Digoxin

Overview

Acute OD → life-threatening vomiting, hyperK^+ and cardiovascular collapse.
Chronic OD → Insidous onset. More common in elderly. Life-threatening at much lower levels
Related 'natural' ODs: digitalis, foxglove, oleander, lily of the valley, bufotoxin – cane toads.

Toxic mechanism

Cardiac glycoside inhibit Na-K-ATPase pump → ↑intracellular Ca^{2+} (↑automacity & inotropic) & ↑extracellular K^+. Also ↑vagal tone → ↓SA & AVN conduction speeds.

Toxicokinetics

Digoxin well abs PO. Peak effect @6h. Large Vd esp in elderly & obese. Renal excretion. $T_{\frac{1}{2}}$~35h

Clinical features

Acute:

- *GI:* N&V within 2-4h, abdo pain
- *CVS:* Bradycardias (slow AF, any AV block), automacity (ventricular ectopy, bigeminy, VT or SVT with AV block), hypotension at ~8-12h may → death
- *CNS:* Lethargy & confusion

Chronic: As for acute but insidious onset over days/wks assoc with illness or ↓renal fn. Also syncope & visual symptoms [↓acuity, colour aberration (chromatopsia), yellow halos (xanthopsia)]

Investigations

Screening: serial ECGs, paracetamol, BSL
Specific: Dig level [NR 1-2.5nmol/L] @4h & q2h in acute or ≥6h post-dose in chronic, EUC (Cr, Ur, any↑K^+)

Risk assessment

Acute: Intoxication if >50-75mcg/kg. Potentially lethal if OD>200mcg/kg or 10mg (child 4mg), K^+>5.5mmol/L (predicts 100% mortality without antidote!), or digoxin level >15nmol/L (12ng/ml).
Chronic: Untreated mort 15-30%. Probability of chronic toxicity varies with level & features:

Chronic Clinical Features	[digoxin] = 1.9nmol/L (1.5ng/ml)	[digoxin] = 3.2nmol/L (2.5ng/ml)
Only bradycardia	10%	50%
Only GIT symptoms	25%	60%
GIT symptoms + bradycardia	60%	90%
Only automacity	70%	90%
Automacity + another feature	>80%	100%

Management

Resus & Supportive Care: ABCs particularly for hypotension, cardiac dysrhythmias & cardiac arrest. If arrest occurs normal measures may be futile but temporise until antidote given.

- HyperK^+: 10% **calcium chloride** 5-10ml or **gluconate** 10-30ml IV over 20min (contrary to classic teaching, there's evidence Ca^{2+} is **not abs CI**). **$MgSO_4$** 10mmol IV is an alternative.
- **Insulin-dextrose** 10IU+25g IV ± **bicarbonate** 100mmol IV
- AV block: **Atropine** 0.6-1mg IV rpt up to 2mg total. External pacing rarely effective.
- Ventricular tachydysrhythmias: **lignocaine** 1mg/kg IV over 2mins
- Replace fluids/electrolytes as appropriate and treat any intercurrent illness

Decontamination: Charcoal if <1h post-acute OD, however vomiting may be problematic.
Antidote: **Digoxin immune Fab** is definitive Rx. (See Antidotes)

Disposition

If (falling serial digoxin levels OR received digoxin immune Fab), normal K+, and well @6h→d/c.
If chronic OD, admit, withhold digoxin for 3d & review need for on-going digoxin.