Poisoning by household products

Common household products include:

1) Corrosives (cleaners)
2) Kerosene (fuel)
3) Pesticides (insecticides and rodenticides)

N.B: both corrosives and kerosene are local acting poisons

Local acting poisons

Common characters of local acting poisons

- **Mechanism:** act only on contact surface by irritating or damaging action (not need absorption)
- **clinical picture:** local immediate effect
- **Treatment:** no gastric decontamination indicated as
  - No fear of absorption
  - Decontamination will increase damaging effect


Glass Plus
CLOROX
Clean-Up.
with Bleach
Soft Scrub
let's eat grandpa

Corrosives

Definition

The caustic (corrosive) poisons are a group of substances that cause both functional and histological damage to the tissues with which they come in contact.

Classification

Alkalis

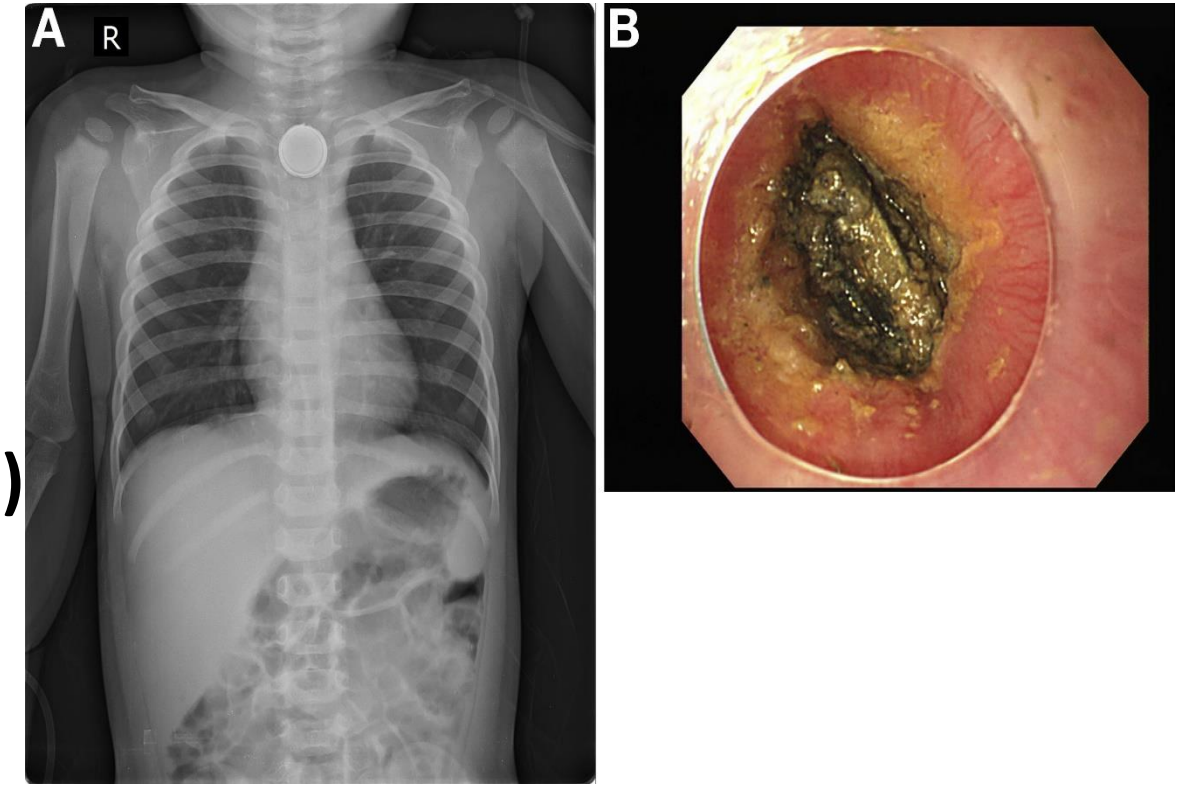
induce significant tissue injuries when the pH is above 11.	
Hydroxides (industrial)	**Bleaches (household)**
• Sodium (caustic soda), • potassium and • ammonium hydroxides.	• Na hypochlorite (Clorox) • K carbonate (Potash).

Acids

induce tissue injuries when the pH is below 3.	
Inorganic (mineral) acids (industrial)	**Organic acids (household)**
• Sulphuric, • hydrochloric and • nitric acids.	• Carbolic (**Phenol**), • **oxalic** and • **acetic** acids

Other corrosives than acids and alkalis

- oxidizing agents,
- denaturants,
- cyanide salts and
- heavy metal salts
- **Disc batteries (mercury chloride)**



Mechanism of toxicity

- **Local acting poison: induce tissue necrosis (by action on proteins)**

1) **Alkalis** produce *liquifactive* necrosis with eventual deep penetration that may lead to perforation.
2) **Acids** result in *coagulative* necrosis that tends to prevent further penetration into deeper layers of the tissue.

- **The extent of injury is determined by:**

- Type
- Volume
- the duration of contact,
- Concentration
- pH of the corrosive substance.

- **Concentration vs PH:** Concentration of the caustic, which is more important than pH, as zinc chloride and phenol are capable of producing severe burns even though they have near physiologic pH.

Manner of poisoning

Unintentional or intentional

Children:

- Unintentional (small amount)
- more frequent among children, so household products containing caustic substances must be of very low concentration (2%- 10%), and placed in child-resistant containers.

Adults

may be intentionally (large amount) or unintentionally exposed to household or industrial caustic products.

Clinical Manifestations

- Pain & burn + others

According to route of exposure:

- Ingestion (GIT manifestations)
- Inhalation (respiratory manifestations)
- Skin
- eye

Gastrointestinal tract

- **pain:** Immediate severe burning pain in the lips, mouth, throat, esophagus and stomach.
- **Mouth:** lips, mouth, throat, pain & burns (the lips with the adjacent cheeks, the chin and neck are stained by corrosion. The fingers may also be burned)
- **Larynx:** chocking (laryngeal edema)
- **Esophagus:** dysphagia (difficult swallowing due to edema) and odynophagia (painful swallowing) with drooling of saliva (important in infants).
- **Stomach:** pain & Severe vomiting. At first, the vomitus is gastric contents, then it is dark in color due to the formation of alkaline or acid hematin, mixed with shreds of gastric mucosa (hematemesis).
- **Intestine:** Abdominal pain, constipation (alkalis cause diarrhea).

Respiratory tract

- **Cause:** through direct inhalation of fumes of corrosive gases (e.g., chlorine and ammonia) or aspiration of vomitus.
- **Upper respiratory tract injury:** Epiglottitis, stridor since the glottis itself is likely to become edematous and corroded. Laryngeal edema leading to choking and dyspnea.
- **Lower respiratory tract injury:** Pneumonitis, and noncardiogenic pulmonary edema.

Eyes: eye damage (superficial or deep??)

- Alkalis produce keratitis with eventual deep penetration that may lead to perforation and blindness.
- Acids result in coagulative necrosis that tends to prevent further penetration into deeper layers of the eye.

Skin (chemical burn):

- Immediate pain and redness, followed by blistering to **full thickness burn.**
- **Burn color** may be characteristic as:

✓Charring in sulphoric acid: is highly hygroscopic, it absorbs water from the tissues leading to their charring

✓Brown color in phenol.

Diagnosis

1- history of exposure

2- characteristic clinical findings of skin, eye, or GIT.

3- investigations:

- **Lab:** Evaluation of blood pH, blood group, hemoglobin, coagulation parameters, electrolytes, and urinalysis.
- **Tool:** to detect extent of damage in GIT (ulcer to perforation)

a. **Chest and abdominal radiographs** to detect gross signs of esophageal or gastric perforation (pneumomediastinum, pneumoperitoneum, and pleural effusion).

b. **CT** is considerably more sensitive for detecting viscous perforation.

c. **Endoscopy.**

Treatment

I- Initial stabilization and supportive measures (ABCDs):

- Careful attention to signs and symptoms of respiratory distress.
- Blind nasotracheal intubation is absolutely contraindicated.
- Large-bore intravenous access and volume resuscitation.

II- Decontamination: according to exposure

Skin and eyes: Irrigation with a copious amount of water for 15-30 minutes to remove any residual caustic material. Then referral to specialists.

Inhalation:

- Remove the patient from exposure.
- Give supplemental oxygen if available.
- Anti-edematous inhalation (pulmecort or adrenaline nebulizer).

GIT decontamination

Do

Dilutional therapy:

- ***Small amount*** of water or milk to drink, in a dose, of 240 ml in a 70 kg adult.
- **A child** who refuses to swallow oral liquids should never be forced to do so.

Do not

- Induced emesis as the poison is already expelled off through the severe vomiting (organic acid corrosives are exception).
- Activated charcoal.
- Gastric lavage is absolutely avoided and it is fatal especially with alkalis and unknown caustic ingestions for risk of perforation. It is only indicated in organic acids poisoning
- Cathartics.
- Neutralization therapy, as it has the potential to worsen the tissue damage by *forming gas and generating excessive heat.*

- **Milk** is the treatment of choice as it dilutes the acid and acts as a demulcent that protects and soothes the mucosa of the esophagus and the stomach.
- **Water** can be used for dilution but milk is preferred because water produces some heat when added to the concentrated acid as H_2SO_4.
- Olive oil also can be used as demulcent

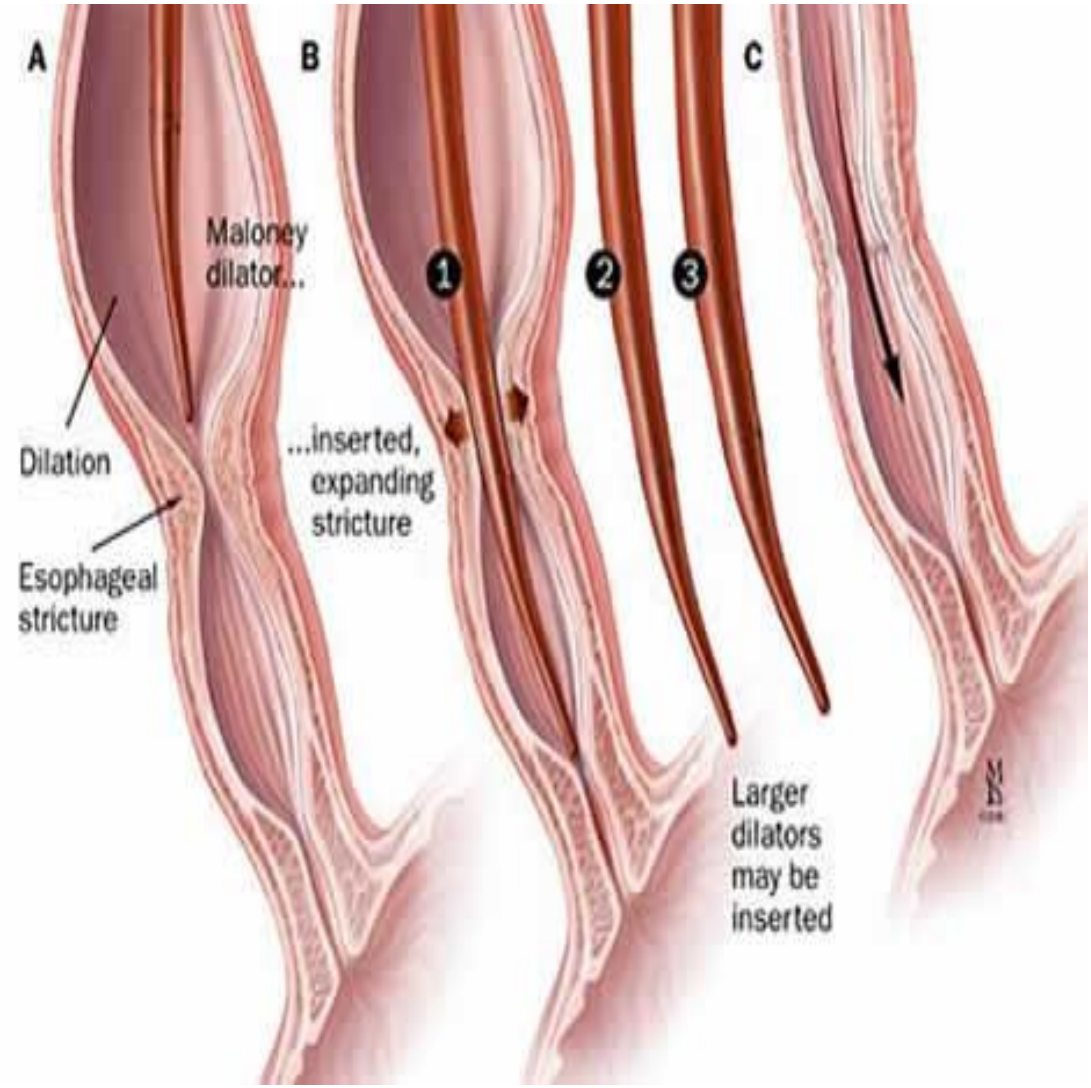
Remember, no thing oral except small amount of milk

Symptomatic treatment

- **Pain:** Analgesics, antacids, H2-blockers and proton pump inhibitors.
- **Burn:** Antibiotics are used for infections, and for patients receiving corticosteroids.
- **Edema:** Patients with signs of airway edema (especially from alkali) benefit from dexamethasone 10 mg IV in adults, and 0.6 mg/kg in children.
- **Healing complication (scar):** Corticosteroids were used in the past for reducing scarring, but this treatment has been proved ineffective and they inhibit resistance to infection.

Surgical management:

- Perforation: Immediate operative intervention in hemodynamic instability associated with clinical evidence of perforation, or extensive areas of necrosis.
- Surgical intervention may include laparotomy or Laparoscopy for tissue visualization, resection, and repair of perforations.
- Stricture: Long term dilatation therapy or stent for esophageal stricture.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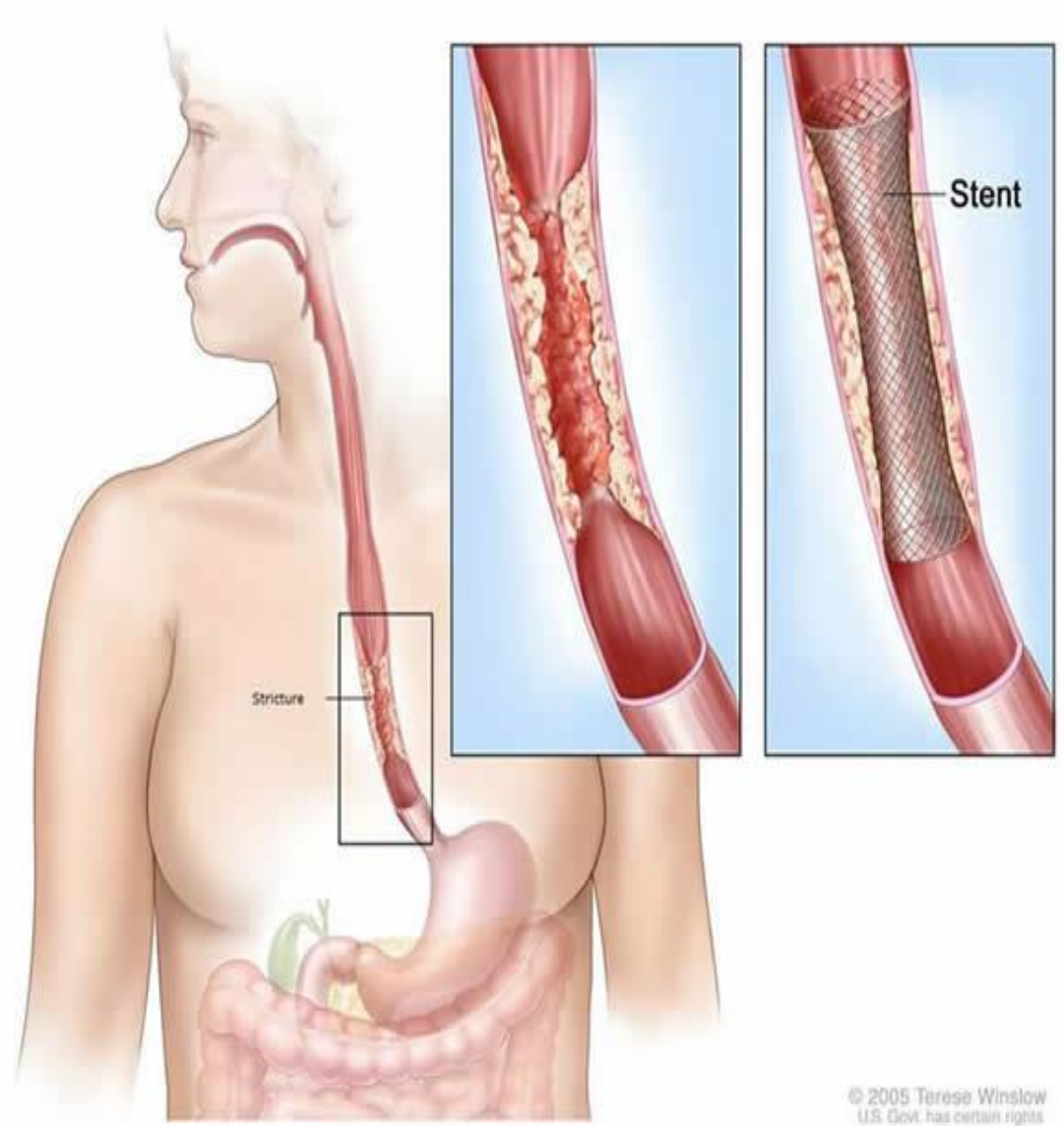
Stricture
Stent
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Organic acids

Carbolic Acid (Phenol)

- Phenol is one of the oldest antiseptic agents which has a characteristic odor

Has both local and remote action

- local: coagulative necrosis, pain (minmum) & burn (brown)
- Systemic: coma, hypotension, dysrhythmia , renal failure, methemoglobinemia.

Treatment:

I- Emergency and supportive measures (ABCDs):

- 1. Maintain an open airway, assist ventilation and administer supplemental O2.
- 2. Consult a gastroenterologist for endoscopy.

II- Decontamination: Gastric lavage using olive oil as it dissolves phenol and hinders its absorption. Olive oil should be left in the stomach to retard the subsequent absorption of any remaining phenol. Magnesium sulphate could be left in the stomach to precipitate the poison as Mg sulphocarbolate.

III- Enhanced elimination (hemodialysis) is generally not effective because of the large volume of distribution of this lipid-soluble compound, but it may be indicated if renal failure occurs.

IV-Symptomatic treatment:

- 1. Coma, seizures, hypotension, and dysrhythmia should be managed.
- 2. If methemoglobinemia occurs, administer methylene blue.
- 3. Management of esophagitis and long term follow up for esophageal stricture may be indicated.

- **Oxalic Acid:** It is found in bleaches, metal cleaners and in many plants especially citrus fruit and rhubarb leaves.
- Treatment:

a) Ca

- Local (in gastric lavage): It should be rapidly instituted by giving Ca lactate, lime water (Ca-hydroxide) and/ or milk to supply large amounts of Ca in order to inactivate oxalate by forming an insoluble Ca oxalate in the stomach.
- IV: Ca gluconate should be given IV to prevent hypocalcemia.

b) Save kidney: Hemodialysis may be life saving to mange acute renal failure and will help to correct the hypocalcemia.

Acetic Acid

- - Glacial acetic acid is a strong irritant, although it is **less corrosive** than inorganic acids.
- - Vinegar is a 2% solution of acetic acid.
- Treatment: is the same as with inorganic acids. Tracheostomy may be needed for laryngeal edema.

Kerosene Poisoning

Kerosene

- petroleum distillates (hydrocarbon)
- Characters

✓Volatile (easily inhaled and aspirated)

✓Colorless (as water)

✓irritant liquid (local acting)

Manner of poisoning

Unintentional or intentional

Children:

- Unintentional (small amount)
- more frequent among children, They often ingest kerosene as it is a household product frequently stored in unmarked container or in soft drink bottles.

Adults

- may be intentionally (large amount) or
- unintentionally (Workers) with occupational exposure through dermal or inhalation of its vapor, usually in a chronic form.

Mechanism of toxicity

Local acting poison: irritant

When ingested: irritate

- **stomach:** vomiting then aspiration
- **Airway:** cough & stridor
- **Lung:** alveolar damage (chemical pneumonitis)

Clinical Manifestations

- GIT
- Respiratory
- CVS (in workers)

GIT symptoms

- Irritant as corrosive but mild and self –limited.
- **Mouth & pharynx** (as corrosive but mild) Initial mouth and pharyngeal irritation and burning, then hyperemia with inflammation and superficial ulceration.
- **Stomach:** Vomiting with smell of kerosene in vomitus, abdominal pain, distension,
- **Intestine:** diarrhea.

Pulmonary manifestations:

- Characteristic smell of kerosene in breath. في الحال

Pulmonary manifestations may be caused by:

a) Inhalation of vapors: A transient gasping, cough or cyanosis. في الحال
b) Aspiration of vomitus: Prolonged cough, gasping, or choking usually appears within 30 minutes of exposure. بعد 30 دقيقة

- Aspiration should be hospitalized as it progress to chemical pneumonitis بعد 24 ساعة وممكن تستمر اسبوع

chemical pneumonitis

- progress over 24 hours, reach a plateau, and subside over 2- 8 days
- Signs involve:

a) Generally (fever): often present early, due to direct tissue toxicity, and usually disappears by 24 hours. Persistence of fever beyond 2 days should suggest a bacterial superinfection (bronchopneumonia).

b) Local (difficult breathing or signs of respiratory distress)+ signs of brain hypoxia

-**Mild :** tachypnea, irritability, and drowsiness.

-**Moderate:** grunting respirations, lethargy, or flaccidity.

- **Severe:** intercostal retractions associated with ronchi and wheezes, cyanosis, coma, or seizures.

Cardiac symptoms:

- Tachycardia, severe atrial and ventricular dysrhythmias.
- Sudden cardiac arrest has been associated with kerosene inhalation.

Treatment:

I. Emergency stabilization of the patient (ABCDs):

- Supplemental oxygen if there is any evidence of respiratory distress.
- Selective β2-adrenergic bronchodilators for bronchospasm (e.g., albuterol).
- Intubation and ventilatory assistance for respiratory failure.

GIT decontamination

Do

1- Contaminated clothes should be removed and skin should be washed with soap and water, especially in children.

2- Gastric lavage :

- large ingestion of > 1 ml/kg) or if dangerous additives (pesticides,

- after introduction of cuffed endotracheal tube to prevent aspiration.

Do not

- ***gastric lavage*** *for fear of aspiration (in small ingestion).*
- *syrup of ipecac*
- *Activated charcoal is not effective and may cause aspiration*
- ***No thing oral is the rule.***

Symptomatic treatment

- **Pain:** Analgesics, antacids, H2-blockers and proton pump inhibitors.
- **Burn:** Antibiotics are used for infections, and for patients receiving corticosteroids.
- **Chemical pnemonitis:** Corticosteroids may be used cautiously to treat chemical pneumonitis, as they may affect the immunity of the patient predisposing to infection

Prevention of household poisoning

- Educate the parents to keep toxic substances out of reach of children.
- Familiar bottles or containers should not be used for storage of such products.
- Safety closure for the products containing toxic materials.