% MgSo4, hypo albumin correction with intravenous albumin 20%, and PRC blood transfusion 2 kolf/day were given. Fulfillment of calorie nutrition with intravenous triofucine E500 and a diet of milk 100 cc every 6 hours, but if it is not sufficiently adequate, it is considered with total parenteral nutrition. prokinetic metoclopramide 10 mg when needed was given according to nausea and vomit. Consideration for EGD as soon as general and laboratory improvement. Evaluate clinical symptom, vital signs and heart records during corrections. Evaluation laboratory examination after correction (20th December, 2023). Improvements related to anaemia (Hb 10.9 mg/dl), Sodium 128 meq/L, Potassium 2.7 meq/L, albumin 3.31. Thyroid function values were obtained within normal limits because of recurrent hypokalaemia history, in urine electrolyte examination, normal values were obtained in sodium and potassium electrolytes (Na 107 mmol/L; K 217 mmol/L) but chloride <20 mmol/L, TTKG value was 71, the BGA evaluation results still seem to be a metabolic alkalosis and the evaluation of clinical conditions seems hypotension. From the available data, the possibility of hypokalaemia related to thyroid dysfunction and special conditions such as Barther or Gitelman syndrome was ruled out.

Clinically, feeling weak, nausea and vomit were better and food intake also improved. The results of EGD on December 29, 2023 obtained complex pylorus stricture, scarring of most of the gastric mucosa, dilation with CRE balloon, recommended diet with coarse porridge, EGD evaluation and re-dilation 1 week later (4th January 2024), but before the EGD evaluation, nausea and vomit worse aggravated accompanied by a decrease in blood pressure and a decrease in potassium values (K 1.9 meq/L) and got desaturation suspected due to pneumonia infection. She was transferred to the High care unit (15th January 2024) for intensive treatment due to infection and correction of high doses of potassium electrolytes. Improvement of the condition was carried out by fulfilling of low-dose vasopressin (intravenous Norepinephrine) adjusted for hemodynamics, potassium correction increased by 100 meq every 8 hours, maintenance fluid with triofucine 1000 ml and kalbamine 500 cc within 24 hours and administration of broad-spectrum antibiotics with ceftriaxone 1 gram every 12 hours intravenously. Evaluations related to clinical, and laboratory periodically. From the results of the evaluation, it was found that there was a decrease in Hemoglobi values (Hb 8.2 mg/dl), a decrease in albumin (2.67), hyponatremia of 122 meq/L, and potassium improved (3.4 meq/L), with blood gas values that were still affected by metabolic alkalosis. The therapy that has been given is continued with correction of anemia with PRC infusion of 1 colf/day until the target hemoglobin is greater equal to 10 mg/dl.

After the condition improved, nausea and vomiting were better, so do the laboratory. Haemoglobin better (Hb 11 mg/dl), potassium improved (4.4 mg/dl), and sodium improved (136 mg/dl). The patient underwent an EGD evaluation on 22nd January 2024 with the results of complex pylorus stricture, suspected cicatrices in the major and minor curvatures, considered for digestive surgery consultation, diet only through nasobiliary drain (NBD) with a liquid diet, and EGD was carried out again 3 days later. EDG evaluation (24th January, 2024) scars were found along the esophagus accompanied by erosion, complex pylorus strictures were dilated with an 8mm CRE balloon, and the installation of a 2nd NBD, it was planned to an EGD evaluation 1 week later. 6 days after the 3rd EGD, there were scars along the oesophageal mucosa accompanied by erosion, pylorus complex stricture was dilated with a 10 mm CRE Balloon and NBD was installed, planed evaluation 1 week later, the Liquid Diet was increased to 6x250cc only through the NBD. Evaluation was also carried out by examining the chest Ct scan with contrast. There were pylorus stricture with a thickness of ± 1.3 cm, ± length of 3.3 cm, dilatation of gasters that have been installed with a medical device with a distal tip in the duodenum as high as L1 and in the small bowel as high as VS3 were obtained. Clinical evaluation post EGD evaluation, liquid diet intake via NBD can be given according to the target, vital signs improve without support, The patient was allowed to go home and was evaluated by the polyclinic for the next EGD evaluation plan.



Result:
Scope enters through cavum oris to gaster

Esophagus: Heavy erosion of the distal esophagus. EGJ : can be opened without detention

Gaster: There are a lot of liquid and solid food leftovers. Suction is performed. It appears that the mucosa gaster is mostly covered with sicactrick tissue. Osteum pylorus pin point.

Identification was carried out. Insertion of zebra guide wire 0.25, dilated with balloons in stages, 3atm/5 atm/7atm/8 atm (12mm). It looks like the mucosa is broken. Appears a long, winding pyrlorus stricture

CONCLUSION:
- Complex pylorus stitches
- Performed dilatecy with CRE Baloon

SUGGESTION
Coarse porridge diet
EGD evaluation and re-dilation Thursday, 4th January, 2024

Figure 1 : Endoscopy Results 29th December, 2023

Result:
Suction via NGT: the remaining liquid comes out and a little solid food, approximately 500 cc

The scope of entry from cavum oris to antrum, obtained:

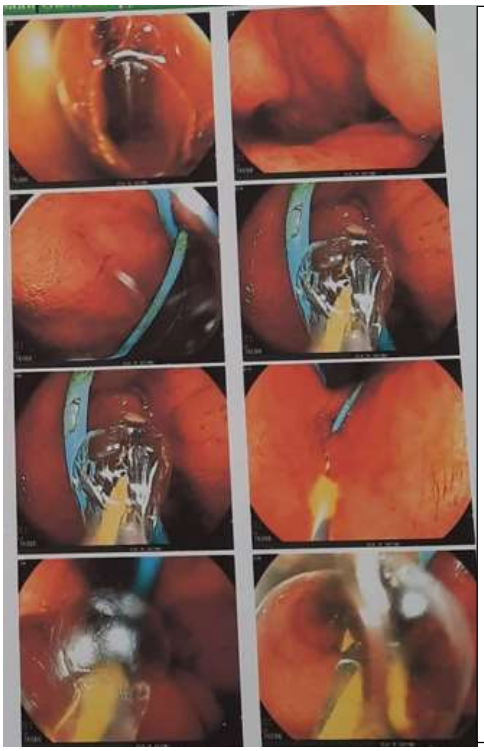
Esophagus: The lumen is open, the mucosa appears to be sculpted along the esophageal wall, there is a granulation of tissue in several places and erosion in the distal scoope can pass through the EGJ easily.

Gaster :
Corpus: The major and minor curvatura of the mucosa appear to have extensive sicactic tissue.
Antrum: mucosa looks saccharic, pylorus pin point lumen and eccentric, guided is carried out with the placement of zebra wire 0.025, scope 1.2 still cannot enter, NBD installation is carried out

CONCLUSION:
- Complex pylorus stitches
- Suspicious of the major and minor curvature

SUGGESTION
Digestive surgical consultation
Only allowed to diet through NBD with liquid entresol milk/sugar water/honey water, EGD evaluation Wednesday, January, 2024

Figure 2: Endoscopy Results 22nd January, 2023



Result:
The double channel scope enters through the cavum oris to the gaster, obtained:

Esophageal:

Acrylic mucosa along the esophageal wall, erosion (+), NBD (+) visible. On the EGJ, the scope can pass through easily

Gaster :
There was a lot of liquid, 2 liters of suction was carried out. It appears that the NBD is attached to the pylorus. A 0.035 guide wire was installed, then dilated with CRE Baloon 8 mm 3 ATM for 1 minute. The 2nd NBD was installed

CONCLUSION:
Complex pylorus stitches were dilated with CRE Balloon and 2nd NBD installation

SUGGESTION
Evaluation of the EGD of the 3rd NBD installation plan in 1 week. Liquid diet 6x200 should only be past NBD

Figure 3 : Endoscopy Results 24th January , 2023

Result:
Guidewire 0.035 enters through one of the NBDs, then the on of them is loosened and aff
Scoce double channel enters through cavum oris to gaster

Esophageal:

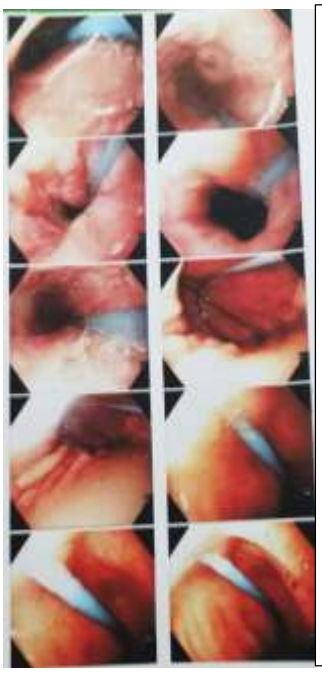
Cicatrices mucosa along the esophageal wall, erosion (+), NBD (+) visible. On the EGJ, the scope can pass through easily

Gaster :
There was a lot of liquid, 1.4 liters was carried out. Visible scuffs on some mucosa. It appears that 1 NBD is attached to the pylorus. Conducted aff NBD.
Dilatation was carried out with CRE Baloon 10 mm 2 ATM for 1 minute repeated 3 times without bleeding, . NBD reinstallation

CONCLUSION:
Complex pylorous stitures are dilated with CRE Balloon and NBD installation

SUGGESTION
Evaluation of the EGD for 2nd NBD installation on Wednesday 7/2/24. The 6x250 liquid diet should only through by the NBD

Figure 4: Endoscopy Results 30th January, 2023



Result:
Scope pass through from cavum oris to gaster

Esophageal:

Cicatrices mucosa along the esophageal wall, erosion (+), NBD (+) visible. On the EGJ, the scope can pass through easily

Gaster :
200 cc of liquid was suctioned.
Visible scuffs on some mucosa.
1 NBD is attached to the pylorus.

CONCLUSION:
Complex pylorus strictures

SUGGESTION
The 6x250 liquid diet should only be past the NBD
Consul Surgeon Digestiv Gastrojejunostomy Considerations

Figure 5: Endoscopy Results 13th February, 2023

3. DISCUSSION

Corrosive chemical ingestion is a major problem, especially in developing countries, showing a bimodal pattern, the first peak found in the age group of children aged 1 to 5 years due to accident, the next peak of the group is adults aged 21 years and older. Most of which are intentional suicide attempts where the amount of material ingested is relatively higher so that

it causes a greater impact of damage. Injuries due to ingestion of corrosive or caustic substances are generally caused by ingestion of acidic or alkaline (alkaline) materials. Alkaline ingestion is more common in Western countries, while in Asian countries such as India, acid ingestion is a more frequent culprit. Women are said to have a higher proportion than men (Forgot et al., 2009) (Hollenbach et al., 2018) (Hall et al., 2019) Hydrochloric acid is the most common cause of corrosive poisoning in Asia such as India, due to its easy-to-obtain nature as a cheap toilet cleaner.(Ashish Saxena and Yuvraj Kolhe, 2015) Some examples of corrosive materials caused in the case of ingestion of corrosive materials are as shown in Table 1. (Contini and Scarpignato, 2013)

"In this case, the patient is a woman who came with complaints of severe nausea and vomiting since the last few months with a history of repeated hospitalization with similar complaints accompanied by recurrent hypokalemia. A history of drinking bathroom cleaner (containing hydrochloric acid) 10 months ago with suicidal motives due to severe mental stress. The prevalence of this case is in accordance with existing studies where the patient is a female patient, with suspected mental distress with a history of drinking bathroom cleaning liquid which is one of the corrosive substances of strong acidic acid containing 20% HCL."

Table 1. . Caustic substances are most often ingested. (Contini and Scarpignato, 2013)

Caustic substance	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
		Washing powders
	Sodium carbonate	Soap manufacturing
		Fruit drying on farms
Ammonia	Commercial ammonia	Household cleaners
	Ammonium hydroxide	Household cleaners
Detergents, bleach	Sodium hypochlorite	Household bleach, cleaners
	Sodium polyphosphate	Industrial detergents
Condy's crystals	Potassium permanganate	Disinfectants, hair dyes

Corrosive chemicals commonly consumed are strong acids and bases (pH <2 or >12) that can quickly penetrate a wide variety of gastrointestinal mucosal layers. The extent of tissue injury depends on factors such as the physical form of the ingested chemical, type, amount, concentration, condition prior to ingestion, tissue condition, and duration of contact. (Rossi, 2015)(Hall *et al.*, 2019) The mechanism of damage caused by acids and bases is different. The substance is alkaline, causing liquefaction necrosis and saponification of tissues related to vascular thrombosis, resulting in deeper permeability or liquefactive necrosis than acidic substances. Acidic substances give rise to coagulation necrosis that causes eskar formations that limit the dispersion of substances, leading to segmental to extensive strictures in the long term. The esophagus and stomach suffer the greatest impact of injury. Almost one-third of cases cause gastric combification. (Ashish Saxena and Yuvraj Kolhe, 2015) (Hollenbach *et al.*, 2018) The relative resistance of the esophageal squamous epithelium to acid, rapid passage through the esophagus, the ability of gastric distension and significant acidic substances lead to the spontaneous reflex of pyloric spasms. These factors prolong the contact period of acidic substances with the gastric mucosa resulting in a myriad of gastric abnormalities such as pyloric stenosis, antral stricture, hourglass stomach, or a wrinkled stomach. (Ashish Saxena and Yuvraj Kolhe, 2015)

Some of the symptoms of acute caustic that can appear include: (Hall *et al.*, 2019)

- Painful and burning sensation in the mouth and throat
- Retrosternal chest and upper abdominal pain

- Nauseous
- Vomiting, often accompanied by hematemesis
- Hypersalivation
- Difficulty swallowing due to edema
- Whurning-looking ulcers or plaque in the mouth, oropharynx, or on the roof of the mouth
- Laringospasm
- Dysphonia/aphonia
- Dispnea
- Perforation of the gastrointestinal tract

While the clinical signs of the advanced phase, obtained:

- Esophageal stenosis
- Stenosis of the gastric or pyloric antrum (usually manifests such as a feeling of a full stomach, nausea, vomiting, and weight loss)
- Reflux gastrointestinal
- Oesophageal or gastric carcinoma (cicatrix carcinoma) appears years several after ingestion of corrosive substances (oesophageal carcinoma occurs in about 3% of patients; gastric carcinoma is very rare)

Symptoms that appear can predict the location of the injury, the presence of persistent vomiting, easy recall and weight loss can indicate the presence of lesions due to gastric outlet obstruction (GOO) which can appear 1-3 months after ingestion up to several years in some cases. The presence of dysphagia, regurgitation, substernal discomfort, and recurrent aspiration indicate esophageal involvement that can occur simultaneously . (Ray and Chattopadhyay, 2015)(Hollenbach *et al.*, 2018)

In the acute phase (early days) it shows necrosis, thrombosis of small blood vessels, and peeling from the mucosa. This is followed by bacterial invasion and fibroblast migration (4-7 days). Collagen deposits are visible for more than 2 weeks. Scar retraction begins in the third week, which eventually leads to stricture. The acute phase of a corrosive injury can be a risk of perforation of the esophagus, gastric or duodenum. The chronic phase of a corrosive injury can lead to several complications, the most common of which is a stricture. Complications in the stomach can lead to achlorhydria, gastric obstruction of the outlet, and the risk of carcinoma. Gastric obstruction of gastric outlets is less common than esophageal stricture, which is only around 5% of all corrosive injuries (Rohan Interest *et al.*, 2019)

Early symptoms and findings of the initial physical examination are not reliable in predicting the extent of the injury. There is no one specific symptom or sign that can be relied upon – especially the presence or absence of oropharyngeal lesions that can predict the severity of tissue injury after consumption of corrosive materials. (Hall *et al.*, 2019) This is different from a study in Turkey, which proposed an initial evaluation of caustic ingestion cases with a DROOL score where a DROLL score was obtained ≤ 4 can be a significant predictor of the incidence of esophageal stricture and poor clinical prognosis whereas the "Med-TU" chart was designed by researchers from Thailand where the presence of drooling, severity of buccal mucosal injury, and white blood count are significant independent predictors of whether a patient is at risk of developing grade 2b or more severe gastrointestinal tract injury. (Sharif *et al.*, 2022)(Uygun *et al.*, 2012)

"Patients with a history of consuming cleaning liquids that are strongly acidic in large quantities. Shortly afterwards, complaining of heat and tenderness in the throat, this indicates the presence of lesions in the esophagus. these are accompanied by nausea and vomiting, with a considerable amount of blackish color experienced several times at the beginning after ingestion. This can indicate the presence of lesions in the gastric area. There were no feeling of shortness of breath, hoarseness, or excessive salivation, especially after a history of ingestion of corrosive substances. This indicates that there is an injury to the stomach The patient was immediately taken by his family to the nearest hospital for observation. The complaints improved after being treated for 4 days. And allowed to go home after the complaint improves."

In assessing the extent of tissue injury, the "gold standard" is the esophagogastro duodenoscopy (EGD) procedure or endoscopic procedure. But Some authors argue that patients who do not show symptoms after ingesting corrosive substances do not require an early endoscopy (<12 hours). (Hall *et al.*, 2019) especially at the beginning of 2017 the act of early EGD (<12 hours) was widely debated, only performed in symptomatic patients or with symptoms or not in patients with cases of intentional ingestion (related to the suspicion of ingestion in large quantities and/or high concentrations). (Uygun *et al.*, 2012)(Rossi, 2015) (Sharif *et al.*, 2022) Actions earlier than 12 hours may not reveal the overall injury and measures > 48 hours after consumption are not recommended due to the increased risk of esophageal perforation due to the fragile mucosa.(Hall *et al.*, 2019) Another study revealed that endoscopy on the 5th day post-consumption was a more effective predictor of the occurrence of esophageal stricture and gastric scarring, compared to the first days due to the possibility of

over-prediction of severity.(Kochhar *et al.*, 2017)In injuries that hit the stomach in addition to the upper gastrointestinal endoscopic examination, it is also important to assess the extent of the damage that has occurred. Based on this by Ananthakrishnan et al, the existing findings can be classified into five groups, as shown in table 2. (Ananthakrishnan, Parthasarathy and Kate, 2010)(Ray and Chattopadhyay, 2015)

Table 2. Classification of chronic gastric corrosive injuries

Type	Information
Type 1	Narrowing of the short ring on the stomach within 1 to 2 cm of the pylorus
Type 2	The stricture extends to the proximal to the antrum
Type 3	Mid-gater strictures involving the corpus and partial proximal and distal gastric
Type 4	Diffuse gastric involvement such as plastica linearity
Type 5	Gastric stricture is related to gastric stricture up to the first part of the duodenum

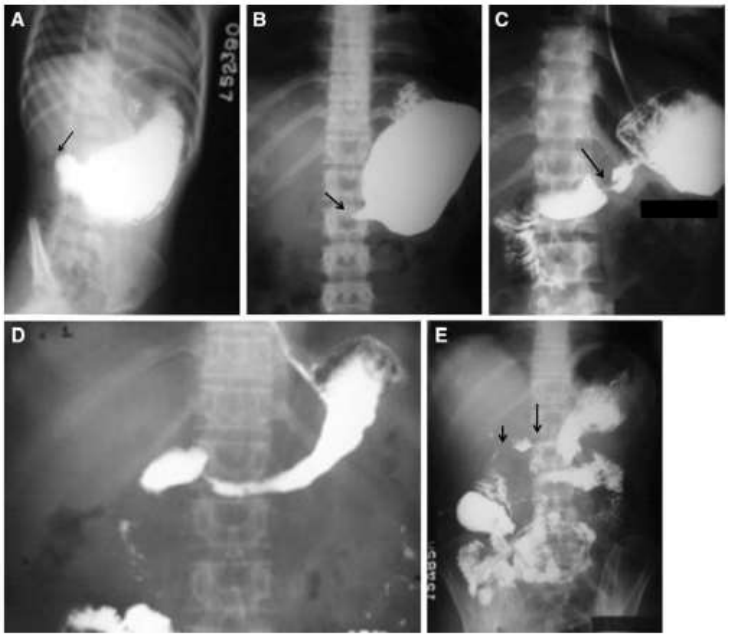


Figure 6. a. Prepiloric stricture (type I), b stricture extending to the antrum (type II), c midgastric stricture (type III), d diffuse gastric involvement (type IV), stricture involving the gastric and duodenum (type V). (Ananthakrishnan, Parthasarathy and Kate, 2010)(Ray and Chattopadhyay, 2015)

The severity of mucosal lesions determined through endoscopy is the most dominant predictive factor for systemic complications and complications of a fatal nature. The greater the lesion severity of the mucosa, the risk of complications will increase 9 times with each increase in severity. The overall accuracy for early endoscopy (<12 hours) for predicting the depth of mucosal lesions after corrosive substance ingestion, based on the Zargar scale (Table 3 and figure 6), was good for 3rd degree lesions (87%), but less accurate for 2nd degree lesions (48%). Therefore, it is necessary to be careful in developing a treatment plan for the patient based only on early endoscopic findings.(Hall *et al.*, 2019)

Table 3. Degree of tissue injury associated with corrosive consumption with endoscopy flexible based on Zargar classification (Lusong, Timbol and Tuazon, 2017)

Degree	Anatomical location	Information
Grade 0	Superficial	Mukosa normal
Grade 1		Edema, mucosal hyperemia

Grade 2A	Bleeding, erosion, blisters, superficial ulcers
Grade 2B	Deep focal or superficial ulcer
Grade 3A	Focal ulcers of dark gray or brownish-black color
Grade 3B	Extensive dark gray or brownish-black ulcers
Grade 4	Perforation

Figure 6. Endoscopic view of Zargar's classification. A: Zargar degree 0; B: Zargar degree I: Edema and hyperemic mucosa; C: Zargar degree IIA: Bleeding, erosion, blister, superficial ulcer; D: Zargar degree IIB: Focal or deep circumferential ulcer; E: Zargar IIIA: Focal ulcer of dark gray or brownish-black; F: Zargar derivate IIIB: Extensive dark gray or brownish-black ulcer (Lusong, Timbol and Tuazon, 2017)

Figure 6. Endoscopy Results 29th December, 2023

Endoscopy, is being used to assess the degree and extent of gastrointestinal damage, can also be used to treat stricture that develop in the oesophagus and stomach. Corrosive injuries with complications of oesophageal stricture can be treated effectively and safely by endoscopic balloon dilation/ *endoscopic balloon dilation* (EBD), but the presence of complex strictures is more difficult to handle and has a refractory tendency even though dilation has been carried out, (Everett, 2019) This can increase the risk of malnutrition which further increases mortality and morbidity rates. (Kluger *et al.*, 2015) Endoscopic grades 1, 2, and 2A are considered "low-grade" injuries, while injuries belonging to classes 2B, 3, and 4 are categorized as "advanced" injuries. Chronic complications are usually not seen in cases of 1st and 2nd degree injuries. The majority of patients with degree 1 and 2A have recovered completely. In contrast, most patients with a 3rd degree or more corrosive injury are more likely to develop stricture. So that consideration is given to surgical action in cases with severe

stricture degrees (degrees 3 to 4) or stricture conditions that do not respond to dilation. (Badiu Tisa *et al.*, 2023)

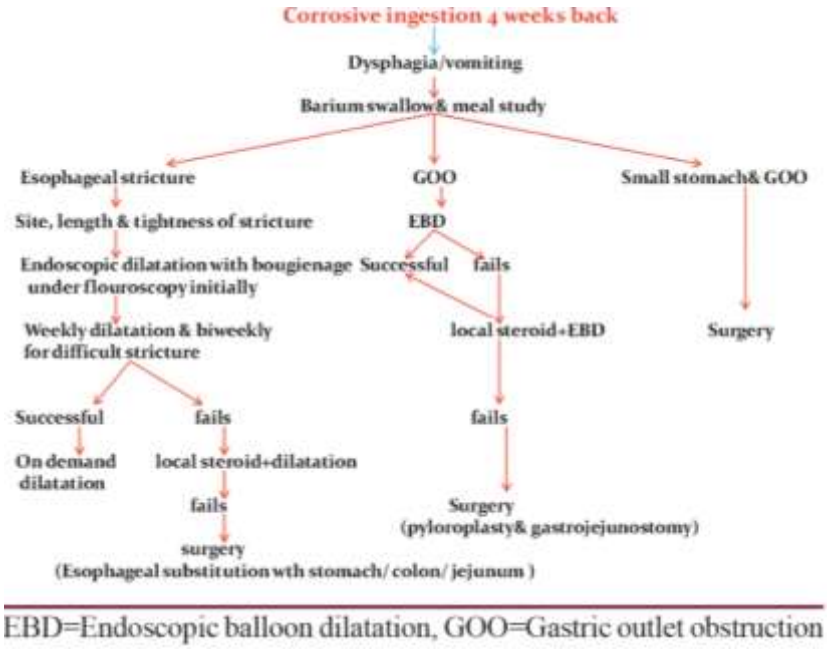


Chart 1. Chronic corrosive injury management algorithms. (Meena et al., 2017)

"The results of Endoscopy (10 months after ingestion) showed scatric tissue and heavy erosion of the distal esophagus and showed that the gaster mucosa was mostly covered with scaturic tissue. Osteum pylorus is seen as a pin point. Impressed is a description of the complex pylorus stitch. From the data of Ct scan of the chest with contrast, a picture of the stricture of the pylorus with a thickness of ± 1.3 cm, a length of ± 3.3 cm accompanied by gaster dilation. Based on the Zargar criteria, the patient was diagnosed as a 2B degree esophageal corrosive injury and a 3B degree gastric injury. Esophageal injuries with a Zargar value of more than 3 have a risk of developing strictures in the future. The presence of extensive cervical tissue in the stomach until the presence of pyloric stenosis allows for advanced gastric injury (3-4 degrees). This supports the picture of gastrointestinal complaints to malnutrition that exists as a result of damage to existing structures that reduce the patient's quality of life. This is in accordance with the reviews of many journals related to complications due to ingestion of corrosive materials."

In general, there are three phases of corrosive injury management – early, intermediate, and chronic phases. The initial phase of management includes immediate assessment of the extent of the injury, resuscitation, and planning for further therapy for acute episodes. The intermediate phase deals with the management of acute episodes in hospitals and deals with sepsis, aspiration, and nutrition issues. The chronic phase is concerned with the management of long-term sequelae from corrosive consumption including strictures and swallowing dysfunction (Kalipatnapu *et al.*, 2018). Esophageal dilation has been used as the first-line therapeutic modality for esophageal strictures without an acute inflammatory response. (Hwang, 2017) In the case of gutter stricture, the choice of surgery depends on several factors: (1) the patient's general condition, (2) the need for simultaneous esophageal reconstruction, and (3) the lesion type of chronic gastric injury. (Rammohan, 2016) (Ray and Chattopadhyay, 2015)

To date, there are no definitive and patented therapeutic protocols for corrosive injuries. The basis of therapy is differentiated into three basic types of strategies, which are carried out in connection with three main categories of possible risks:(Rossi, 2015)

A. Patients with mild visceral lesions, without systemic involvement, are provided with only medical support. Patients can be outpatient with periodic observation to conduct clinical and endoscopic evaluations.

B. Patients with severe visceral lesions, usually associated with biochemical abnormalities of systemic involvement, with the possibility of perforation, are considered timely surgical exploratory measures, with a high probability of restrictive therapy.

C. Patients with visceral lesions of moderate severity (accompanied by clinical and laboratory-related complications), who are at risk of further damage, are the middle zone, of which much of the definitive action literature is still controversial.

The type of management recommended for category "C", it is necessary to carry out a "careful review" with the surgeon to

evaluate whether there are any considerations for invasive measures needed not only for therapy but also for preventive purposes.

In corrosive GOO, the main goal of surgery is to remove the obstruction by trying to reduce the remaining gastric volume as much as possible. Early definitive surgery and avoiding gastric resection can give quite good results, as it can provide a better quality of life to the patient. In a study conducted by Ray and Chattopadhyay in India, patients with short-segment strictures involving the pylorus and/or antrum can be performed with anastomosis of the restrictoplasty of the healthy gastric mucosa to the duodenal mucosa. However in patients with long segment strictures involving the distal stomach or extending to the duodenum/complex damage condition, it can be performed with a loop or Roux-en-Y gastrojejunostomy which is also beneficial for preventing bile reflux. From the existing studies, this operative action gave quite good results, where in the study conducted all patients showed weight gain, and there was an improvement in hypoproteinemia within 6 to 8 weeks after surgery. In contrast, non-surgical management of gastric corrosive injuries with endoscopic dilation does not provide satisfactory results in most cases. (Ray and Chattopadhyay, 2015) However, in gastric injuries of grade 3b or more, gastrectomy is preferred.(Chirica *et al.*, 2014) In the case of esophageal stricture, surgical measures are considered in conditions of severe complications, when endoscopic balloon dilatation (EBD) fails or when the patient cannot tolerate the EBD procedure, the presence of esophageal stenosis longer than 3 cm, and the presence of multiple strictures.(Alhames, Alkhaled and Ghabally, 2023) This is briefly explained in chart 2. (Chirica et al., 2014)

To date, there is no definitive therapeutic protocol for corrosive injuries. It all depends on each individual's clinic, availability of facilities and operator assessment. The phase of therapeutic action follows the clinical stage and and endoscopic examination. This includes Gastrojejunostomy, which is a surgical procedure especially in cases of severe GOO stricture injury with the possibility of loss of gastric volume due to considerable cicatrice, by creating anastomosis between the stomach and jejunum. (Ray and Chattopadhyay, 2015)

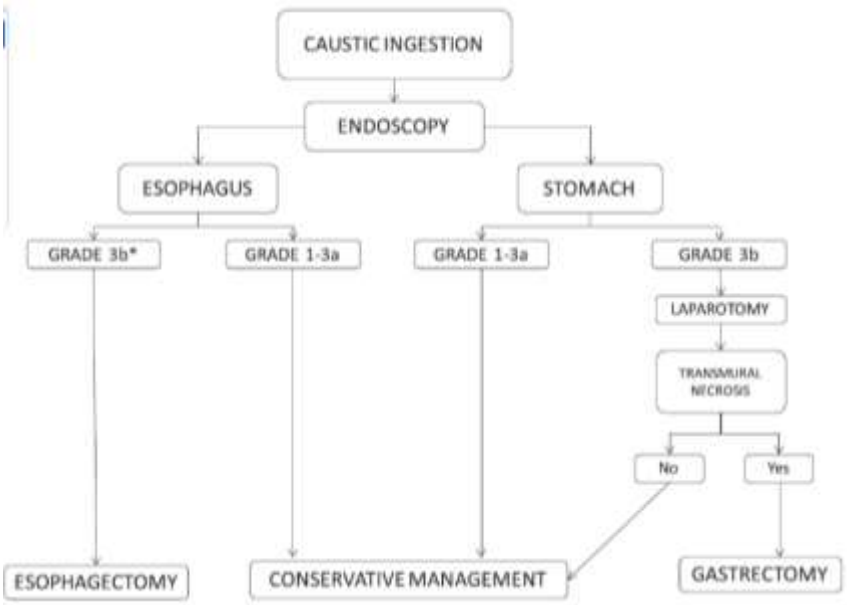


Chart 2. Decision making algorithms for caustic injury management. (Chirica et al., 2014)

There are three main indications for a gastrojejunostomy, including to treat blockages in the stomach of the distal part or the proximal small intestine such as in the case of cancer or scarring due to ulcers or other causes (including ingestion of corrosive materials), as part of the reconstruction procedure after a subtotal gastrectomy for cancer, and a weight loss procedure by creating a bypass to the small intestine. (Sigmon and Lopez, 2023) Before performing a Gastrojejunostomy, it is necessary to conduct a detailed examination to ensure the absence of contraindications that can harm and increase complications, including the presence or absence of extensive adhesions, massive ascensions, abdominal carcinoma, extensive gastric varicose veins, or anatomical changes from the previous procedure. Malnutrition conditions must be corrected before action is taken, in order to minimize the risk of anastomosis leakage. If needed, parenteral or enteral nutrition can be done through a food tube as access to nutrients. (Sigmon and Lopez, 2023)

"Patients with advanced manifestations due to corrosive esophageal injury degree 2B (Zargar classification) and gastric injury degree 3B (Zargar classification), complex pyloric stenosis accompanied by malnutrition complications (BMI 16) and recurrent electrolyte disorders. Complaints of chronic nausea and vomiting as well as recurrent electrolyte disturbances were still felt even after the installation of NBD and attempts at stricture dilatation but did not provide a good enough

response. This is relevant to some existing studies where complex strictures are more difficult to deal with and have a tendency to be refractory despite dilation. This can lead to complications (malnutrition and electrolyte disorders) that increase morbidity and decrease the patient's quality of life. With this condition, it is sought to consult a digestive surgeon to consider surgical procedures. Dr. Digestive surgery, by considering the history, symptoms, and existing supporting data (endoscopy, Ct scan of the chest with contrast). The presence of severe injury (degree 3b wide) in the gaster mucosa accompanied by the presence of pilloric strictures can be considered gastrectomy and reconstruction with the Roux en Y jejunum electively which is relevant to the existing study. For the esophagus with milder lesions where there is esophagitis accompanied by scar tissue on the surface (it seems that Zargar degree 2B) is still expected to be a conservative effort. Further evaluation will be carried out later during the durante process of surgery related to the exact findings of the affected organs. Nutritional therapy efforts while waiting for surgery have been carried out with the installation of NBD and the application of a jejunostomy tube as well as symptomatic therapy is expected to reduce digestive symptoms (nausea, heartburn) that are still occasionally felt. "

4. CONCLUSION

It was reported that a 32-year-old female patient with advanced caustic injury accompanied by moderate-severe dehydration complications due to nausea and vomiting, profuse, malnutrition, anaemia, hypo albumin and electrolyte disorders (hypokalaemia and hyponatremia) with a history of ingestion of corrosive substances with strong acids (toilet cleaning liquid) 10 months ago. Early treatment addresses acute conditions related to dehydration and electrolyte disorders. Crystaloite rehydration is given at the beginning of therapy, prokinetic administration and hypo albumin correction. Maintenance therapy is given after the acute condition improves with the correction of hypokalaemia, anaemia, and liquid enteral nutrition gradually. The patient underwent endoscopy as a diagnostic and therapeutic procedure, a picture of cervical erosion of the distal oesophagus (zargar degree 2B) was obtained accompanied by a gastric wide cervical injury *(zargar degree 3B).* Dilatation w / *CRE Balooning* and installation of NBD as nutrient access was carried out 5 time after a few weeks, but the stricture did not give a good enough response. With this condition, definitive therapeutic action with surgical measures is considered. Consultation with TS of digestive surgery, taking into account the extent of the lesion as well as the coupling involving the gastric is planned gastrectomy and reconstruction with the jejunum Roux en Y . Clinical and nutritional improvements through the insertion of the NBD tube and the application of the jejunostomy tube before the procedure aim to minimize the risk of complications of operative actions due to anastomosis leakage.

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