

Clinical Toxicology

Initial Evaluation & Management of the Poisoned Patient (II)

Lec. 3 & 4

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University of Mustansiriyah/College of Pharmacy

Department of Pharmacology & Toxicology

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Objective of lecture:

Objective of this lecture is to identify certain methods used to prevent gastrointestinal absorption (gastrointestinal decontamination), & these are:

- gastric lavage,
- oral administration of activated charcoal,&
- whole bowel irrigation.

Orogastric lavage:

Lavage (Fr. laver = to wash) is a process of washing out the stomach with solutions, including water, saline, & sodium bicarbonate.

The technique of performing orogastric Lavage

A. Select the correct tube size:

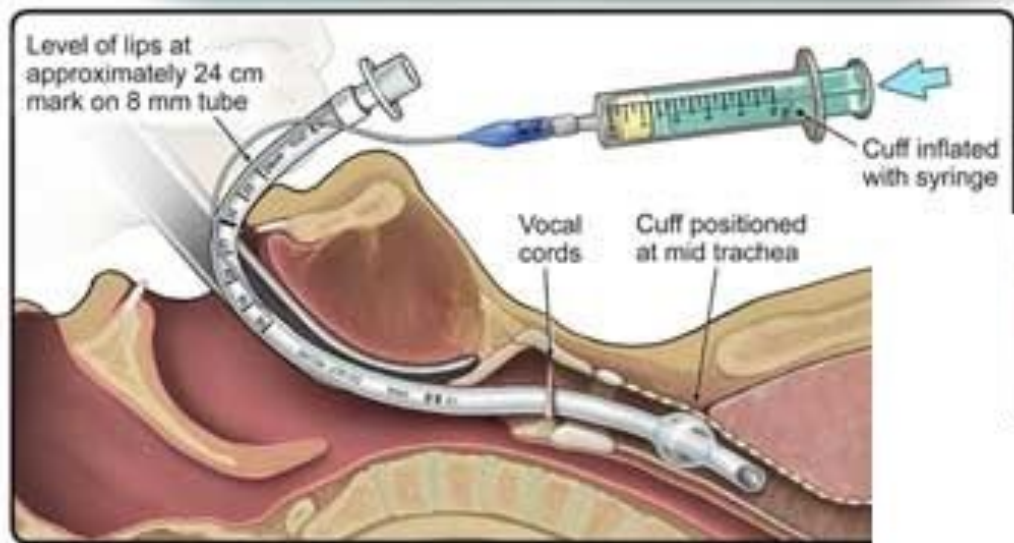
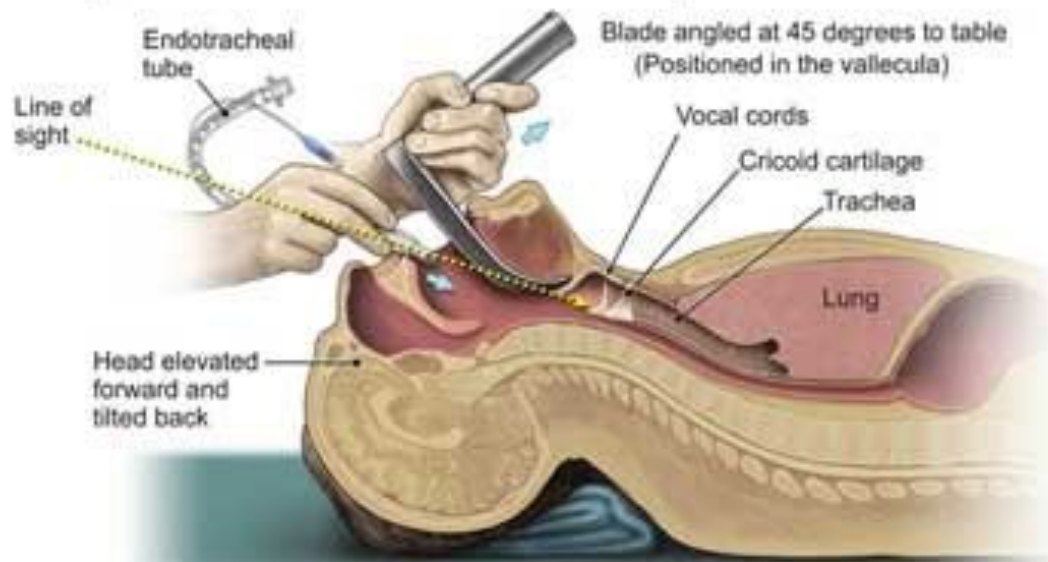
Adults: 36–40 French

Children: 22–28 French

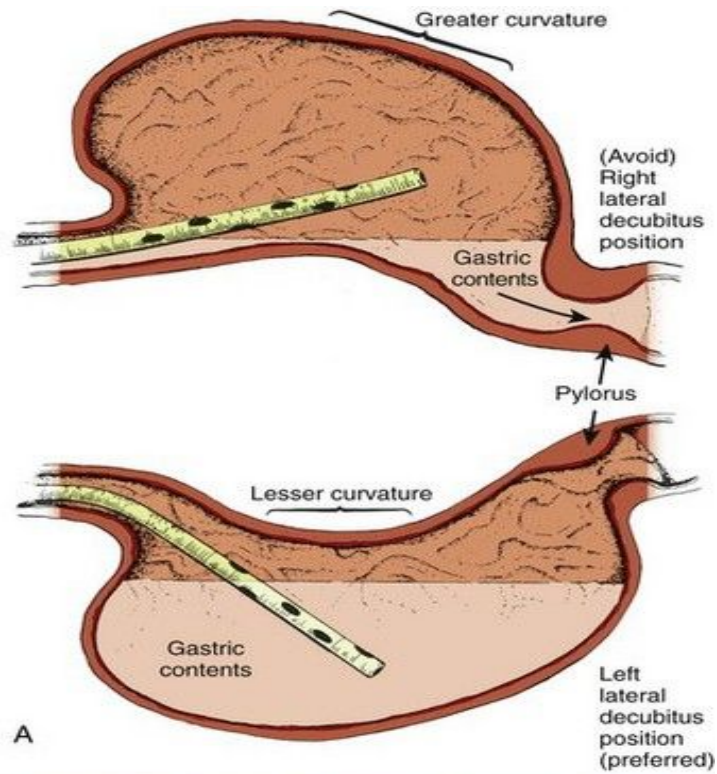
B. Procedure:

1. The patient's airway should be protected by intubation, using a cuffed endotracheal or nasotracheal tube. Intubation should precede gastric lavage in the unconscious patient.

Proper Intubation Technique



2. The patient should be kept in the left lateral decubitus position. Because the pylorus points upward in this orientation, this positioning theoretically helps prevent the xenobiotic from passing through the pylorus during the procedure.
3. Before insertion, the proper length of tubing to be passed should be measured & marked on the tube. The length should allow the most proximal tube opening to be passed beyond the lower esophageal sphincter.



The preferred position for gastric lavage

4. After the tube is inserted, it is essential to confirm that the distal end of the tube is in the stomach.
5. Any material present in the stomach should be withdrawn and immediate instillation of activated charcoal should be considered for large ingestions of xenobiotics known to be adsorbed by activated charcoal.
6. In adults, 250 mL aliquots of a room-temperature saline lavage solution is instilled via a funnel or lavage syringe. In children, aliquots should be 10 to 15 mL/kg to a maximum of 250 mL.

7. Orogastric lavage should continue for at least several liters in an adult & for at least 0.5 to 1.0 L in a child or until no particulate matter returns & the effluent lavage solution is clear.
8. After orogastric lavage, the same tube should be used to instill activated charcoal if indicated.

Contraindications to orogastric lavage:

- The patient does not meet criteria for gastric emptying (mentioned previously).
- The patient has lost or will likely lose his or her airway protective reflexes & has not been intubated. (After the patient has been intubated, orogastric lavage can be performed if otherwise indicated.).
- Ingestion of corrosives.
- Ingestion of a xenobiotic with a high aspiration potential (e.g., a hydrocarbon) in the absence of endotracheal intubation.

- The patient is at risk of hemorrhage or gastro intestinal perforation because of underlying pathology, or recent surgery.

Adverse effects of orogastric lavage:

Reported adverse effects of orogastric lavage include injury to the airway, esophagus, & stomach, as well as severe hypernatremia

Activated charcoal:

- For many years, orally administered activated charcoal (AC) has been routinely incorporated into the initial treatment of a patient poisoned by the oral route.
- The actual recommended dosing regimen for activated charcoal is:
 - 25 to 100 g in adults (1 g/kg of body weight), &
 - 0.5 to 2.0 g/kg of body weight in children.

- The results of in vitro studies show that the ideal activated charcoal-to-xenobiotic ratio varies widely, but a common recommendation is to deliver an activated charcoal-to-xenobiotic ratio of 10:1 or 50 to 100 g of activated charcoal to adult patients, whichever is greater. When calculation of a 10:1 ratio exceeds these recommendations, either gastric emptying or MDAC therapy should be considered.

- Time Factors:

Many authors state that administration of a single dose of activated charcoal should be considered if a patient has ingested a potentially toxic amount of a xenobiotic (that is known to be adsorbed to activated charcoal) within the previous hour.

In reality, many factors, such as the presence of food in the stomach, sustained-release formulations, & co-ingestions with anticholinergic or opioid properties delay gastric emptying. These factors increase the time frame for possible adsorption to AC.

Properties of activated charcoal:

Binds poorly to:

Elemental metals (lead, lithium, mercury)

Boric acid

Cyanide

Electrolytes

Ferrous sulfate

Pesticides (malathion, dichlorodiphenyltrichloroethane(DDT), N-methylcarbamate)

Petroleum distillates

Ethanol

Methanol

Mineral acids, alkali

Multiple oral doses useful with:

Carbamazepine

Dapsone

Digitoxin

Nadolol

Phenobarbital

Phenylbutazone

Theophylline

Contraindications & complications:

- Vomiting frequently complicates the administration of activated charcoal.
- Although rare, misplaced nasogastric tube leads to severe pulmonary complications & death. Administration of activated charcoal to already intubated patients is associated with a low incidence of aspiration pneumonia.
- Although relatively few reports of clinically significant emesis & pulmonary aspiration resulting from the administration of activated charcoal exist, the severity of these complications is clear.

Multiple-dose activated charcoal (MDAC):

MDAC is typically defined as more than two sequential doses of activated charcoal.

This technique serves two purposes:

(1) to prevent ongoing absorption of a xenobiotic that persists in the GI tract (usually in the form of a modified-release preparation), &

(2) to enhance elimination by either disrupting enterohepatic recirculation or by “gut dialysis” (enteroenteric recirculation).

The activated charcoal in the gut lumen serves as a “sink” for toxicants.

- Studies have demonstrated that MDAC increases the elimination of amitriptyline, dextropropoxyphene, digitoxin, digoxin, disopyramide, nadolol, phenylbutazone, phenytoin, piroxicam, & sotalol.

Dose:

- Initial dose orally or via orogastric or nasogastric tube:

Adults & children: 1 g/kg of body weight or a 10:1 ratio of activated charcoal to xenobiotic, whichever is greater. After massive ingestions, 2 g/kg of body weight might be indicated if such a large dose can be easily administered & tolerated.

- Repeat doses orally or via orogastric or nasogastric tube:

Adults & children: 0.5 g/kg of body weight every 4–6 hours for 12–24 hours in accordance with the dose & dosage form of xenobiotic ingested (larger doses or shorter dosing intervals may occasionally be indicated).

Whole bowel irrigation (WBI):

- WBI represents a method of purging the GI tract in an attempt to prevent further absorption of xenobiotics. This is achieved through the oral or nasogastric administration of large amounts of an osmotically balanced polyethylene glycol electrolyte lavage solution (PEG-ELS) that is not absorbed & does not lead to fluid or electrolyte imbalance.

- WBI cannot be applied safely if:
 - the GI tract is not intact,
 - there are signs of ileus or obstruction,
 - or there is significant GI hemorrhage or
 - patients with inadequate airway protection, uncontrolled vomiting, or
 - consequential hemodynamic instability that compromises GI function.

Cathartics:

- At present, there is no indication for the routine use of cathartics as a method of either limiting absorption or enhancing elimination.
- A single dose can be given as an adjunct to activated charcoal therapy when there are no contraindications & constipation or an increased GI transit time is expected.
- Multiple-dose cathartics should never be used, & magnesium-containing cathartics should be avoided in patients with renal insufficiency.

- Saline (meaning salt) cathartics, which include magnesium citrate, magnesium hydroxide, magnesium sulfate, sodium phosphate, & sodium sulfate, are used infrequently & cautiously in medical toxicology.
- Hyperosmotic agents, including sorbitol & lactulose, are also occasionally considered in poisoned patients.

Thank
you

