



CLINICAL GUIDELINE	
Patent Ductus Arteriosus (PDA) Management Following Surgical Closure	
Scope (Staff):	Nursing and Medical Staff
Scope (Area):	NICU KEMH, NICU PCH, NETS WA
Child Safe Organisation Statement of Commitment	
<p>The Child and Adolescent Health Service (CAHS) commits to being a child safe organisation by meeting the National Child Safe Principles and National Child Safe Standards. This is a commitment to a strong culture supported by robust policies and procedures to ensure the safety and wellbeing of children at CAHS.</p>	

This document should be read in conjunction with this [DISCLAIMER](#)

This guideline concentrates on the particulars of management of post-surgical PDA closure. Refer the following guidelines for general post-op management and complications:

- [Cardiac: Routine Post-Operative Care](#)
- [Cardiac: Complications Management Following Surgery](#)
- [Patent Ductus Arteriosus \(PDA\)](#)

Overview

PDA's which are surgically closed in the neonatal period are generally those which occur secondary to prematurity, have not closed with medical treatment and are problematic.

Congenital PDA in a term baby is a different entity, and is usually closed via cardiac catheterisation once the infant is bigger. However, if the PDA is very large, it may cause cardiac failure and then may require surgical closure in the neonatal period.

Operative mortality rates approach zero in term babies/older children with PDA closure. Mortality rates in premature infants are low in the immediate post-op period but there are reports that 10% don't survive to discharge (due to other complications of prematurity).

Indications for Surgical Closure in Premature Infants

The role for surgical ligation of a PDA in premature infants is debated. Some centres advocate early surgical closure arguing that surgery is more effective than indomethacin, other centres resort to surgery when indomethacin is contraindicated or has failed and yet others rarely if ever ligate the ductus. There is no clear evidence to support or refute any of these approaches.

Surgical closure is only considered after discussion between Consultant Neonatologist and Cardiologist.

Surgical Procedure

The surgery is performed via a left posterolateral thoracotomy. The ductus is either clipped, ligated with suture or if very large divided and oversewn.

Routine Post-Op Management of the Neonate Following PDA Closure

For more general post-op cardiac management, refer to [Cardiac: Routine Post-Operative Care](#)

The procedure is usually very well tolerated, with the main problems being due to prematurity and underlying lung disease and possibly pulmonary hypertension.

Ventilation

- Normal neonatal ventilation strategies and SaO₂ ranges according to gestational age.
- Conventional ventilation should be the primary mode. In case of ventilation or oxygenation failure, to do CXR and consider change to high frequency ventilation.
- Closure of the PDA in the premature neonate will most likely not be a miraculous cure for previous ventilation problems, and a slow wean from support is likely.
- In the term neonate, ventilate overnight to facilitate pain relief and commence weaning to extubation the following day.

CVS

- Closely monitor vitals HR, SBP, DBP, MBP, RR, and temperature.
- To discuss with Cardiology team of about early postoperative echocardiogram (<1hour): LV output less than 200 mL/kg/min is a sensitive predictor of cardio-respiratory instability and need for inotropic support. To discuss the need for prophylactic milrinone.
- Early diastolic or combined (systolic and diastolic) hypotension – possible differentials: Haemorrhage, obstruction to LV output (e.g. tension pneumothorax), severe pulmonary arterial hypertension, adrenal insufficiency and sepsis.
- Post cardiac ligation syndrome: Systolic blood pressure <3rd centile requiring vasopressors with associated ventilation and oxygenation failure.
- When hemodynamic instability present, discuss with neonatal consultant and cardiology team about further management.

Fluids/Electrolytes. hemodynamics

- Euvolemia is recommended.
- 100 mL/kg/day should suffice for day 1, and then increase fairly quickly up to pre-op amount over the next couple of days.
- Feeds can be recommenced on day 2. The amount depends upon the patient and their clinical status.

Antibiotics

- As per normal post-op protocol (refer to [Cardiac: Routine Post-Operative Care](#)).

Analgesia/Sedation

- Morphine infusion should suffice, though occasionally midazolam may also be required.

Complications Following PDA Closure

Surgical

- Pneumothorax
- Haemorrhage following ligation and division of ductus or tearing of ductus if the tissue is friable (Refer to [Cardiac: Complications Management Following Surgery](#)).
- Recurrent ductal patency (low 0.4-3%).
- Ligation of wrong structure e.g. Aorta, pulmonary artery and left pulmonary artery.
- Stridor due to recurrent laryngeal nerve palsy (Refer to [Cardiac: Complications Management Following Surgery](#)).
- Cyllothorax due to damage to thoracic duct (unusual) (Refer to [Cardiac: Complications Management Following Surgery](#)).
- Gastric distension/paresis secondary to traction on the vagus nerve.
- Pulmonary hypertension especially in those who had a very large PDA with a large shunt.
- Worsened respiratory problems in the premature neonate with RDS/CLD due to atelectasis following collapse of left lung during surgery.
- Chest infection particularly in premature neonates and those who had pre-existing congestive heart failure.
- Increased risk of neurosensory impairment.¹¹
- Post cardiac ligation syndrome: Neonate present with ventilation and oxygenation failure and systolic hypotension (usually 6-12 hours). Discuss with neonatal consultant and cardiology team about echocardiogram and vasopressors (milrinone, epinephrine and dobutamine).
- Pulmonary edema secondary to LV diastolic dysfunction: Neonate present with ventilation and oxygenation failure and have normal blood pressure. Discuss with neonatal consultant and cardiology team. To do CXR, echocardiogram and suggested approach is to increase mean airway pressure, diuretics and milrinone.
- Adrenal dysfunction: This can be due to developmental immaturity of the hypothalamic-pituitary-adrenal axis and adrenal hypoperfusion due to chronic ductal steal. Hydrocortisone should be considered early in those with severe and/or refractory hypotension, especially in the setting of a preoperative failed ACTH stimulation (synacthen) test.

Related CAHS internal policies, procedures and guidelines

Neonatology

- [Cardiac: Routine Post-Operative Care](#)
- [Cardiac: Complications Management Following Surgery](#)
- [Patent Ductus Arteriosus \(PDA\)](#)

References

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