IN THE NAME OF GOD

POISONING IN CHILDREN

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INTRODUCTION

- Most pediatric ingestions are accidental and minimally toxic.
- Approximately 50% occur in children <6 yr old , with the highest number of exposure occuring in 1 and 2 yr olds
- In adolescents , poisoning is the 3rd leading cause of injury – related death.
- Although adolescents (age 13-19 yr) account for only about 12% of exposures ,they constituted much larger proportion of death.

APPROACH TO THE POISONED PATIENT

- Treat the patient , not the poison.
- Assessment:
  - General appearance
  - Breathing
  - Circulation
  - ABCDs
  - IV access and monitors

INITIAL ASSESSMENT

- Physical examination:
  - Mental status
  - Vital signs
  - Pupils(size , reactivity)
  - Nystagmus
  - Bowl sound
  - Skin

INITIAL ASSESSMENT

- Laboratory evaluation:
  - A basic chemistry panel (ele , renal function , glucose, blood gas)
  - Over dose of acetaminophen : AST ,ALT , INR
  - Anion gap , serum osmolality
  - CPK
  - B-HCG
  - Specific drug level !!!
  - Urine toxicology :rarely helpful

ADDITIONAL DIAGNOSTIC TESTING

- Cardiac monitoring or 12-lead ECG
- Chest xray : pneumonitis , FB, non cardiogenic pulmonary edema
- abdominal xray:
  - FBs
  - Radiopaque tablets
  - Drug pack in a body packer

SECONDARY ASSESSMENT

- Past medical history
- Obtain detail history of the amount and time of ingestion
- May need to search the home
- Events prior to presentation

PRINCIPALES OF MANAGEMENT

- Supportive care
- Decontamination
- Directed therapy
- Enhanced elimination

DECONTAMINATION

- Syrup of Ipecac :
  - *All published statements in favor of Abandoning the use of ipecac*
- Gastric lavage :
  - *No longer recommended*

DECONTAMINATION

- single dose Activated charcoal
- Ineffective in some ingestions:
  - Alcohols
  - Caustics: alkalis and acids
  - Heavy metals : (e.g., lead)
  - Hydrocarbones
  - Iron
  - lithium

ACTIVATED CHARCOAL

- Recommended dose:

  infants: 1g /kg / dose po

  children: 1-2 g / kg /dose po(or 25-50 gr /dose)

  Adolescents and adult : 50 -100 gr po

- Sorbitol:

  infants and children : not indicated , due to risk for dehydration and ele imbalance

WHOLE BOWL IRRIGATION

- PEG(POLYETHYLENE GLYCOL):
- Useful for ingestions of iron,lithium, and sustained release perparations.
- DOSE : 35cc/kg /hr for small children and1- 2L/ hr for adolescents and adults.
- Administer for 4-6 hr or until effluent is clear.
- WBI is typically administerred by NG tube

DIRECTED THERAPY

- Antidotal therapy
- Intralipid emulsion therapy
  - CCB
  - TCA
  - Bupropion

ENHANCED ELIMINATION

- Multipledose activated charcoal (GI dialysis) :
  - 0/5 gr / kg every 4-6 hr for 4 doses
  - Contraindication: unprotected airway and concerning abdominal exam
  - Phenobarbital,theophyllin, carbamazepine, dapsone ,quinin

ENHANCED ELIMINATION

- Urinary alkalization :
  - Drugs that are weak acids :become trapped in the renal tubules
  - Continuous infusion of sodium bicarbonate – containing IV fluid
  - Goal of urine PH : 7/5 – 8
  - Useful in managing salicylate and MTX toxicity

ENHANCED ELIMINATION

- Hemodialysis:
  - Methanol
  - Salicylates
  - Ethylene glycol
  - Theophylline
  - Lithium
  - Valporic acid

OUR PATIENT ???

TODDLERS / PRESCHOOLERS

Accidental

ADOLESCENTS

Accidental

Suicidal

show of

CASE # 1

- The patient is a 14 year old girl who is brought to ER after she tells her mother " I took as much acetaminophen as I could"
- Ingestion occured 2 hr prior
- Denies other ingestions or medication use

PHYSICAL EXAM

- The patient is alert , orient to TPP , nauseated , mild abdominal pain
- VS :
  - HR: 90
  - BP:100 / 70
  - RR : 20
- EXAM : normal

ACETAMINOPHEN

- Most widly used pediatric analgesic on the markets
- Most common ingestion in toddlers , preschoolers and adoescents
- Normal cytochrome p-450 metabolism yeilds small amounts of free oxidants that are hepatotoxic
- In overdose free NAPQI (Highly reactive intermedite metabolite of APAP) is able to produce hepatocellular necrosis.

STAGES OF LIVER INVULVEMENT

- Stage 1 (4-12 hr)
  - Nausea, vomiting,diaphoresis, pallor,anorexia
- Stage 2 (24-72 hr)
  - Increasing LFTs,resolution of above symptoms
- Stage 3 (72-96 hr)
  - Peak LFT abnormalities, elevated PT time, liver failure
- Stage 4 (4 d – 2 wk)
  - Resolution of liver injury

DIAGNOSIS

- Toxic dose :
  - Children : 150 -200 mg /kg
  - Adults and adoscents : 7/5 -10 gr
  - Single dose or in 4 hr
  - In < 6y/o children : > 100 mg / kg /day in 72 hr

MANAGEMENT

- Charcoal 50 gr
- NAC therapy :
  - Proven to be very effective when given within 8-16 hours of ingestion
  - Loading dose (oral) : 140 mg / kg po
  - Maintanace dose : 4 hr after loading dose , give 70 mg /kg PO q4 hr for a total of 17 doses
  - IV continuous infusion:
    - 150 mg /kg iv over 1hr
    - 50 mg / kg iv over 4 hr
    - 100 mg / kg iv over 16 hr
- Cimetidine : 20-40 mg / kg / day IV q6hr for 24 hr

CASE 2

- 16 y/o boy brought by ambulance after a call from a parent who found our son unconscious at home.
- He was in the park with his friends 4 hrs ago
- His father, utters a few choice words and calls an ambulance

CASE PROGRESSION

- Unpon arrival the child has clumsy movement with a decreased level of consciousness
- Vital signs : HR:120 , RR :20 , BP: 80/50 , T: 37/4
- GCS : 6/15 pupil : nl size he smells of alcohol
- What class of toxin has this child ingested?

CASE DISCUSSION: ALCOHOL

- ETHANOL
  - Hypoglycemia,acidosis (respiratory or metabolic)
- Methanol
  - Blindness, high osmolar gap , metabolic acidosis , hyperglycemia
- Ethylene glycol
  - Renal failure (ca-oxalate crystals) ,osmolar gap, metabolic acidosis

CASE PROGRESSION

- Patient had mild metabolic acidosis which resolved with hydration
- Normal BS
- O2 SAT :95% without O2 therapy
- Now what???

MANAGEMENT

- Charcoal??? NO!!!
- Intubation ??
- Hemodialysis ?
- PICU admission ?

CASE 3#

- 3 y/o boy who drank from a soda bottle containing gasoline
- Cried immediately,gagged and coughed, and then vomited
- Alert and crying, HR: 122 , RR :24 , BP : 90/60
- What do you do ?

HYDROCABONES

- Hydrocarbons include gasoline, kerosene, lamp oil, lighter fluid, paint thinners and removers, and motor oil. Young children may unintentionally ingest these fluids.

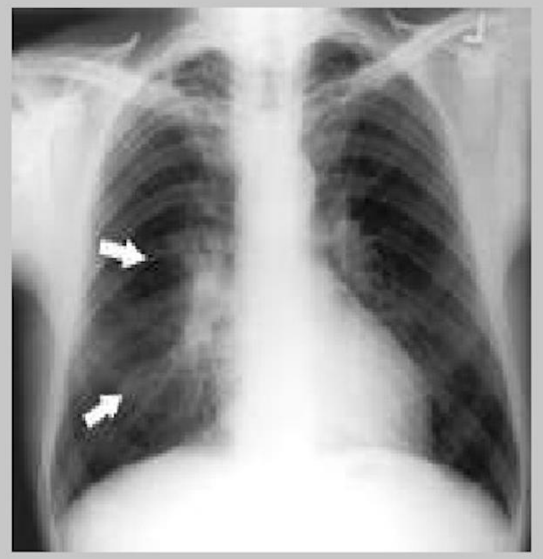
- Exposure to these poisons can affect the respiratory and central nervous systems.

MANAGEMENT ISSUES

- Admit all symptomatic patients and obtain ABG,EKG, and CXR
- Absence of symptoms for 4-6 hr after ingestion makes chemical or aspiration pneumonitis unlikely (CXR and pulse oximetry 6hr after ingestion seems resonable)

- Charcoal ?? NO!!!
- Prophylactic AB ??? NO !!!
- Washing??? NO!!!

KEROSEN POISONING



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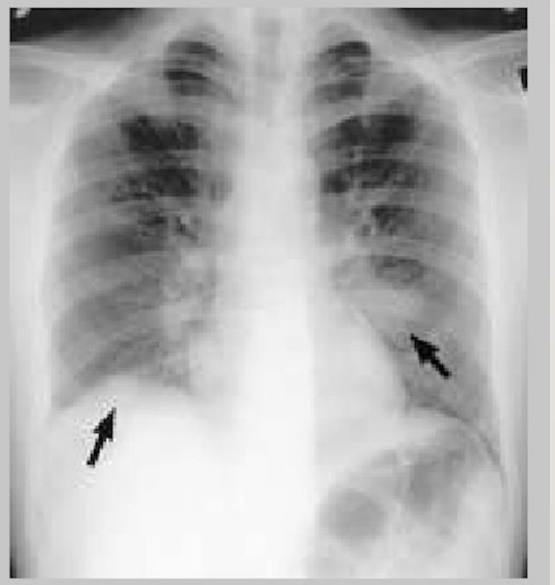
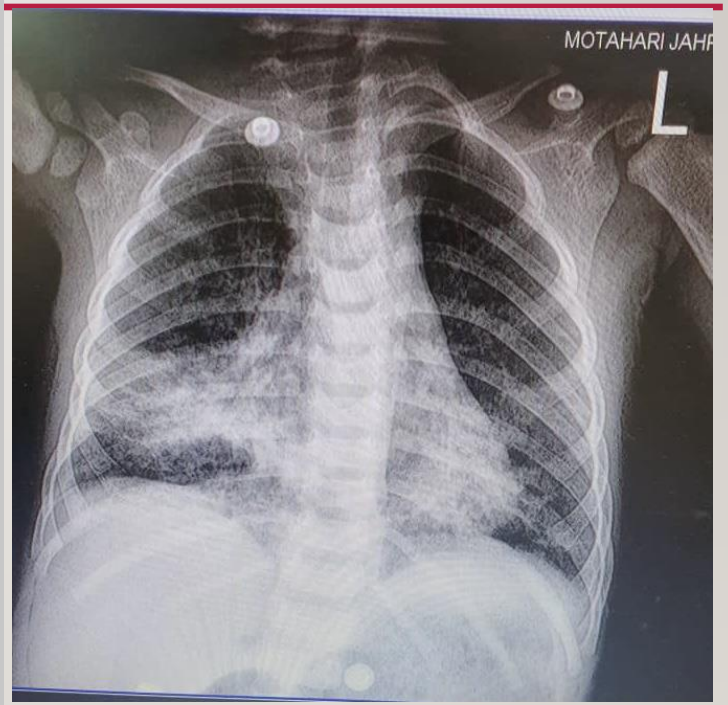


Bi-basal infiltration



CASE 4#

- A 5 Y/O girl was at school when she developed :
  - Nausea
  - Vomiting
  - Abdominal pain
  - Bloody diarrhea
- Patient report that she ate some of her mothr's pills 2 hrs ago
- The bottle had contained 30 pills of ferrous sulfate ,and is now empty

CASE PROGRESSION

- Patie is alert , orient to TTP , mild abdominal tenderness
- RR :22 HR : 110 , T :36/6 BP: 80/50
- The pt is deydrate (mild)

DISCUSSION: IRON

- Toxic exposure is based on elemental iron load

- Dose of elemental iron in children and adult preparation:
  - Children : 7-15 mg /cc (syrup) -65 mg per pill
  - Adults : 44mg – 65 mg per pill

IRON

- Toxic dose in children :
  - 10- 20 mg / kg of elemental iron : may show signs of toxicity
  - > 50 mg / kg : serious toxicity is likely
  - >100 mg / kg : lethal dose

CLINICAL PRESENTATION

- Phase 1 (first 6hr) :
  - Vomiting , diarrhea , abd pain ,both hematemesis and hematochezia
- phase 2 (4-12 hr) :
  - Improvement in GI symptoms ,however the vital signs worsen(tachycardia,metabolic acidosis,etc)
- Phase 3 (12-24 hr) :shock stage
  - Shock , coma,seizure,coagulopathy
- Phase 4 (2-3 days):hepatotoxicity stage
- Phase 5 (2-6 wks) : GI scarring

MANAGEMENT

Abd X ray : iron tab are radio-opaque

MANAGEMENT

- Whole bowl irrigation :
  - 250-500 cc / hr (toddlers and preschoolers) 1-2 L/hr (adolescents)
  - Continue irrigation until the repeat radiographic findings are negative or rectal effluent is clear
- Deferoxamine:
  - Serum fe > 500 mcg /dl
  - Significant clinical toxicity
  - Persistant xray findings despite GI decontamination
  - Dose :15mg/kg /hr for 6 hr

CASE 5#

- 8 y/o boy who playing outside and returened to his house with respiratory distress
- Her mother arrived and note him to be lethargic, diaphoretic , and in moderate respiratory distress

CASE PROGRESSION

- Physical exam reveals rales and wheezing in lung field with excessive oral secretions
- Lethargic with 1mm pupils
- Vital signs : HR: 50 , RR: 70,BP : 90/P,T:37/8 ,Wt :25 kg

CHOLINERGIC (ORGANOPHOPHATE)TOXIDROME

- Cholinergic agents inhibit acetylcholinestrase
- Clinical presentation:
  - Diarrhea
  - Vomiting
  - Bradycardia
  - Urination
  - Salivation
  - Miosis
  - bronchorrhea

MANAGEMENT

- Remove clothing –skin decontamination
- Gastric washing
- Charcoal
- Atropine: vagal block (for muscarinic symptoms)
  - Dries secretions,decreased bronchoconstriction and increases HR
  - DOSE: 0/03 – 0/05 mg /kg IV/IM/ET q10-20 min PRN to effect, then q 1-4 hr for at least 24 hr

MANAGEMENT

- Pralidoxime (for nicotinic symptoms) :
  - 20-50 mg /kg /dose (not to exeed 2 gr /dose)IV
  - Followed by 10 -20 mg kg hr IV continuous infusion for maintanance
  - Continue:
    - till the pt being asymptomatic for 24 hr
    - Or 12- 24 hr from last dose of atropine

CASE 6#

- 10 y/o girl brought to ER 3 hrs after ingestion of 4 packs of unknown pills
- Patient noted to be lethargic and tachypneic ,with adequate circulation
- Patient responds to physician's voice and there are no focal finding on neurological exam
- V/S : HR :140, RR: 60 and deep ,T: 39,BP : 90/70
- VBG: PH:7/25
  - CO2:25
  - HCO3: 10

SALICYLATES

- Metabolic acidosis with respiratory alkalosis =
- Salicylate toxicity until proven otherwise

CASE DISCUSSION

- Respiratory alkalosis
- Increased temp ,HR ,RR
- Alters plt function and BT
- Tinnitus
- Confusion,dilirium,psychosis may developed cerebral edema
- High anion gap metabolic acidosis
- Vomiting , hyperpnea, lethary

CASE DISCUSSION

- Toxic dose :
  - >150 mg /kg or >6/5 gr
- Management :
  - Urinary alkalization with sodium bicarb to maintain urine PH> 7/5 - 8
  - Hemodialysis :
    - Renal insufficiency
    - Refractory metabolic acidosis
    - Altered mental status
    - Acid – base and electrolyte imbalance despite appropriate therapy

CASE 7#

- You are called to visit a 13 y/o girl after her parents arrived home from work to find the pt unresponsive
- Positive history of psychiatric problem in the pt family

CASE PROGRESSION

- Ph exam :
  - T: 38 , HR: 160 with widened QRS on the monitor , RR : 25 , BP : 100 /55

- Pupils are dilated and reactive, skin is dry and flushed, and pt is responding to deep pain only

CASE DISCUSSION : TRICYCLIC ANTIDEPRESSANTS

- Clinical picture is anticholinergic intoxication , CNS depression and cardiovascular instability
- Mainsity of therapy is sodium bicarb in addition to supportive cares

MANAGEMENT

- Charcoal 50 gr after airway secured
- Alkalinization with bicarb for hypotension, wide coplex tachycardia,VT,QRS widening(>110ms)
    - Multiple bolus doses of sodium bicarb,1-2 meq/kg may be needed to narrow the QRS to <110 ms
- Hypertonic saline and/or lipid emulsion : for refractory cases
- Hypotension: 1- hydration with 10-20 cc/ kg n/s
    - 2- sodium bicarb
    - 3-epinephrine and norepinehrine
- Seizure : benzodiazepins (phenytoin is contraindicated)

QRS DURATION

- QRS > 100 ms associated with seizure
- QRS > 160 associated with cardiac arrhythmia

CASE 8#

- 2 y/o boy who was found unconscious with empty bottle of grandma's drugs(antihypertensive ,CCB) at his side

- Multiple episodes of vomiting on transport to the hospital ,containing pill fragments

CASE PROGRESSION

- Vs : T : 37/5 , HR : 45 with 3rd degree heart block , RR : 12 , BP : 70 / 25

- Patient responsive to deep pain only , extremities cool with decreased pulses

CCB

- Specific agents include verapamil , diltiazem , nifedipine , amlodipine
- Morbidity and mortality result from cardiovascular collaps
- Verapamil and diltiazem are the most dangerous in overdose

MANAGEMENT

- Activated charcoal
- WBI for SR product in stable pt
- Calcium gluconate : help to overcome blocked ca channels
- High dose insulin euglycemia therapy : antidote of choice:
  - An initial bolus of 1 unit/kg R/I
  - Followed by an infusion 0/5-1 unit/kg/hr
- IV fluid boluses and vasopressors
- Intralipid

THANKS FOR YOUR ATTENTION