HEART FAILURE ● 1/3

DEFINITION

- Cardiac failure occurs when the heart is unable to pump sufficient blood to meet metabolic demands of body tissues
- underlying cause may be cardiac or non-cardiac

Common causes

Cardiac

- Left-to-right shunt (see **Increased left-to-right shunt**)
- Arrhythmia
- Hypoplastic left heart syndrome
- Critical aortic stenosis
- Coarctation
- Interrupted aortic arch

Non-cardiac

- Sepsis
- Hypoxia
- Anaemia
- Polycythaemia
- Fluid overload
- AV malformation
- Pulmonary hypertension

Clinical differentiation between an obstructed systemic circulation and severe sepsis is extremely difficult as a murmur and weak pulses can be common to both.
For a baby* in extremis*, presence of abnormal pulses alone is sufficient indication to start a prostaglandin infusion until a cardiac lesion has been excluded by echocardiography (see* Prostaglandin infusion *guideline)

SYMPTOMS AND SIGNS OF CARDIAC FAILURE

- Tachycardia
- Tachypnoea
- Hepatomegaly
- Excessive weight gain
- Hypotension
- Murmur
- Abnormal femoral pulses
- weak femoral pulses (in obstructive left heart lesions – femoral pulses may not be absent if duct is still patent)

INVESTIGATIONS

- Blood gases including lactate
- Baseline bloods including FBC, U&E, LFT
- Blood culture
- Chest X-ray – look for cardiomegaly and pulmonary oedema
- Pre and postductal saturations
- postductal saturations can be considerably lower than preductal in aortic arch defects and PPHN (a difference of >2% is significant)
- ECG
- Echocardiogram

TREATMENT OF CARDIAC FAILURE DUE TO OBSTRUCTIVE HEART DISEASE

If left-sided obstructive lesion suspected, treat with inotropes and use diuretics cautiously

Resuscitation

Airway

- Routine intubation not indicated
- Intubate and ventilate babies presenting collapsed or with obvious cyanosis in association with cardiac failure
- If apnoea occurs secondary to a prostaglandin infusion, intubate baby but do not alter infusion

Breathing

- See **Ventilation: conventional** guideline
- Ventilate with PEEP 5–6 cm
- Adjust ventilation to maintain:
- $PaCO_2$ 5–6 kPa
- pH >7.25

Circulation

- Vascular access with 2 IV cannulae or umbilical venous catheter (UVC) (see **Umbilical venous catheter: insertion and removal** guideline)
- Prostaglandin infusion to maintain ductal patency (see **Prostaglandin infusion** guideline)
- open duct with dinoprostone (prostaglandin E_2, prostin E_2), see **Neonatal Formulary**. Start at 5–10 nanogram/kg/min, may be increased to 50 nanogram/kg/min, but only on cardiologist advice
- Monitor blood pressure invasively

Cardiac output

- Signs of poor cardiac output include:
- tachycardia
- low BP
- acidosis
- high lactate
- poor peripheral perfusion with cold extremities
- **When cardiac output low:**
- ensure adequate intravascular volume
- correct anaemia
- discuss with regional cardiac centre for choice of inotropes

SUBSEQUENT MANAGEMENT – TRANSFER

Baby must be kept warm and normoglycaemic

- Discuss further management and transfer with regional cardiac centre
- Babies who respond to a prostaglandin infusion may not need transferring out-of-hours
- Appropriately skilled medical and nursing staff are necessary for transfer

Intubation

An intubated baby requires a cardiac centre ITU bed; do not intubate routinely for transfer

- Intubate if:
- continuing metabolic acidosis and poor perfusion
- long-distance transfer necessary
- inotropic support needed
- apnoea
- recommended by cardiac team

DISCHARGE FROM CARDIAC CENTRE

Baby may go home or return to a paediatric ward or NNU, possibly on a prostaglandin infusion whilst awaiting surgery or for continuing care after a palliative procedure (e.g. septostomy)

Management plan

- Regardless of outcome, obtain a management plan from cardiac centre, defining:
- acceptable vital signs (e.g. saturations)
- medication, including dosage
- follow-up arrangements

INCREASED LEFT-TO-RIGHT SHUNT

RECOGNITION AND ASSESSMENT

Definition

- Any lesion causing increased pulmonary blood flow
- Usually presents when pulmonary resistance falls after 48 hr
- Size and type of lesion will influence time of presentation

Differential diagnosis

- AVSD
- Partial AVSD
- VSD
- Truncus arteriosus
- PDA

Investigations

- Chest X-ray looking for fluid overload
- Echocardiogram

MANAGEMENT

- If in cardiac failure, give immediate dose of diuretic
- May require maintenance diuretics (discuss with cardiologist)
- usually furosemide 1 mg/kg twice daily (oral/IV) and amiloride 100 microgram/kg twice daily (oral)
- Discuss with cardiac centre for definitive management and follow-up