The management of esophago-gastric necrosis due to caustic ingestion: Anastomotic reinforcement with Cyanoacrylate glue and damage control with Vacuum Assisted Closure Therapy—A case report

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**ABSTRACT**

**INTRODUCTION:** The surgical treatment of a complete gastric necrosis due to caustic ingestion is extremely challenging and life threatening. In this emergency scenario, a first-time reconstruction of the gastrointestinal tract is often dangerous for the patient because of the high risk of infections and anastomosis leakage. Literature lacks of clear indications for the management of this condition.

**PRESENTATION OF CASE:** Male patient with history of major depression disorder was admitted to our Emergency Unit after the ingestion of muriatic acid. CT scan showed massive pneumo-peritoneum with esophago-gastric thickening. Free fluids in the abdominal cavity were detected. Intraoperative finding was a complete necrosis of the stomach and corrosion of the lower esophagus.

**DISCUSSION:** In this case report we proposed a first approach with the drainage and lavage of the abdomen cavity. Then, an esophago-jejunal anastomosis reinforced by Cyanoacrylate glue was performed and a damage control with VAC therapy (Vacuum Assisted Closure) was carried out.

**CONCLUSION:** Cyanoacrylate glue could be considered useful and efficient in the reinforcement of anastomosis even in emergency surgical procedures. Damage control using VAC allows to keep a good control of the surgery performed.

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1. Introduction

Upper gastrointestinal injuries due to caustic ingestion are rare surgical emergencies often associated to intentional suicide attempts in adults [1,2]. These emergencies usually concern patients with an age starting from 21 years old [3].

The scenario after a caustic ingestion is extremely various, ranging from a single perforation of the stomach or an esophageal stricture to a complete gastric necrosis [4].

Patients survival after severe caustic gastrointestinal injuries depends on the time frame between ingestion and surgical treatment [5].

Esophagogastroduodenoscopy represents the gold standard to evaluate the severity and the extension of the injury and it also allows to choose the best treatment for patients [6].

It is quite debated in literature what is the best surgical procedure to treat this condition; in fact both one stage and two stages procedures have been proposed [6,7].

We aimed to report our experience in the management of a patient with severe full-thickness gastric wall necrosis associated with partial low esophageal injury after the ingestion of hydrochloric acid.

A two-time surgery was performed using cyanoacrylate glue for the reinforcement of the esophago-jejunal anastomosis. Furthermore, we carried out a damage control using VAC (Vacuum Assisted Closure) therapy in order to keep a good control of surgery.

This case report is written according to SCARE criteria [8].

2. Presentation of case

A 64 years old male was admitted to our Emergency Unit showing anxiety, confusion and agitation, pharyngeal burns and epigastric pain. GCS 15.

The anamnesis was collected by his relatives who reported muriatic acid ingestion about 5h before First Aid admission. Furthermore, the patient has been in a state of major depression for 10 years. No other comorbidities or previous surgeries were reported. Patient vital signs were BP 100/55 mmHg, HR 125/min, RR 22/min, temperature 37 °C, weight 95 Kg, height 180 cm.

At physical examination: tenderness of the abdomen, positive Blumberg sign, absence of bowel sounds.

The hemogasanalysis showed a metabolic acidosis (pH 7.14) with a slight hypercalcaemia (1.29 mmol/L) and a hypercholemera (118 mmol/L).
Blood tests showed neutrophilic leukocytosis and an increase of C-reactive protein (112 mg/L), Hb 16.7 g/dl and Hct 51%, lactic acid 1.8 mmol/L.

At First Aid an ECG was performed (sinus tachycardia, 117 bpm) and the patient underwent a chest x-ray and an Esophagogastroduodenoscopy (EGDS) showing an extensive mucosal necrosis (Zargar 3B).

The abdomen CT scan demonstrated a massive pneumoperitoneum with esophago-gastric thickening. Free fluids in the abdominal cavity around the stomach were detected.

The patient underwent emergency surgery (ASA IV) and during the first operation the abdomen was explored with evidence of a large aperture of the posterior-lateral gastric wall and total gastric necrosis with the presence of ingested material. Considering the patients’ poor performance status, as first approach three tubular drains were put in the abdomen after a lavage; the aperture on the posterior wall of the stomach was closed and the necrotic tissues was removed. In the second operation (18 h after) a total gastrectomy with omentectomy (Fig. 1) and a stapled functional side-to-side esophago-jejunal (E-J) anastomosis on the anterior esophageal wall were performed. An end to side jeuno-jejunal anastomosis was carried out to restore the gastrointestinal transit.

Cyanoacrilate glue was used to reinforce the E-J anastomosis and damage control with VAC (Vacuum Assisted Closure) (Fig. 2) was carried out in order to keep a good control and to allow a second look surgery.

After 48 h VAC System was removed and the anastomosis was checked with an esophagojejunoscopy with an air leak test (negative). The abdomen was closed with interrupted Vicryl I for the fascia.

On postoperative day (POD) 5 the patient underwent parenteral nutrition in the Intensive Care Unit and on POD 8 a temporary tracheostomy was performed and the patient started to drink.

On POD 14 he had a pneumonia treated by antibiotic therapy and on 22 POD he was moved to the Psychiatry Unit where he started a therapy for the major depression and a semisolid diet.

On POD 26 a further esophagojejunoscopy demonstrated the absence of leakage and a good transit through the anastomosis (Fig. 3). The wound healing was completely normal and the patient was discharged on POD 33.

3. Discussion

Massive Ingestion of corrosive substances for suicidal intent in adults represents a surgical emergency with a high rate of mortality (about 20%) and long-term consequences [9]. The real prevalence of these injuries is underrated because literature lacks of reviews and includes only random papers and case reports/case series.

Injuries from caustic substances are more common in Western countries than in developing countries where people can easily find acids which are used for suicidal intent [10].

Lesions after caustic ingestion are more sever in adults, maybe due to the massive amount of caustic ingested [1]. Among devastating consequences due to caustic ingestion, severe injuries, such as necrosis of the oesophagus and/or the stomach, can occur leading to short and long term life-threatening complications [11].

Most of times, the first approach is a life-saving medical therapy performed to keep the patient stable (e.v fluids, antibiotics and electrolytes correction) and, if necessary, an orotracheal intubation to assess airway safety [9].

Even if there are no strict guidelines regarding the indication of endoscopy after the ingestion of a large amount of corrosives,
CAUSTIC INGESTION

ESOPHAGEAL INJURIES

GRADE 3b

GRADE 1 - 3a

ENDOSCOPY

STOMACH INJURIES

GRADE 1 - 3a

GRADE 3b

LAPAROTOMY

TRANSMURAL NECROSIS?

NO

YES

ESOPHAGECTOMY

CONSERVATIVE MANAGEMENT

GASTRECTOMY

Table 1

Zargar’s grading classification of mucosal injury caused by ingestion of caustic substances.

<table>
<thead>
<tr>
<th>GRADE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Normal examination</td>
</tr>
<tr>
<td>1</td>
<td>Edema and hyperemia of the mucosa</td>
</tr>
<tr>
<td>2a</td>
<td>Superficial ulceration, erosions, friability, blisters, exudates, hemorrhages, whitish membranes</td>
</tr>
<tr>
<td>2b</td>
<td>Grade 2* + deep discrete of circumferential ulceration</td>
</tr>
<tr>
<td>3a</td>
<td>Small scattered areas of multiple ulceration and areas of necrosis with brown/black or greyish discoloration</td>
</tr>
<tr>
<td>3b</td>
<td>Extensive necrosis</td>
</tr>
<tr>
<td>4</td>
<td>Perforation</td>
</tr>
</tbody>
</table>

VAC could be considered very helpful for critical patients since it allows a faster abdominal closure and an earlier discharge from the Intensive care Unit [16,17].

4. Conclusion

Ingestion of caustic substances has devastating consequences on the esophagus and the stomach and often emergency surgery is required. Cyanoacrylate glue could be considered useful and efficient in the reinforcement of anastomosis even in emergency surgical procedures. Damage control using VAC allows to have a good control of the surgery performed and to make a revision of the abdomen two days after the critical surgical procedure and before the closure of the abdomen.

Conflicts of interest

No conflict of interest to declare.

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Ethical approval

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Consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

Author contribution

Arcangelo Picciariello: conception of study design, data collection, analysis, manuscript writing, revision and manuscript submission.

Papagni Vincenzo: conception of study design, data collection, analysis, revision of the manuscript.
Gennaro Martines: critical revision of the manuscript, approved the final version of the manuscript for submission.
Nicola Palasciano: data collection, analysis, manuscript writing and revision.
Donato F. Altomare: manuscript writing, drafting, revising of the manuscript and participation in the care of the patient.

Registration of research studies
This study does not require the registration.

Guarantor
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