



VT, VF and Torsades

Sept 2014

VT

Pathophysiology

Re-entrant (most common in 1st 30mins after MI) and incr automaticity (most common >12hrs after MI due to denervation hypersensitivity to NE and E in area beyond infarct)

Causes

Monomorphic: usually structural / IHD

Polymorphic: usually poisoning / wide QTc

RF: IHD, cardiomyopathy, meds (dig, type Ia antiarrhyth, phenothiazides, TCA, sympathomimetics), hypo/hyperK, MI, MVP

Assessment

Decr BP, canon a waves in JVP (AV dissociation, like in HB), variable intensity of S1; hypotension common; VT more likely if >35yrs, active angina, prev MI

ECG

1. Rate >100 (usually >150)
 2. 3+ consecutive ventricular beats (non-sustained = <30secs)
 3. QRS >120-140 (>100 in children)
 4. RS >100 (>95% spec)
 5. Morphology of V1 and V6 - QRS >140 with RBBB morphology or QRS >160 with LBBB morphology
 6. Concordance of QRS vectors in all precordial leads (20% sens, 90% spec)
 7. LAD/RAD: the more abnormal the axis, the more likely VT
 8. QRS pattern / axis different to baseline
 9. Regular rhythm
 10. Evidence of AV dissociation (absent if underlying AF)
- Notching of QRS at different positions = different P wave rate to QRS rate (40% sens; >75% spec)
- Fusion beats: QRS with features of narrow atrial and wide ventricular
- Capture beats: normal QRS amongst broad complexes

Brugada's criteria for VT: this is easiest

1. Absent RS in any precordial lead (100% spec) = VT (ie. all leads just an R wave or an S wave)
2. RS >100 in any precordial lead = VT
3. AV dissociation as above = VT

Wellen's criteria for VT:

RBBB pattern = V1 positive = L sided ectopic focus

LBBB pattern = V1 negative = R sided ectopic focus

Suggestive of SVT with aberrancy

RSR / QS in V1 (85% SVT, 10% VT); slows with carotid massage; varying BBB

Differential diagnosis

SVT with BBB, SVT with aberrant conduction, pre-excited SVT, metabolic derangement (hyperK), toxin-related, pacemaker-related

Management

Electrical cardioversion

Indicated if severe chest pain/APO, hypotension

Synchronised unless pulseless; 90% success rate; use 50-70J biphasic - 120J - 150J - 170J

Overdrive pacing

Amiodarone: 150mg IV over 5-10mins - rpt over 10-20mins if needed - 600mg/24hrs

30% effective in 1hr; best if poor LV function

Procainamide: 100mg IV - 50mg/min IV until reversion (max 500mg)

Most effective (75%); but CI if MI / LV dysfunction due to negative inotrope

Sotalol: 1.5mg/kg over 5mins

65% effective; CI if CV compromise (ie. Poor LV function) or long QTc

Lignocaine: 1-1.5mg/kg IV Q5mins (max 300mg/hr) - 50mg bolus if needed

Use if ischaemic VT; less effective than procainamide/sotalol

Na channel blocker (eg. TCA) - NaHCO₃

SVT vs VT

More likely VT if:

Absence of typical RBBB/LBBB morphology

Extreme axis

QRS > 160

AV dissociation changes + P waves at different rate to QRS

Concordance of chest leads

RSR with taller L rabbit ear

>35yrs, IHD, prev MI, CCF, HOCM, FH sudden cardiac death

More likely SVT if:

BBB/WPW on prev ECG's

Hx SVT

Torsades



Cyclical multiform ventricular ectopic complexes that vary about isoelectric axis, due to 2 vent ectopic foci

Rate 150-300

QT > 600 (QTc > 400)

R on T phenomenon

To make diagnosis must have prolonged QTc on a previous ECG; usually short lived but recurrent

Causes

Prolonged QTc (esp if > 500)

Female; bradycardia; recent conversion from AF; CCF; digoxin; severe hypoMg/K/Ca; severe myocardial disease; IHD; hypothyroid; arrhythmias with long pauses; CRF

Class Ia, Ic, sotalol, amiodarone or any other drugs that prolong QTc/repolarisation



Management

Avoid class I anti-arrhythmics, amiodarone, beta-blockers; replace K
If sustained: DC cardioversion

If non-sustained:

1. correct cause
2. MgSO₄ 2g over 1-2mins - 1-2g/hr (shortens QTc)
3. isoprenaline (incr HR to 120 to overdrive pace); overdrive pacing; Ca; shock if compromised, but relatively resistant
4. pacemaker

VF

Chaotic broad complex rhythm

Rate 300-600; initially coarse (more likely to cardiovert) - decr amplitude over time - asystole 1-3mins

Management

Non-synchronised DC cardioversion; use drugs only if DC fails (see above)