Physiology we need at the front door - Cardiology

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Cardiac physiology at the front door

Using physiology to identify acute coronary occlusion

Electrophysiology for managing arrhythmias in the acute setting

Acute heart failure presentations

Cardiac physiology in adults with congenital heart disease – what we need to know
Acute coronary occlusion: early reperfusion saves lives


Acute coronary occlusion: ST elevation

http://www.nhlbi.nih.gov
Acute coronary occlusion: ST elevation

Anterior

Lateral

Inferior

Posterior infarction vs. anterior ischaemia?
Anterior ST depression: recognising posterior MI

ST-segment depression (horizontal >> downsloping/upsloping)
Prominent R wave V1 / V2
R/S wave ratio >1.0 in lead V2
Prominent, upright T wave
Additional lead ECG (posterior leads V₇ to V₉) ≥ 1 mm ST-segment elevation
Anterior ST depression: recognising posterior MI

ST-segment depression (horizontal >> downsloping/upsloping)
Prominent R wave in V2
R/S wave ratio >1.0 in V2
Prominent, upright T wave
Additional lead ECG (posterior leads V_7 to V_9) ≥ 1 mm ST-segment elevation
Posterior MI: (1) look for inferior or lateral STE
Posterior MI: (2) use the clinical presentation
Posterior MI: (2) use the clinical presentation
Acute coronary occlusion: a common cause of VF

1. Membrane less depolarised
2. \( \text{Na}^+ \) channels inactivated
3. Regions of slow conduction
4. Re-entry and VF
Posterior MI: (2) use the clinical presentation
Recognising a critical LMCA lesion

STE aVR > V1
Widespread ST depression

Increase CO
Improve coronary flow
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1. There is a hierarchy of pacemaking ability in the heart

2. The only way to a narrow QRS is to use the His-Purkinje system

3. If you know how the atria and ventricle relate to one another you know what the rhythm is

Katzung BG, Masters SB, Trevor AJ: basic & Clinical Pharmacology
Regular narrow complex tachycardia

1:1 A:V

AVNRT

AVRT

A > V

Flutter

Atrial tach

1. Look in V1

2. Block AVN
Regular narrow complex tachycardia

1:1 A:V

AVNRT

2. Block AVN

AVRT

A > V

Flutter

Atrial tach
Regular broad complex tachycardia
Regular broad complex tachycardia

Ventricular tachycardia > 80%
SVT with bundle branch block
SVT over an accessory pathway

age > 35 or MI/HF > 90%
Irregular broad complex tachycardia

AF over an accessory pathway

AF with BBB

DANGER
Accessory pathway conduction

APs may conduct AF fast enough to cause VF

Each QRS will be a fusion of activation via AVN and AP
In SR this will be stable
In AF, each QRS will have a different balance of AP/AVN conduction
Pre-excited atrial fibrillation

1 big square = 200ms  = 300bpm = not the AV node
Pre-excited atrial fibrillation

AF over an accessory pathway

AF with BBB

Varying QRS width and morphology
Some very fast rates

Risk of VF – increased by AVN blockers
Give flecanide / DCCV
Managing bradycardia

Fast, reliable pacemakers
- Will not respond to atropine
- Will often disappear when paced

Slow, unreliable pacemakers
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Young people with ADHF
- often don’t have oedema
- will often maintain BP
Acutely decompensated heart failure

- Warm
- Cold
- Cardiac output

- Young people with ADHF
  - often don’t have oedema
  - will often maintain BP

- Sepsis
- Pulmonary oedema
- Hypovolaemia
- Cardiogenic shock

Filling pressure

Dry

Wet
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Adult congenital heart disease

Simple lesions
- Repaired / benign

Complex lesions
- Good outcomes with modern surgery

Very complex lesions
- Cyanosis / Eisenmenger’s Univentricular hearts
Adult congenital heart disease – some simple rules

1. Patients may present in adulthood
2. Surgical repairs may result in different BPs / absent pulses in upper extremities
3. Pregnancy can be hazardous
4. All patients are at risk of endocarditis
5. Cyanotic patients are also at risk of:
   - Hyperviscosity and Fe deficiency
   - Paradoxical cerebral emboli and abscess formation
   - Pulmonary haemorrhage
6. No arrhythmia is benign

Ventricular arrhythmias usually present as sudden death

Atrial arrhythmias
- common
- unpredictable
- require cardioversion

Bradyarrhythmias
- common
- unpredictable
- require pacing
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Thank you

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