Case conference

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Discussion

CCB intoxication

Introduction

- Calcium flow
  - Cardiac automaticity
  - Conduction
  - Contraction
  - Vascular tone.
- CCBs are used in the treatment of hypertension, angina pectoris, cardiac arrhythmias, Raynaud disease, esophageal spam, pulmonary hypertension.

Clinical manifestation

- Normal or sustained released preparations
- Cardiovascular toxicities
  - Mild to moderate overdose:
    - Dihydropyridines: peripheral vasodilatation and reflex tachycardia.
    - Verapramil and diltiazem: varies degree of blockage of sinus automaticities and conduction.
  - Severe overdose:
    - Loss of selectivity.
    - Bradycardia and hypotension.

Clinical manifestation

- Pulmonary: respiratory depression, apnea, pulmonary edema, ARDS
- CNS: depressed mental status, seizure (uncommon)
- GI: Nausea, vomiting
- Metabolic: lactic acidosis, hyperglycemia, hyperkalemia.
- Dermatologic: flushing, diaphoresis, pallor, peripheral cyanosis

CCB v.s. digitalis

- Digitalis acute poisoning:
  - More nausea/Vomiting (usually first symptoms).
  - More hyperkalemia.
  - Markedly elevated digoxin level
  - SVT, varied AV block
- Chronic poisoning:
  - Hypo-K, Hypo-Mg, Hyper-Ca, diuretics, old age will ↑ digoxin toxicity
  - Drug level did not correlated with toxicity
  - More VT/VF
- Treatment difference:
  - Enterohepatic circulation
  - Phenytoin and lidocaine
  - Fab fragment

CCB v.s. β-blocker

- Same as CCB:
  - bradycardia and hypotension
- β-blocker:
  - More CNS effect (β_3 -R)
  - More diversity in ECG, including VPC, bigeminy, VT/VF, torsades de pointes
  - Bronchospasm
  - Hypoglycemia
- Treatments are similar.

Management

- Treat bradycardia and hypotension as ACLS guildline.
  - Atropine alone has less effect.
  - Isoproterenol 2-10 μg/min.
- Calcium salts:
  - 10% Calcium chloride 10-20ml iv in 5-10 min, then 5-10 ml/hr. (optimum dose is unknown)
  - Calcium level does not related to mortality, suggest <14 mg/dL.

Management

- Glucagon 0.05mg/kg q10min, up to 0.15mg/kg, then 0.075-0.15mg/kg/hr.
  - Vomiting and hyperglycemia.
  - No benefit in survival.
- Hyperinsulinemia/euglycemia (HIE):
  - Insulin bolus 1U/kg with 50ml D50W then 0.5-1U/kg/hr with D10W at 100-300ml/hr.
  - Beware of hypoglycemia.
- Phosphodiesterase inhibitor:
  - Amrinone 5 μg/kg/min.

- Decontamination:
  - Gastric empty and activated charcoal only reserved for sustained-release preparation.
- Supporting device:
  - IABP, CPB, ECMO