

RESUSCITATION

REVERSIBLE CAUSES OF CARDIAC ARREST 4 Hs & 4Ts

Hypoxia

The patient should be getting manually ventilated via **Bag-Valve- Mask (BVM)** usually with an airway adjunct or at the very least with airway manoeuvres.
The BVM should be **connected to an oxygen supply** running at maximum flow

Preparations should be made for intubation to provide definitive airway support. This also allows positive airway pressure to manage conditions such as pulmonary oedema. However, if there is suspicion of pneumothorax (simple or tension), be conscious of the risk of creating/ worsening tension.

Hypothermia

Dysrhythmias usually occur below 30°C and often causes VF arrest- **do not attempt defibrillation or use inotropes <30°C.**

- **Remove wet clothing**
- Get core temperature e.g. **rectal thermometer**
- Rewarm as quickly as possible using **passive** (blankets), **active external** (bair hugger) and **active invasive** (warmed IV fluids, consider bladder lavage etc.)
- Resuscitation drugs should be given at twice the normal interval i.e. every 8- 10 minutes
- Be careful when moving patient as this can precipitate arrhythmias.
- Hypothermia as the primary cause of arrest mandates a prolonged resuscitation attempt.

Remember: You aren't dead until you're warm and dead

Futility

Frozen chest wall/ ice in airway
K⁺ >10 mmol/L

Hypo/ Hyperkalaemia (plus other metabolic causes)

- Especially **Hypoglycaemia**- always check a BM immediately and give glucose bolus if necessary

Will be apparent from **blood gas**
ECG (in PEA arrest) will show:

- **HyperK⁺** Tall T waves- greater than QRS. Widened QRS
- **HypoK⁺** Flattened T waves or wide QRS may also cause Torsades du pointes

K⁺ >5.5 consider **10mls Calcium Gluconate 10%, IV insulin** (with glucose) and sodium bicarbonate

Profound HypoK⁺ (<2.5) give 40mmol KCL diluted in 500mls 0.9%NaCl and 2g Magnesium Sulphate



Hypovolaemia

1L of crystalloid should already be primed in each resus bay. Attach as soon as IV/ IO access is established. Use a pressure bag to hasten administration

Remember replace like with like.

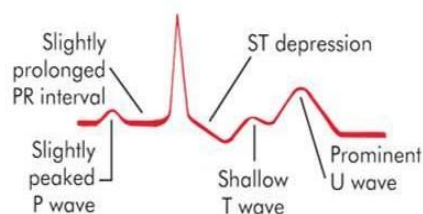
If major haemorrhage is suspected give blood and activate the major haemorrhage protocol. There are two units of O- in the blood fridge in resus.

Hypothermia severity

32- 35°C= mild
30- 32°C= moderate
<30°C= severe

Malignant arrhythmias above 32°C are unlikely to be caused by hypothermia

Hypokalemia



Hyperkalemia

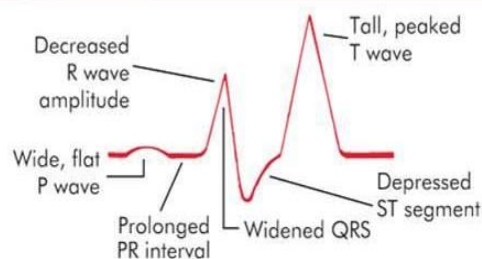


Fig. 4-7. Electrocardiogram Changes with Potassium Imbalance
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Thromboembolism

Includes pulmonary embolism as well as myocardial infarction

MI

Commonly causes VF arrest. If cardioversion is achieved typical ST changes may be seen, but remember these changes may be seen in any cause immediately post cardioversion.

Treatment is as for any MI with ACS protocol and emergent PCI.

PE

- Collateral history or past medical history may be suggestive
- Common physical findings pre- arrest include distended neck veins and tachycardia.
- Echo may show clot or strain in the right ventricle
- Treatment is via surgical evacuation or fibrinolysis

For patients with cardiac arrest and without known PE, routine fibrinolytic treatment given during CPR has shown no benefit and is not recommended.

Toxins

Cardiac arrest caused by toxins, and identifying specific toxins, can be extremely difficult to diagnose without collateral information either from family/ friends or emergency services.

If toxins are suspected it will usually mandate a **prolonged resuscitative effort**.

Cocaine is the most common street drug causing cardiac arrest.

Common prescribed causes include:

- Tricyclic antidepressants
- Digoxin
- Beta blockers
- Calcium channel blockers

Also remember to consider exposure to known allergens causing anaphylaxis.

See **Toxicology week** for the features and management of common poisonings.

Toxbase can advise on the treatment of most identified toxins

Tension pneumothorax

- Caused by pleural parenchymal injury creating a one- way valve into thoracic cavity.
- With each breath the volume increases.
- Eventually the increasing pressure causes lung collapse and contralateral mediastinal shift impinging the other lung, the great vessels and reducing venous return.

Commonly caused by **trauma** and **mechanical ventilation**.

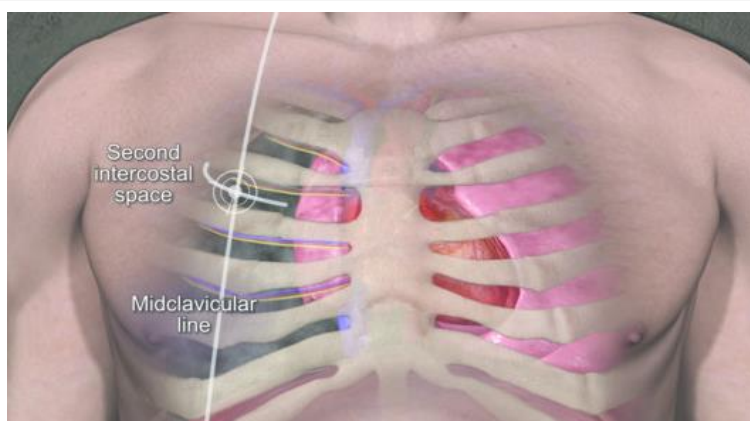
Features:

Respiratory distress, reduced chest wall movement & air entry on affected side, **hyper resonance and difficulty ventilating**.

Hypotension, tachycardia, PEA arrest

Tracheal deviation is a late sign.

Treatment is by emergent needle thoracostomy (2nd intercostal space, midclavicular line)



Cardiac Tamponade

- Fluid in pericardial sac compresses the heart preventing filling during diastole reducing stroke volume.
- Can be caused by blunt or penetrating trauma

Presents as **low BP, distended neck veins & muffled heart sounds**.

Pericardial fluid may be visible on ultrasound

Acutely, **<100mls** can cause significant cardiac impairment

Treatment is by emergent needle Pericardiocentesis.

