PULMONARY HAEMORRHAGE

RECOGNITION AND ASSESSMENT

Definition
- Acute onset of bleeding from endotracheal tube (ETT) associated with cardiorespiratory deterioration and changes on chest X-ray
- Significant pulmonary haemorrhage is most likely to represent haemorrhagic pulmonary oedema. Differentiate from minor traumatic haemorrhage following endotracheal suction

Risk factors
- Preterm infants
- Respiratory distress syndrome (RDS)
- Large persistent ductus arteriosus (PDA)
- Excessive use of volume expansion (>20 mL/kg) in first 24-48 hr in infants aged ≤28 weeks gestation
- Coagulopathy
- Sepsis
- IUGR
- Use of synthetic rather than natural surfactant
- Grade 3 HIE (hypoxic ischaemic encephalopathy)

Symptoms and signs
- Apnoeas, gasping respirations, desaturations
- Tachycardia >160/min, bradycardia, hypotension, shock, PDA, signs of heart failure
- Widespread crepitations, reduced air entry
- Pink/red frothy expectorate, or frank blood from oropharynx or ETT if intubated

Investigations
- Blood gas (expect hypoxia and hypercarbia with mixed acidosis)
- FBC, clotting
- Chest X-ray (usually shows classic white-out with only air bronchogram visible but may be less striking and resemble RDS)

IMMEDIATE TREATMENT

- Basic resuscitation

Respiratory
- Intubate and ventilate
- Sedate and give muscle relaxant
- PEEP 6-8 cm, even higher PEEP of 10-12 cm of water sometimes required to control haemorrhage
- PIP to be guided by chest expansion and blood gases
- Long inspiratory times (0.5 sec may be needed)
- Endotracheal suction (try to avoid but consider in extreme cases to reduce risk of ETT blockage)
- Ensure adequate humidification
- Avoid chest physiotherapy
- Establish arterial access

Fluid management
- If hypovolaemic, restore circulating volume over 30 min with 10 mL/kg sodium chloride 0.9% or O-negative packed cells if crystalloid bolus already given. Beware of overloading (added volume can be detrimental to LV failure)
- If not hypovolaemic and evidence of left ventricular failure, give furosemide 1 mg/kg IV
• Correct acidosis (see Neonatal formulary)
• If PDA present, restrict fluids to 60-80 mL/kg/24hr in acute phase
• Further blood transfusion, vitamin K administration and FFP to be guided by haemoglobin concentration, PT and APTT (see Transfusion of red blood cells guideline and Coagulopathy guideline)

Hypotension
• If still hypotensive after fluid resuscitation, treat hypotension with inotropes (See Hypotension guideline)

Infection
• If infection suspected, request septic screen and start antibiotics

SUBSEQUENT MANAGEMENT
Once infant stable
• Inform on-call consultant
• Speak to parents
• Document event in case notes
• Consider single extra dose of natural surfactant in infants with severe hypoxaemia or oxygenation index >20
• If PDA suspected, arrange echocardiogram (see Patent ductus arteriosus guideline)