Caustic ingestion
Introduction

- Accidental or suicidal attempt
- More serious complication in suicide
- Degree and extent of damage depends on type of substance, morphologic form of agent, quantity, and intent
Common Agents

- Alkali (pH>7): hair relaxer, laundry detergents, dishwasher (NaOH)
- Acids (pH<7): toilet bowl cleaner, battery fluid, and sulfuric acid
- Bleach (pH≈7): sodium hypochlorite
Pathophysiology

- Alkali: liquefaction necrosis
  - early disintegration of mucosa with deep penetration into tissues
  - more oral and upper esophageal involvement
Pathophysiology

- Acids: coagulation necrosis
  → a coagulum to form on mucosa limiting deeper absorption until agent reach stomach (acidic pH heighten the injury)
  → higher incidence of gastric complication (gastric perforation and stricture formation)
  → may extensive damage to esophagus

- bleach: no significant morbidity or mortality or associated complications
Pathophysiology

- Mucosal sloughing (4~7 days after initial injury) → bacterial invasion, inflammatory response
- Collagen deposition may not begin until the 2nd week, tensile strength of healing tissue is low during the first 3 weeks
- Scar retraction begins by the 3rd week, may continue for several months
- Many people advocate avoiding endoscopy between 5 to 15 days
Clinical Presentation

- depend upon type of substance, amount, and physical form of substances
- solid alkali adheres to mouth and pharynx → maximum damage, relatively sparing esophagus
- liquid form rapidly through mouth and pharynx → greatest effect on esophagus
Clinical Presentation

- larynx or epiglottis → hoarseness and stridor
- esophagus: dysphagia and odynophagia
- stomach: epigastric pain and hematemesis (or aortoenteric fistula)
- absence of pain not preclude significant GI damage
Clinical Presentation

- perforation of stomach or esophagus can occur at any time during first 2 weeks
- any change in clinical condition (worsening of abdominal pain or chest pain → radiologic studies)
Clinical Presentation

- 10~30% patients with esophageal burns have no oropharyngeal damage
- 70% patients with oropharyngeal burns do not have significant damage to esophagus
- Injuries of oropharynx are not a reliable index of damage to esophagus

Management

- gastric lavage (x)
- induced emesis (x)
- milk and water: (?) diluting agents, effectiveness not proven
- radiologic studies
- endoscopy
- oral intake
- prevention of strictures
Radiologic Studies

- CXR: air in mediastinum or under diaphragm (esophageal or gastric perforation)
- confirm perforation: water-soluble agent (hypaque or gastrografrin) or barium sulfate
- barium studies: evaluate progressive dysphagia to stricture formation
Endoscopy

- assess oropharynx, larynx, esophagus, stomach, and duodenum
- laryngoscopy: airway obstruction → early intubation or tracheostomy
- no GI injury → observation, discharged, evidence of GI injury → managed appropriately
# Endoscopic grading

<table>
<thead>
<tr>
<th>Degree</th>
<th>Description</th>
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<tbody>
<tr>
<td>First degree (superficial)</td>
<td>nonulcerative esophagitis, mild erythema, edema of mucosa</td>
</tr>
<tr>
<td>Second degree (transmucosal)</td>
<td>whitish exudate, erythema, underlying ulceration that may extend into the muscularis</td>
</tr>
<tr>
<td>Third degree (transmural)</td>
<td>dusky or blackened transmural tissue, deep ulcerations (may extend into periesophageal tissue, lumen may be obliterated)</td>
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Endoscopy

- performed between 24~48 hrs after injury, allowing time to manifest most information
- wound softening after 2~3 days and lasts up to 2 weeks (avoid endoscopy between days 5~15, increase danger of perforation)
- endoscope should be advanced until a circumferential 2rd degree burn or 3rd degree burn is seen, attempts to past increase risk of perforation
Oral Intake

- graded 1 → permit oral intake and discharged within days
- grades 2 or 3 → nutritional support by parenteral or NG tube (blind passage increases risk of iatrogenic esophageal perforation)
- Grade 2: NPO 3-5 days
- Grade 3: NPO > one week
Prevention of Strictures—steroid

- Steroid: decrease stricture: controversial
- Hawkins and Oakes have attributed several side-effects to the use of steroids (increased vulnerability to infection and GI bleeding)

Prevention of Strictures-

- antibiotics and steroids (1.5–2 mg/ kg / day prednisone), and fed through a NG tube during acute phase → lower frequency of esophageal stenosis
- Steroid: little effect on patients who have ingested more than one tablespoon, seems to contribute to other complications (infection, bleeding, fistulae, and death)

Prevention of Strictures-steroid

- A meta-analysis in 361 subjects from a total of 13 studies, strictures occurred in 40% of patients not receiving corticosteroids and antibiotics compared with 19% in the treated group.

Prevention of Strictures-
steroid

- Grade 1: not necessary
- Grade 2: most effective
- Grade 3: surgery, risk of perforation
- Dosage: controversial, recommendation: 1~2 mg/kg/day, 3 weeks

Prevention of Strictures—antibiotics

- Antibiotics: prophylaxis: controversial
- Recommendation: withhold antibiotics until secondary infection

Prevention of Strictures

- Intraluminal stent (silicone rubber) may be helpful in selected esophageal injuries patients (grade 2 or 3)
- long term outcome: unclear

Treatment of Strictures

- (Endoscopic) dilatation / bougination
- Surgery
  - emergent surgery: perforation or shock, acidosis, coagulation disorder with ingested large amount of caustic agent → improve outcome
  - reconstruction: colon interposition
Complications

- Stricture formation (may contribute to formation of long stricture)
- Gastric outlet obstruction (less frequently than stricture)
- Esophageal carcinoma (1000~3000-fold increase in the incidence, better prognosis)
Take Home message

- What kind of agent, amount, intent...
- Clinical presentation, detail PE
- CXR
- Endoscopy (within 24hr or 24-48hr)
- NG (not blind insertion)
- Steroid and antibiotics: based on clinical finding
Reference

- Are´valo-Silva et al.: Caustic Ingestion Laryngoscope 116: August 2006
- Caustic Ingestion and Foreign Bodies in the Aerodigestive Tract
  Ellen M. Friedman Gabriel Calzada Head & Neck Surgery - Otolaryngology, 4th Edition