

3-5 Circulatory embolus v.1

Causes: thrombus, fat, amniotic fluid, air/gas.

Signs: hypotension, tachycardia, hypoxemia, decreased ETCO₂ **Symptoms:** dyspnoea, anxiety, tachypnoea. Also consider if sudden unexplained loss of cardiac output.

START

- 1 Call for help and inform theatre team of problem. Note the time.
- 2 Call for cardiac arrest trolley.
- 3 Stop all potential triggers. Stop surgery.
- 4 Give 100% oxygen and ensure adequate ventilation:
 - Maintain the airway and, if necessary, secure it with tracheal tube.
- 5 If indicated start CPR immediately (CPR can help disperse air emboli and large thrombi).
- 6 Give i.v. crystalloid at a high infusion rate. (Adult: 500-1000 ml, Child: 20 ml.kg⁻¹)
 - Inotropes may be required to support circulation.
- 7 Treat according to suspected embolus type (see Boxes A-D) whilst considering alternative diagnoses (Box E).
- 8 Consider investigations to help confirm diagnosis:
 - Arterial blood gases (increased PaCO₂-ETCO₂ gradient).
 - Transoesophageal echocardiography (right heart strain, pulmonary arterial emboli).
 - Computerised tomography.
- 9 If cardiovascular collapse refractory to treatment, consider extra-corporeal membrane oxygenation (ECMO) or intra-aortic balloon counter-pulsation.
- 10 Plan transfer of the patient to an appropriate critical care area.

Box A: THROMBOEMBOLISM

Consider thrombolysis e.g. alteplase 10 mg i.v. then 90 mg over 2 h (>65 kg)
Consider surgical removal – consult vascular surgeon
Consider percutaneous removal – consult radiologist

Box B: FAT EMBOLISM

- Petechial rash, desaturation, confusion/irritability if patient conscious
- Supportive measures are mainstay of initial management

Box C: AMNIOTIC FLUID EMBOLISM

- Supportive measures are mainstay of initial management
- Monitor the fetus, if undelivered
- Treat coagulopathy (fresh frozen plasma, cryoprecipitate and/or platelets)
- Consider plasmapheresis

Box D: AIR/GAS EMBOLISM

- “Mill wheel” murmur may be present
- Discontinue source of air/gas if applicable and discontinue N₂O
- Tell surgeon to flood wound with saline and cover with wet packs
- Lower surgical field to below level of heart if possible
- Place patient in left lateral position if possible
- If central venous catheter in situ, attempt to aspirate air
- Volume loading and Valsalva manoeuvre may help

Box E: ALTERNATIVE DIAGNOSES

Pneumothorax (+/- tension)	Hypovolaemia
Bronchospasm (→ 3-4)	Myocardial failure
Pulmonary oedema	Sepsis(→ 3-14)
Cardiogenic shock	Bone cement implantation syndrome
	Anaphylaxis (→ 3-1)