

Ingestions of Household Products

Morning Report

May 1, 2006

“Dr., my child just ingested bleach, what should I do”?

Questions to ask...

- What type of bleach?
- **Household bleaches (clorox) are relatively mild (pH <11) and do not usually cause significant injury**
- How much was ingested?
- What did the child do after the ingestion?
 - Cough, gag, vomit, choke?
- How is the child acting now?
- Any physical signs of injury? (i.e. oral ulcerations, drooling, respiratory distress..)

**“Dr., my child just ingested
Drano, what do I do?”**

- How much did he/she ingest?
- Drano is an example of what type of corrosive ingestion?
- **Alkaline corrosive ingestion**
- The mom asks if she should use ipecac. What do you tell her?
- **No! Induction of emesis is contraindicated b/c it can cause further mucosal injury to the esophagus**

- **The mother reports her child appears o.k. now and does not have any sores visible around or in her mouth. She asks if her child needs to still be evaluated?**
- **Yes! Clinical manifestations of corrosive ingestions are poor predictors of extent of esophageal injury**

- **The child is now in the emergency room. The resident tells you his assessment/plan. Do you agree?**
- **IVF, NPO**
- **Yes, NPO until endoscopy to determine extent of injury**
- **CXR, BMP, ABG**
- **Yes, to evaluate for signs of perforation, aspiration, acidosis, hypoxia**
- **NGT placement**
- **No. Blind placement of NGT is contraindicated due to risk of perforation**
- **Activated Charcoal**
- **No. AC has poor adsorption to acids and alkaline solutions and interferes with endoscopy**

“Dr., my child just ingested toilet bowl cleaner, what should I do?”

- How much was ingested?
- Toilet bowl cleaner is what type of corrosive ingestion?
- **Acidic corrosive ingestion**
- The mom asks if she should give her child water or milk to dilute the corrosive agent, what do you recommend?
- **Diluting agents such as milk or water are not recommended b/c a large volume is needed to actually dilute the acid or alkaline ingestion. This may lead to vomiting and further progression of the injury**
 - **Exception→ household bleach which is relatively mild and at low risk of causing mucosal injury**

“Dr., my child just ingested a small amount of furniture polish, should I be worried?”

- What type of ingestion is this?
- **Hydrocarbon ingestion**
- What is the primary organ affected by hydrocarbon ingestion?
- **Lung- via aspiration (also CNS, GI, and CV)**
- The mom has ipecac in the home, should she use it?
- **No! Induction of emesis or gastric lavage is contraindicated b/c it will increase risk of aspiration**
 - If necessary (very large volume, contains toxic additives), secure airway w/ cuffed ETT

PREP 2005

You are examining a 2-month-old infant who does not yet roll over. Results of physical examination and developmental assessment are normal. The parents are concerned about home safety issues.

Of the following, the MOST appropriate time to discuss the storage of poisonous substances with this infant's parents is

today

at the 4-month visit

at the 6-month visit

at the 9-month visit

at the 12-month visit

The most appropriate time to discuss the storage of poisonous substances is at the **6-month health supervision visit**. Prior to 6 months, an infant usually is not sufficiently mobile to be at risk for poisoning. The physician should not wait until the 9-month or 12-month visits because by those ages, most infants already are mobile enough to gain access to poisons that are stored in cabinets at floor level and to open cabinet doors.

Parents can help protect their children further from poisoning by purchasing medicines that have childproof caps and keeping the phone number of their local poison control center easily available. Poison control centers often are much better resources than a 911 operator or a personal physician for the initial management of a suspected poisoning.

Although parents used to be advised to have ipecac in the home for emergency use, the American Academy of Pediatrics no longer recommends this. Research has shown that even when ipecac is administered immediately after the ingestion of a substance, it does not remove the substance completely from the stomach. Adverse effects include persistent vomiting, lethargy, and diarrhea. Another shortcoming of home ipecac therapy is that continued vomiting may result in the child being unable to tolerate other orally administered poison treatments, such as activated charcoal.

Corrosive Ingestions

Corrosives are concentrated **acid, alkaline** or oxidizing agents

Boys > Girls

Ages 1-5 years most common (peak age 2)

1.5 million toxic exposures in children (2002)

Alkaline agents >> Acidic agents

alkaline agents are often tasteless

Signs and Symptoms

Oral

Burns/ulcers

Drooling

Gastric

Retrosternal pain

abdominal pain

Hematemesis

Esophageal

Dysphagia*

Delayed transit

Loss of motility

Upper Airway

Stridor

Hoarseness

Nasal flaring

Retractions

Signs of epiglottitis

Oral Lesions



Common ingestions

Acidic agents

Toilet bowl cleaners

Battery Fluids

Swimming pool products

Rust removal products

Metal cleaners

Alkaline agents

Drain cleaners (Drano)

Laundry and dishwasher
detergents

Bleaches

Cleaning agents with
phosphates or ammonia

Button or disc batteries

Bleach (sodium hydrochlorite)

U.S. Household bleach

(3-6% Na hydrochlorite)

Minor mucosal erosion may occur which *can* be diluted with water or milk

Industrial strength

Higher concentration of sodium hypochlorite

More corrosive and can be associated w/ severe injury

Alkaline injury

Liquefaction necrosis = more extensive injury

Early disintegration of the mucosa

Deep penetration or perforation

Extent of injury varies with concentration and length of time agent is in contact with mucosa

pH > 11 causes most severe burns

Circumferential injury almost always results in stricture formation

Acidic injury

Coagulation Necrosis

Depth of penetration limited by eschar formation

Alkaline pH and squamous epithelium of the esophagus and pharynx are relatively resistant to coagulation necrosis

Gastric injury is more common

Acids burn top layers of skin and children are more likely to stop drinking these substances quickly

Upper airway injuries occur from gagging/choking

Esophageal Injury

Acute injury More common with bases	1st day
Delayed injury Vascular thrombosis and inflammation	1- 7 days later
Granulation tissue Weakening of esophageal wall (high risk of perforation)	10-21 days later
Esophageal fibrosis and stricture	3-6 weeks later

Predictors of Esophageal Injury

Clinical manifestations of caustic ingestions are poor predictors of the extent or depth of esophageal injury

In 378 caustic ingestions:

12% with no symptoms had severe burns

82% with symptoms had minimal or no injury

(Gaudreault P. Pediatrics 1983)

In a review of 489 cases,

45% without oral burns had no esophageal burns

54% with oral burns had esophageal burns

(Wason S. J Emerg Med 1985)

Grading of Esophageal Burns

First Degree: superficial edema and erythema

Second Degree: linear ulcerations, hemorrhage,
blisters involving mucosa and submucosa

Third Degree: circumferential injury; full-thickness
injury with or w/out perforation
associated with high likelihood of stricture formation

Gastric Injury

Less common than esophageal injury

More common & severe with **acids**

Alkaline solutions may be neutralized by acidic gastric pH and cause less injury

Sites of injury: **distal stomach** (antrum & pylorus)

Injuries include: Pyloric burns and obstruction, duodenal erosion, gastric perforation, hemorrhage

Upper Airway Injury

Usually seen soon after ingestion

Can have a 1-2 hour delay of symptoms
(powdered detergents)

Symptoms include hoarseness, stridor,
Dyspnea, signs of epiglottitis

Treatment: *Do's & Don'ts*

Induction of emesis → NO!

not indicated because of potential of further injury from gastric contents

Neutralizing agents → NO!

not indicated because of heat injury during reaction

Dilution with ingestion of fluids → NO!

not indicated because of volume needed, possible induction of emesis, or presence of airway edema

Activated Charcoal → NO!

No role for AC because of poor adsorption and interference w/ endoscopy

NG tube

blind placement of NGT is contraindicated-risk of perforation

Treatment of Choice

Observation/NPO

Upper endoscopy within 48 hours (flexible endoscope preferred)
early (< 6 hours post injury) may not reveal injury
late (> 4 days) increases risk of perforation

NGT placement during endoscopy if extensive burns present
May need gastrostomy tube if extensive esophageal injury

Barium contrast studies **1-3 weeks later**

Esophageal dilation for strictures (repeated dilations usually needed)
esophagectomy w/ colon interposition if unsuccessful

Treatment: *other considerations*

NPO recommended until endoscopy

PO acceptable if 1st degree or mild 2nd degree burn

More extensive injury- delay PO until after acute phase is completed (~1-2 weeks). TPN often needed

Prophylactic Antibiotics

may help prevent stricture formation in 2nd and 3rd degree burns

H2 blockers or PPI

may decrease secondary damage due to reflux into injured esophageal tissue

Controversial Treatment: *Corticosteroids*

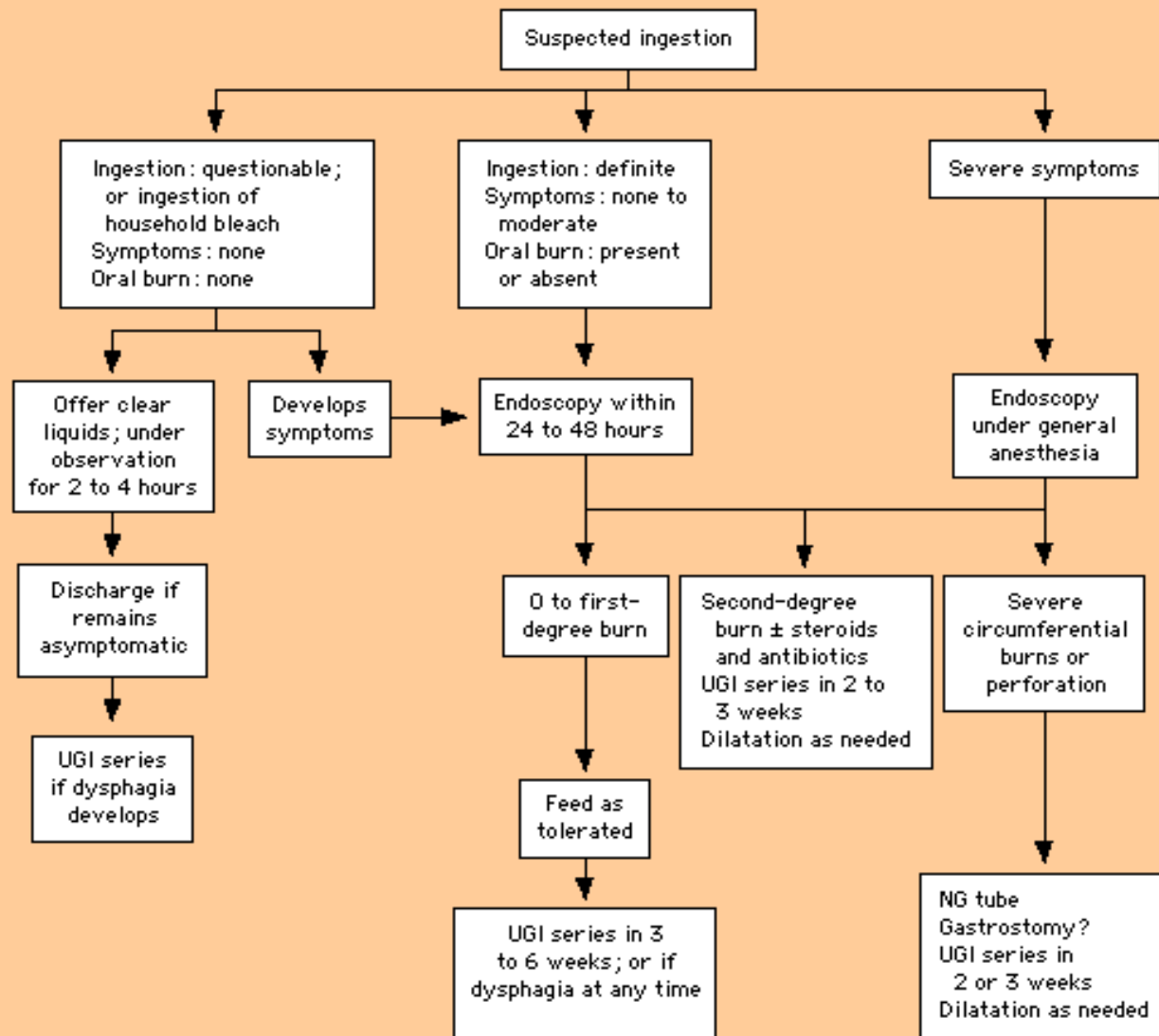
Should only be used with *alkaline* ingestions, if at all
prevented esophageal scarring in animal
models

may prevent stricture formation in 1st and 2nd
degree burns?

stricture formation appears to be related to
extent of caustic injury

*most 3rd degree burns progress to stricture
formation regardless of treatment*

Evaluation of Ingestion of Caustic Substances†



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Hydrocarbon Ingestion

Organic substances that contain carbon and hydrogen

Liquids at room temperature

Four classes of hydrocarbons: **aliphatic**, aromatic, halogenated and terpene

Toxicity mainly occurs via **aspiration or inhalation**

Determinants of toxicity: *high* volatility, *low* surface tension and *low* viscosity associated with greatest toxicity (furniture polish > motor oil)

Hydrocarbon-containing Products

Cosmetics

Baby oil

Hair oils

Body/bath oils

Sunscreens

Make-up removers

Nail polish

Automotive products

gasoline

Fuel injection cleaners

Carburetor cleaners

Cleaning Solvents

Furniture polish

Spot removers

Metal cleaners

paint removers/thinners

Other

Water repellents used for decks,
shoes, sports equipment

glues

Many of these products are used for inhalant abuse by teenagers

Clinical Manifestations

Lung: primary organ involved

~0.2cc is needed during aspiration or inhalation to cause pulmonary problems

“creeping phenomenon” of low viscosity HCs produces pulmonary edema, necrotizing pneumonitis

Asphyxia ensues

pneumothorax, pneumatoceles common

symptoms of pulmonary insult include: burning in mouth, coughing, choking, tachypnea, cyanosis, odor on breath

clinical manifestations ususally increase over 24 hrs and resolve over few days (3-5 days)

Clinical Manifestations

CNS: somnolence, H/A, ataxia, lethargy, sz's occurs from direct hydrocarbon effects and due to hypoxia from pulmonary insult

GI: local irritation to GI tract, N/V, abd pain from direct insult to the mucosa

CV: cardiac arrhythmias can occur via sensitization to catecholamines (“sudden sniffing death”)

Hydrocarbon Toxicity: Management

Decontamination is an important part of therapy
remove clothing, wash skin/hair, flush eyes

Do NOT induce emesis or do gastric lavage

exception: very large volumes or HC contains other toxic materials (pesticides, heavy metals)

NO role for activated charcoal (poor adsorption)

Symptomatic pt → CXR/monitor ABG/admit

Asymptomatic pt → observe for 6-8 hrs

symptoms develop → admit

asymptomatic → discharge w/ close follow-up

Anticipatory Guidance

All household products should be moved up and out of reach of children

Corrosives should not be placed in unlabeled containers or food containers

Large labels/symbols of poison should be marked on the product and explained to children

Poison control number should be kept close to a phone: (800) 942-5969 (IL poison control)