Acute Arrhythmia Management

Initial Approach

- Follow usual ABCDE approach if critically ill

No pulse – follow cardiac arrest ALS algorithm

- Adverse signs
  - Tachyarrhythmia → synchronised DC cardioversion (see box at bottom)
  - Bradycardia → atropine ± pacing (see box at bottom)

- No adverse signs – see specific sections below

- All arrhythmias
  - Apply defibrillator machine’s 3-lead cardiac monitoring (see box at bottom) – initially set machine to ‘monitoring’
  - Treat any reversible causes e.g. electrolyte abnormalities

- Review ECG – determine type of arrhythmia
  - Tachycardia (HR > 100 bpm)
    - Narrow complex tachycardia (QRS < 120 ms / 3 small squares)
    - Broad complex tachycardia (QRS > 120 ms / 3 small squares)
  - Bradycardia (HR < 60 bpm)

Narrow Complex Tachycardias

Caused by atrial tachyarrhythmias

- Sinus tachycardia → treat cause, consider β-blocker or rate-limiting Ca²⁺ channel blocker if required – regular with P waves
- ’Paroxysmal’ SVT → 1st line: Vagal manoeuvres, 2nd line: Adenosine (not in asthma – use Ca²⁺ channel blocker), 3rd line: β-blocker
  - Atrial tachycardia (i.e. abnormal depolarising focus in atrium) – regular with abnormal P waves
  - AV nodal re-entry (junctional) tachycardia (an entire re-entry conduction circuit in and around AV node) – regular with no P waves
  - AV re-entry tachycardia (an accessory conduction pathway allowing conduction ‘re-entry’ between atrium and ventricle e.g. WPW) – regular with no P waves
  
  NB. this refers to orthodromic AVRT (antidromic AVRT looks like and is treated like VT)

- Atrial fibrillation/flutter → AF irregular with no P waves; flutter regular with sawtooth baseline

  - Treat cause
  - Rate control if old patient >65y and IHD/no Sx/not suitable for cardioversion
    - (β-blocker or rate-limiting Ca²⁺ channel blocker, or digoxin if sedentary lifestyle)
  - Rhythm control if not
    - now if clear onset <48h ago (electrical DC cardioversion as box below or pharmacological cardioversion with flecaïnine, or amiodarone if structural HD)
    - after 4 weeks full anticoagulation (or after TOE to confirm no clots) if not (electrical with pharmacological pre-treatment)
  - Reduce thromboembolic risk if not cardioverted (LMWH/warfarin)

Broad Complex Tachycardias

May be caused by ventricular tachyarrhythmias or atrial tachyarrhythmias with abnormal conduction

- Ventricular tachyarrhythmias
  - Sustained VT → amiodarone
  - Torsades de pointes (polymorphic VT) → magnesium sulphate – VT with varying amplitude

- Broad complex tachycardias of supraventricular origin (if you are not sure, treat as VT)
  - Atrial tachyarrhythmia with aberrant conduction (e.g. SVT or AF with L/RBBB) → treat as narrow complex tachycardia – looks like VT (see box for how to distinguish); irregular if AF
  - Atrial tachyarrhythmia with pre-excitation (e.g. SVT or AF with pre-excitation syndrome) → amiodarone (don’t use adenosine for AF with pre-excitation – it will block the only normal conduction pathway) – looks like VT with different size complexes (due to multiple AV conduction pathways); irregular if AF

© 2014 Dr Christopher Mansbridge at www.OSCEstop.com, a source of free OSCE exam notes for medical students’ finals OSCE revision
Bradycardias

Differentials
- AV heart block: 1st/2nd/3rd degree
- Sinus bradycardia:
  - Extrinsic: drugs (beta-blockers, digitalis etc), neutrally mediated syndromes (carotid sinus hypersensitivity, vaso-vagal syncope), hypothermia, hypothyroidism
  - Intrinsic: ischaemia/infarct of SA node, fibrosis of atrium and SA node (sick sinus syndrome)

Management
- Treat cause
- If bradycardia causing adverse signs or there is risk of asystole (see red boxes):
  1. Atropine
  2. If still haemodynamic compromise or risk of asystole, transvenous pacing is required (in the interim, give further atropine or perform transcutaneous pacing)
- If no adverse signs or risk of asystole: observe and treat cause if possible
  - Indications for permanent pacing: Mobitz type II (2nd degree) heart block, 3rd degree heart block

Practical aspects

Drug doses to memorise
- Adenosine: 6mg IV (can be followed by 12mg then another 12mg if unsuccessful)
  Note, must be bolused and flushed very fast via a large line in the antecubital fossa minimum
- Amiodarone: 300mg IV over 20-60min (followed by 900mg over 24 hours)
- Atropine: 500mcg IV (repeat every 3-5min to maximum of 3mg if needed)
- Magnesium sulphate: 2g IV over 10-15min

Placement of 3-lead cardiac monitoring and AP defibrillator pads
- 3-lead cardiac monitoring (clockwise from right arm: Ride Your Green Bicycle)
  - Red: anterior aspect of right shoulder
  - Yellow: anterior aspect of right shoulder
  - Green: left anterior superior iliac spine
  - Black: not present on defibrillation machine
- AP defibrillation pads
  - ‘Right’ pad: place longitudinally on left sternal edge
  - ‘Left’: place longitudinally on left paraspinal muscles (in line with anterior pad)
  - Plug lead into defibrillator machine

Synchronised DC Cardioversion
- Anaesthetist should be present to sedate patient
- Apply 3-lead cardiac monitoring and connect lead to external monitor or defibrillator machine
- Apply defibrillator pads (in AP position) after shaving chest if required
- Connect pads lead to defibrillator machine
- Set defibrillator machine monitoring trace to ‘pads’
- Set defibrillator to synchronised mode (synchronises shock with R wave to avoid inducing VF)
- Set energy level (increase as shown if unsuccessful)
  - Broad-complex tachycardia or AF: 150J → 200J → 200J (biphasic)
  - Narrow complex tachycardia or atrial flutter: 70J → 120J → 200J (biphasic)
- Ask anaesthetist to sedate patient and wait until they are happy to proceed
- Ask everybody to move away from the patient and ask for the oxygen to be moved away
- Press charge (then move hand away from button)
- Re-check everybody and oxygen is away from the patient, announce you are about to shock and press shock (hold button until shock is delivered – it will wait for the R wave)
- Re-assess the rhythm
  - If unsuccessful, repeat at next energy
  - If successful, reassess patient (ABCDE) and perform another ECG to check rhythm and for any signs of ischaemia
- Note the above is for patient with a pulse – if no pulse, follow cardiac arrest ALS algorithm

Transcutaneous pacing
- A conscious patient will require some sedation (ask trained senior or anaesthetist)
- Apply the defibrillator machine’s 3-lead cardiac monitoring and defibrillator pads (in AP position) after shaving chest if required
- Ask sedating doctor to sedate patient and wait until they are happy to proceed
- Set defibrillator to pacing mode
- Set onscreen pacing rate (default usually ~70bpm) and energy (default starting energy usually ~30mA)
- Click onscreen start pacing button
- Observe the monitor to see if QRS complexes follow every pacing spike – if not, gradually increase the energy until they do – ‘electrical capture’ (usually occurs at 50-100mA)
- Next check the patients pulse corresponds to the induced QRS complexes – ‘mechanical capture’
- Now seek definitive management
- Note you can touch the patient during pacing

Bradycardias at risk of asystole
- Mobitz II
- Complete HB with broad QRS
- Ventricular pauses >3secs
- Recent asystole
Monitoring trace input
Set to 'pads'

Pacing mode

Pacing rate ↑/↓
Default = 70bpm

Pacing energy ↑/↓
Default starting energy = 30mA
Increase until get a pulse

Synchronisation on/off
Check it says Sync and light is on

Shock energy