Beta Blockers

Overview

Usually little toxicity unless propranolol or sotalol OD when it can be life-threatening.
E.g. atenolol, bisoprolol, carvedilol, esmolol, metoprolol, propranolol, sotalol.

Toxic mechanism

Competitive antagonist at 1 & 2 receptors. Reduces intracellular cAMP and blunts effects of catecholamines. Propanolol has some NaBlockade effects and sotalol blocks K^+ channels→↑QTc.

Toxicokinetics

Rapid abs with peak levels @ 1-3hr. Variable Vd and metabolism depending on the agent.
Propanolol is very lipophilic and undergoes hepatic metabolism.

Clinical features

Onset by ~4hrs (unless controlled release prep) of ↓HR to ~60bpm.
With propranolol/sotalol or if elderly, underlying heart/lung disease, or co-ingestion with CCB or digoxin may have more severe effects:

- *CVS:* ↓BP, bradycardias (sinus, $1^{st}/2^{nd}/3^{rd}$ degree block, junctional or ventricular). ↑QRS (propranolol), ↑QTc (sotalol).
- *CNS:* Delirium, coma, seizures (propranolol)
- Other: Bronchospasm, pulm. oedema, ↑K^+, ↓BSL (children).

Investigations

Screening: ECG, paracetamol, BSL
Specific bloods: UEC

Risk assessment

Dose, age, underlying heart/lung disease, co-ingestion/regular CCB or digoxin all are factors.
Propanolol may be toxic with doses ≥1g.

Management

Resus: Most likely needed when propranolol (treat like TCA OD in this case).

- If ventricular arrhythmias promptly intubate/hyperventilate & give bicarbonate.
- For bradycardia & ↓BP: **atropine** 20mcg/kg IV (temporising), or **glucagon** 5-10mg stat then 1-5mg/hr, **adrenaline** (infusion), **isoprenaline** 4mcg/min IV infusion.
- For ↑QRS (propranolol): **sodium bicarbonate** 1-2mmol/kg boluses over 1-2min.
- For ↑QTc (sotalol): **$MgSO_4$**, **isoprenaline** or overdrive pacing.
- Cardiac pacing, ECMO or intra-aortic balloon pump may be req in sev refractory cases.
- **BDZ** for seizures

Supportive Care: Cardiac monitoring & BP for ≥4h.
Decontamination: Charcoal if <2hrs and care if propranolol as risk of coma/seizures.
Antidote: **High dose insulin-dextrose**, and for propranolol, possibly **IV lipid emulsion** (see Antidotes).

Disposition

If asymptomatic with normal ECG at 6hrs can be d/c else admit HDU/ICU.