

# PATENT DUCTUS ARTERIOSUS

## RECOGNITION AND ASSESSMENT

### Definition

- PDA is the continuation of blood flow through the duct following birth
- Persistent PDA is failure of functional closure of duct by 48 hr or of anatomical closure by 3 weeks

### *Factors associated with delayed closure*

- Early gestation
- Lack of antenatal corticosteroid prophylaxis where indicated
- Surfactant-deficient lung disease
- Hypoxaemia
- Volume overload

### Adverse effects of PDA

- Can become manifest in first 48 hr
- Significant right-to-left shunt and hypoxia until pulmonary pressure falls
- Reduced systemic blood flow leading to acidosis and hypotension
- Increased pulmonary blood flow leading to increased work of breathing
- Pulmonary haemorrhage
- Intraventricular haemorrhage and cerebral ischaemia (Steal)

### Symptoms and signs

- Can be absent in a clinically significant duct for first 7 days of life
- Significant left-to-right shunt suggested by:
  - active praecordium
  - full pulses
  - wide pulse pressure
  - murmur
  - hypotension
  - hepatomegaly
  - oedema
- Significant right-to-left shunt suggested by:
  - hypoxia

### Differential diagnosis

- Other cardiac pathology
  - physiological left pulmonary branch stenosis
  - ventricular septal defect
  - atrial septal defect/patent foramen ovale
- Sepsis
- Right-sided cardiac pathology secondary to lung disease

## INVESTIGATIONS

- Chest X-ray
  - cardiomegaly
  - pulmonary plethora
- Echocardiography
  - not essential but advisable because duct-dependent cardiac lesion can be difficult to detect clinically
  - important, if considering treatment with prostaglandin inhibitor, to assess cardiac anatomy and ductal status

## MANAGEMENT

- Prostaglandin inhibitor to initiate ductal closure
- indometacin OR ibuprofen

- evidence to suggest that ibuprofen is not as effective as indometacin
- follow your unit's practice

## IMMEDIATE TREATMENT

- Restrict fluid intake to  $\leq 150$  mL/kg/day
- Check suitability for indometacin or ibuprofen
- renal function
- urine output  $>1$  mL/kg/hr
- platelet count  $>50 \times 10^9/L$
- feed tolerance
- Contraindications to indometacin or ibuprofen are:
  - serum creatinine  $>130$   $\mu\text{mol/L}$
  - urine output  $<1$  mL/kg/hr
  - platelet count  $<100 \times 10^9/L$
  - suspected necrotizing enterocolitis
- If not contraindicated, give loading dose of indometacin 100 microgram/kg IV over 20-30 min or ibuprofen 10 mg/kg IV administered in accordance with the **Neonatal Formulary**

## SUBSEQUENT MANAGEMENT

- **If it is not possible to monitor the ductus sonographically**, give further doses of:
  - indometacin or ibuprofen according to the **Neonatal Formulary**
- **Check renal function and platelets before each dose**
- Feeds can be initiated and continued at a routine rate
- If PDA fails to close with medical therapy, discuss with consultant

### Monitoring pharmacological treatment

- Check:
  - urine output  $>1$  mL/kg/day
  - feed tolerance
  - FBC – platelets  $>50 \times 10^9/L$
  - renal profile – an increase in urea and creatinine can be expected after administration of indometacin but urine output is of more clinical value. Discuss with senior colleague
- **Persistence or recurrence of the murmur does not necessarily indicate return of the PDA**
- Echocardiogram may demonstrate a physiological left branch pulmonary stenosis – this is common after ductal closure and not clinically significant

### *Surgical referral*

- Consider surgical ligation if:
  - pharmacological closure contraindicated or ineffective
  - obvious cardiac compromise
  - it is not possible to extubate the baby or there has been post-extubation failure
  - there have been pulmonary haemorrhages or other symptoms suggestive of ductal steal

***A second course of indometacin is unlikely to close the ductus***

## DISCHARGE POLICY FOR PERSISTENT PDA

- If duct does not close but baby can be extubated:
  - monitor duct clinically
- Refer to cardiologist for further management if there is:
  - evidence of cardiac failure
  - failure to thrive
  - persistent oxygen requirement
- If PDA still present echocardiographically or clinically by age 6 wks, refer to paediatric cardiology service