Poisoning pitfalls

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What will we talk about?

- Three can’t miss ECG findings in the poisoned patient.

Case 1

- A 40 year-old male with a history of alcoholism presents with obtundation.
- Initial vital signs HR 108 and BP 80/60. He is thought to be intoxicated and dehydrated and his BP improves to 122/68 with 1 Liter of NS.
- 3 hours later the patient has a generalized tonic clonic seizure. Repeat BP 89/58, HR 110.
- Management includes ativan, IV fluids, seizure work up.

Case 1 ECG

- 3.5 hours later, the patient has a repeat seizure and PEA arrest.
- During the resuscitation he regains pulses after the administration of sodium bicarbonate.
- He has a prolonged ICU course but is eventually discharged in good condition.
Case 1

- TCA level = 860 ng/mL

**TCA toxicity**

**Clues to the diagnosis**
- Right Axis Deviation
- Widened QRS duration
- R wave in AVr

**Selected drugs and toxins causing Na channel blockade**

<table>
<thead>
<tr>
<th>Drug</th>
<th>Effect</th>
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<tbody>
<tr>
<td>Amantadine</td>
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<td>Carbamazepine</td>
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<td>Chloroquine</td>
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<td>Class 1A antidysrhythmics</td>
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<td>Disopyramide</td>
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<td>Quinidine</td>
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<td>Procainamide</td>
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<td>Class 1C antidysrhythmics</td>
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<tr>
<td>Encainide</td>
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<td>Flecainide</td>
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<td>Propafenone</td>
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<td>Citalopram</td>
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<td>Cocaine</td>
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<td>Cyclic antidepressants</td>
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<td>Diltiazem</td>
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<td>Diphenhydramine</td>
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<td>Propranolol</td>
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<td>Propoxyphene</td>
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<td>Quinine</td>
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<td>Verapamil</td>
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An 18 year-old male with no significant past medical history presents to the ED with increasing agitation, confusion and diaphoresis after cocaine use.

- Initial exam is remarkable for mydriasis, diaphoresis and paranoia.
- Vital signs: BP 160/70, P 127, RR 20, O2 sat 100%, afebrile
Case 2 - ECG

Baseline ECG of the same patient

Brugada in cocaine intoxication

Left main coronary artery occlusion
Acute pulmonary embolism

A 65 year old female presents with generalized fatigue and palpitations. She was started on an angiotensin-converting enzyme inhibitor 2 months ago and has missed her follow up appointments.

Case 3

Case 3 - ECG

Hyperkalemia

Differential Dx

- Right ventricular hypertrophy
- Brugada
- Acute right heart strain (PE)
- Chronic lung disease (COPD)
- Sodium-channel blockade
- Hyperkalemia
- May be normal in infants, children, young slender adults

Case 4

A 35 year-old female presents with dizziness x 2 days and new onset seizures. She was witnessed by her boyfriend to suddenly collapse, and had noted “twitching” movements and loss of bladder function. In the ED she is awake and alert complaining of intermittent dizzy spells.

BP 120/70, HR 55, RR 16, O2 Sat 100% on RA, glucose 110.
Case 4 - ECG

A 35 year-old female presents with dizziness x 2 days and new onset seizures. She was witnessed by her boyfriend to suddenly collapse, and had noted “twisting” movements and loss of bladder function. In the ED she is awake and alert complaining of intermittent dizzy spells.

BP 120/70, HR 55, RR 16, O2 Sat 100% on RA, glucose 110.

Social history: Previous intravenous drugs user

Causes of QT prolongation

- Congenital (long QT syndromes)
- Acquired
  - Electrolyte abnormalities (K, Mg, Ca)
  - Drug induced
Selected drugs associated with prolongation of QTc

<table>
<thead>
<tr>
<th>Case</th>
<th>Drug</th>
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<tbody>
<tr>
<td>Antiarrhythmics</td>
<td>Quinidine</td>
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<tr>
<td></td>
<td>Amiodarone</td>
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<td></td>
<td>Sotalol</td>
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<td></td>
<td>Practacainamide</td>
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<td>Antihistamines</td>
<td>Terfenadine</td>
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<td>Astemizole</td>
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<td>Antibiotics</td>
<td>Macrolides (erythromycin)</td>
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<td></td>
<td>Fluroquinolones (moxifloxacin)</td>
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<td>Antipsychotics</td>
<td>Chlorpromazine</td>
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<td></td>
<td>Haloperidol</td>
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<td>Quetiapine</td>
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<td></td>
<td>Droperidol</td>
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<td>GI motility agents</td>
<td>Cisapride</td>
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<td></td>
<td>Domperidone</td>
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<tr>
<td>Analgesics</td>
<td>Methadone</td>
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<td>LAAM</td>
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</table>

Case 4

- A 35 year-old female presents with dizziness x 2 days and new onset seizures. She was witnessed by her boyfriend to suddenly collapse, and had noted “twitching” movements and loss of bladder function. In the ED she is awake and alert complaining of intermittent dizzy spells.
- BP 120/70, HR 55, RR 16, O2 Sat 100% on RA, glucose 110.
- Social history: Previous intravenous drugs user
- Medications: Methadone 120 mg/day

Case 5

- A 64 year-old female with a history of CHF and atrial fibrillation presents to the emergency department complaining of 2 days of generalized weakness, nausea, and vomiting.
- Vital signs HR 40, BP 85/48, RR 20, O2 Sat 95%, Afebrile
- Exam remarkable for bradycardia and an irregular rhythm.

Case 5

- Labs are significant for the following
  - K = 6.5
  - Serum creatinine = 3.3 (baseline normal)
  - Digoxin level = 4.6 ng/ml
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  - K = 6.5
  - Serum creatinine = 3.3 (baseline normal)
  - Digoxin level = 4.6 ng/ml

Summary

- Sodium channel blockers produce
  - Right axis deviation
  - Widened QRS complexes
  - R wave in aVR
  - DDx includes: Brugada, right heart strain, left main coronary artery occlusion, and hyperkalemia

Summary

- Look at the QTc in all patient with syncope
- Many medications can prolong the QTc
  - www.azcert.org
- Prolonged QTc may result in torsades de pointe
- DDx includes
  - Congenital long QT syndromes
  - Electrolyte abnormalities (K, Mg, Ca)

Summary

- Digoxin is cleared by kidneys
- Dehydration, underlying illness and renal failure are risk factors for toxicity
- Common ECG abnormalities include
  - Supraventricular tachycardias with AV block
  - Frequent PVCs
  - Junctional escape rhythms