

HEART FAILURE

DEFINITION

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

Differential diagnosis

Non-cardiac

- Sepsis
- Asphyxia
- Anaemia
- Polycythaemia
- Fluid overload
- AV malformation
- BPD (bronchopulmonary dysplasia)

Cardiac

- LVOT obstruction
- Left-to-right shunt
- Arrhythmia

Left ventricular outflow tract obstruction (LVOT)

- Hypoplastic left heart syndrome
- Critical aortic stenosis
- Coarctation
- Interrupted aortic arch

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

SYMPTOMS AND SIGNS OF CARDIAC FAILURE

- Tachycardia
- Tachypnoea
- Hepatomegaly
- Excessive weight gain
- Hypotension
- Murmur
- Abnormal femoral pulses
- in obstructive left heart lesions, femoral pulses may not be absent if duct still patent
- weak femoral pulses are significant

INVESTIGATIONS

- Chest X-ray
- fluid overload
- Echo
- Four-limb BP (a difference of >20 mmHg between an upper and lower limb is significant)
- Pre- and postductal saturations
- postductal saturations can be considerably lower than preductal in aortic arch defects (a difference of >15% is significant)

IMMEDIATE TREATMENT

If left sided obstructive lesion suspected, do not give diuretics, treat with inotropes and volume support

Resuscitation

Airway

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

Breathing

- See **Ventilation** guideline
- Ventilate with PEEP 4-6 cm
- Adjust ventilation to maintain:
 - $5 \leq \text{PaCO}_2 \leq 6$ kPa
 - $\text{pH} \leq 7.4$

Circulation

- Vascular access with 2 IV cannulae or UVC. See **Umbilical venous catheterisation**

Presence of cyanosis and a murmur suggest baby likely to respond to prostaglandin infusion

- Prostaglandin infusion to maintain ductal patency
- open duct with Prostaglandin E₂ (dinoprostone, prostin E₂) – See **Neonatal Formulary**. Start at 5 nanogram/kg/min, may be increased to 40 nanogram/kg/min – but only on advice of cardiologist
- Monitor blood pressure invasively using a peripheral arterial cannula, not UAC
- Titrate infusion to keep to SaO₂ >75% and BP mean not above the gestation in weeks for first 48 hr (a 34 week baby should have a mean BP of 34 mmHg)
- need to balance pulmonary and systemic circulations:
 - SaO₂ too high compromises LV output and worsens hypotension
 - BP too high may reduce pulmonary blood flow and SaO₂
- Assess cardiac output, it is likely to be low when:
 - tachycardia persists
 - BP remains low
 - acidosis persists
 - peripheral perfusion poor (white peripheries)
 - ensure prostaglandin infusion adequate
- When cardiac output low:
 - ensure adequate intravascular volume
 - correct anaemia
 - inotropes may be required for hypotension

SUBSEQUENT MANAGEMENT-TRANSFER

It is imperative that baby is kept warm and normoglycaemic

- Discuss further management and transfer with regional cardiac centre
- Babies who respond to a prostaglandin infusion do 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 occurring

- recommended by cardiac team

DISCHARGE FROM CARDIAC CENTRE

Patient may go home or return to a paediatric ward or neonatal unit, 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

Investigations

- CXR looking for fluid overload
- ECHO

MANAGEMENT

- If in cardiac failure give immediate dose of diuretic
- May require maintenance diuretics
- usually furosemide and amiloride – see **Neonatal Formulary** for dose and administration
- Discuss with cardiac centre for definitive management and follow-up