Toxicology

Opioids

- Toxidrome : CNS depression. Respiratory depression. Miosis.
- respiratory acidosis
- Sensorineural hearing loss. other than opioids: gentamycin, aspirin and Lasix
- Pruritus/ Urticaria and Flushing
- **Antidote**: **Naloxone** (never oral)
- to manage Opioid withdrawal? METHADONE , once daily.

Benzodiazepine

- enhance GAPA , release CL which affect the action potential.
- Most important indication is :seizures
- metabolic acidosis
- Antidote: **Flumazenil**

ACETAMINOPHEN = Paracetamol= APAP

- child: therapeutic dose 10-15mg/kg , toxic dose in child is 150 mg/kg.
- Adults: therapeutic dose 325-1000 mg/dose , toxic dose : 7.5-10 g/dose
- NAPQI Is toxic
- Clinical manifestation:
  - Stage 1 : n/v, anorexia or asymptomatic
  - Stage 2 : RUQ pain, elevation of: PTT, INR, bili & liver enzymes
  - Stage 3 : Hepatic fulminant , acidosis,hypoglycemia
  - Stage 4 : Resolution or if symptoms not improved it is indication for liver transplantation
- Serum APAP level should be measured **between 4 and 24** hours after ingestion not before 4h , the value evaluated according-to the Rumack-Matthew nomogram : Any level below the solid line > pt is unlikely to develop hepatic toxicity >u can discharge him. If above the solid line >treat him!
- Which lab test is the most sensitive for early detection of hepatotoxicity? AST
- Antidote: **NAC = Mucomyst** , within 8-10h
- AC : within 1h.

Iron

- Normal serum iron levels: 50 to 150 micg/dL (<20)
- free (unbound) iron in the serum which is toxic.
- How to calculate toxic dose? 60 mg\kg X weight in mg
- iron associated with 50% mortality (LD50) Reported to be 200-250
- Injury to the gastrointestinal mucosa
- It impaired cellular metabolism
- impairment of adenosine triphosphate (ATP) synthesis
- Five stage
- Antidote: **Deferoxamine** can use with pregnant women and turns the urine into “vin rose?” color

Lead

- Anemia , demyelination , Wrist drop and foot drop , fibrosis in proximal tubules , lead encephalopathy , cerebral edema
- basophilic stippling
- children : “lead bands” or “lead lines”
- Chelation Therapy : **Dimercaprol (BAL) , ethylenediaminetetraacetic acid (CaNa2EDTA), DMSA , oral d-penicillamine.**

Arensic

- severe hemolysis(anemia), GI symptoms, CNS and liver dysfunction , unilateral facial nerve palsy.
- Exchange transfusions and plasma exchange lines in the nails (**Mees**’ lines), **hyperkeratosis** of the palms and soles.
- **Intramuscular Dimercaprol (BAL)** is the preferred chelator inpatients ,**DMSA** given **orally**.

Mercury

- pneumonitis and ARDS.
- not absorbed by the gastrointestinal tract so ingestion does not normally lead to systemic toxicity
- Nephrotoxicity and skin changes.
- Chelation therapy: **Dimercaprol (BAL)** (inorganic only) , **DMSA** , **D-Penicillamine** .

Monoamine Oxidase Inhibitors (MAOIs)

- Old , a lot of complication
- Bind irreversibly to monoamine oxidase
- should avoid **tyramine** containing food
- **hypertensive crisis** (fatal).

Tricyclic antidepressants

- 7 MOA
- Both mitosis and mydriasis , hyperthermia, tachycardia, agitation, sedation,
- **ECG** change: sinus tachycardia, Prolonged QT interval, **Widening QRS interval**, Right axial deviation (RAD), Prominent R wave in aVR lead.
- **Plasma Alkalization (NaHCO3/hyperventilation) , Sodium load (NaHCO3 or 3% Saline)**

SSRIs

- Mainstay for treatment of depression
- safer in over dose
- QTc prolongation, Seizures
- SIADH at therapeutic doses (**hyponatremia** within 1 month)
- **Middle age guy** + seizure + hyponatremia = Amphetamine or on SSRI // **Elderly** +seizure + hyponatremia = hydrochlorothiazide until proven otherwise
- Serotonin syndrome : FEVER and HYPERRFLEXIA , the medication AT LEAST 5 WEEKS used , Consider **cyproheptadine**.

Beta-blockers

- decrease sympathetic except propanol
- occurs in 1 to 4 hours.
- Toxidrome : Bradycardia , Hypotension , Unconsciousness , Respiratory arrest or insufficiency, Mild hyperkalemia , Hypoglycemia is common in children
- **Propanol**: seizure, **wide complex tachycardia**, Treated with **sodium bicarbonate** .
- Crystalloid IV fluids , **Atropine** first line , glucagon

calcium channel blockers

- Most fatalities occur with verapamil
- Metabolic (lactic) acidosis; hyperglycemia (mild); **hyperkalemia** (mild), Flushing, Hypotension , diaphoresis .
- prolonged QRS or QT interval suggest bedpril
- IV fluid, Oxygen, Cardiac Monitoring , **IV calcium** first, **atropine** , bradycardia or heart block persists, the next step is a pacemaker.

Nitrates & Nitrites

- CI in MI patient using Viagra (phosphodiesterase PDE inhibitor)
- as vasodilators> **Hypotension** , give **IV fluids**.
- convert hemoglobin to methemoglobin "**methemoglobinemia**" (venous blood sample appears **chocolate brown**, and the skin appears blue) , give **IV methylene blue**.

Digitalis (digoxin)

- paralyzes the Na-K pump > **hyperkalemia**
- it's digoxin toxicity unless proven otherwise when there are any of them : **1-SLOW ATRIAL Fib (<30 bpm) 2-BIDIRECTIONAL VENTRICULAR TACHYCARDIA**
- ECG change , GI symptoms, blurred or colored vision, as well as neurological symptoms.
- Serum digoxin levels
- Antidote: **digibind** (Fab Fragments). severe hyperkalemia is indication for treatment with antidote

Blood test: Paracetamol, Aspirin, alcohol, digoxin

Done by : Afnan AlMalki