

## Patent Ductus Arteriosus (PDA) - NICU - Paediatric - Summary Clinical Guideline

Reference No: NIC RC 15/May 2023/v004

### 1. Introduction

Patent ductus arteriosus (PDA) is the failure of the ductus arteriosus to spontaneously close in early extra-uterine life. Prostaglandins contribute to maintaining ductal patency [1]. PDA is particularly common in babies born at less than 29 weeks gestation or with a birth weight below 1000g. PDA remains a significant cause of or associated with morbidity and mortality amongst preterm babies.

**Background** In intra-uterine life, the PDA diverts majority of ventricular output away from the lungs [2], allowing blood to shunt between the descending aorta and pulmonary artery either as increased flow of oxygenated blood to the pulmonary circulation (left to right shunt) or of deoxygenated blood to the systemic circulation (right to left shunt). Most ducts clinically close around 48 hours of age in both term and preterm babies [3].

### 2. Aim and Purpose

Ensure standardized approach to the management of babies with PDA and to improve our understanding of PDA and its medical management.

### 3. Main body of Guidelines

- a. The development of **PDA is multifactorial**; eg prematurity, RDS, infection, lack of steroids.
- b. The **clinical consequences** of a PDA in premature babies include apnoeas, food intolerance
- c. The **clinical signs of a PDA** include *active precordium, systolic or continuous heart murmur, bounding peripheral pulses and hepatomegaly*. Clinical signs are a poor predictor of duct size hence Management and treatment of PDA should be based echocardiography.

#### Pretreatment Recommendation

1. Have a high index of suspicion of a clinically apparent PDA in the at-risk group.
2. Careful attention to and management of risk factors.
3. Prophylaxis with Indomethacin or Ibuprofen is not currently recommended.
4. There is no indication to routinely treat PDA in the first 72hrs of life.
5. Universal echocardiography screening of at-risk group is not currently recommended.

**d. Echocardiographic assessment of PDA:** At risk babies with clinically apparent PDA should have a heart scan before treatment to assess accurately, its haemodynamic significance.

- i. **Timing of echocardiography:** Consider early (1<sup>st</sup> 72hrs) echocardiography in at risk babies with **clinically apparent PDA**.
- ii. **Findings on echocardiography:** function, haemodynamic significance and exclude significant structural abnormalities of the aorta and arch.

- iii. **Determine Left atrium to Aortic root ratio (LA/Ao):** by m-mode to assess left atrial dilatation secondary to volume overload of the left heart. <1.5, 1.5-2.0 and 2.0
- iv. **Determine ductal size into:** <1.5mm, 1.5-2.0mm, 2.0mm
- v. **Determine pulsatile pattern.** Determine direction and describe the pulsatility pattern: Growing, Pulsatile and Closing
- vi. **Pulsatility ratio:** Max to lowest ductal velocities, > 2.0 is significant.
- vii. **Haemodynamically Significant duct –** need at least 3 of these criteria  
Moderate to large PDA, LA:Ao ratio  $\geq$  2, Ductal steal, Unrestricted Pulsatile ductal flow

**Assessment Recommendation:**

1. No routine pre-emptive echocardiogram
2. Early echocardiogram only if clinically apparent PDA in at risk group
3. Echocardiogram should give guidance if the PDA is haemodynamically significant or not

e. **Treating a baby with haemodynamically significant and symptomatic PDA:**

- i. **Fluid Management:** fluid restriction does not help to close PDA.
- ii. **Oral feeds** to 135-150mls/kg/day if compromised and breathless.
- iii. **Intravenous fluids** to 120mls/kg/day and maximize parenteral nutrition.
- iv. **Diuretics treatment:** consider short term use of diuretics for symptomatic relief if there is echocardiographic or clinical evidence of left heart failure.
- v. **Prostaglandin inhibitors:** Inhibiting prostaglandin synthesis with ibuprofen, non-selective cyclooxygenase (COX) 1 and 2 non-steroidal anti-inflammatory drugs (NSAID), **Ibuprofen**
  - a. **Dosage Regime for ibuprofen:** Three IV doses 24 hours apart, 10mg/kg first dose then 2 further doses of 5mg/kg.
  - b. **Intravenous infusion:** over 15 minutes usually undiluted (or diluted with 0.9% saline or 5% glucose solution).
  - c. **Check Relative Contraindications**
    - a. **Paracetamol:** if NSAID is contraindicated: **Dosage regime for paracetamol:** oral paracetamol 15 mg/kg/ dose 6hrly
- f. **Post treatment echocardiogram:** if clinically apparent PDA/ symptomatic.

**Treatment Recommendation:**

1. Ibuprofen should be used as medical treatment of symptomatic PDA.
2. If baby is in heart failure, consider short term fluid restriction and diuretics.
3. For the duration of treatment, do 12 hourly fluid balance, daily weight, monitor platelets and U&E

g. **Surgical Ligation or device closure of a clinically significant PDA: Referral**  
(See EMNODN/EMCHC pathway)

- h. **Cardiology Follow up on discharge:** PEC and named consultant of indicated or if surgically ligated or device closed PDA: as per post-surgical plan.

**Referral and follow up Recommendation:**

1. Consider surgical ligation in symptomatic babies where medical and specific measures have failed or contraindicated. Refer to the EMNODN/EMCHC pathways)
2. Babies diagnosed with PDA should have appropriate follow up on discharge