

PATENT DUCTUS ARTERIOSUS

RECOGNITION AND ASSESSMENT

Definition

- [Patent ductus arteriosus](#) (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

- [Palpation of femoral pulses](#)
- [Pre and post ductal SpO₂ monitoring](#)
- 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

IMMEDIATE TREATMENT

- Restrict fluid intake to ≤ 150 mL/kg/day or give diuretics with larger volumes

Prostaglandin inhibitor to initiate ductal closure

- indometacin or ibuprofen
- evidence to suggest that ibuprofen **less effective**
- follow your unit's practice

Contraindications to indometacin or ibuprofen

- Serum creatinine >130 $\mu\text{mol/L}$
- Urine output <1 mL/kg/hr
- Platelet count $<50 \times 10^9/\text{L}$
- Suspected necrotising enterocolitis

Dose

- 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 **Neonatal Formulary**

SUBSEQUENT MANAGEMENT

- **If not possible to monitor the ductus sonographically**, give further doses of:
- indometacin or ibuprofen according to **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 $>50 \times 10^9/\text{L}$
 - 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 murmur

- **Does not necessarily indicate return of PDA**
- Echocardiogram **sometimes** demonstrates a physiological left branch pulmonary stenosis: 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 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