



NCCU CLINICAL GUIDELINES
SECTION: 14

NEONATAL CARDIAC CONDITIONS:

MEDICAL AND SURGICAL MANAGEMENT

Section 14: Neonatal Cardiac Conditions
Surgical closure of a PDA
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Neonatology Clinical Guidelines
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MANAGEMENT FOLLOWING SURGICAL CLOSURE OF A PATENT DUCTUS ARTERIOSUS (PDA)

This guideline concentrates on the particulars of management of post surgical PDA closure. For general post-op management and post-op complications and details on PDA please see separate guidelines.

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.

Currently, in WA, premature neonates <29/40 all get an echo within 4-24hrs after birth, and those with PDA >1.5mm are treated with a course of indomethacin/ ibuprofen. If the ductus is still significantly open on re-echo after the 1st course of NSAIDs, then a 2nd course is given. If the 2nd course of NSAIDs fails to close the ductus and it remains large or problematic eg. causing high ventilation requirements/ failure to wean off ventilation then the decision may be to refer that baby to cardiology for consideration of surgical closure.

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, 'Routine Care of The Neonate Post Cardiac Surgery'.

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.
- 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:

CO/ BP/ arrhythmias should not be a problem.

Fluids/ Electrolytes:

- 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 (*see 'Routine Care of The Neonate Post Cardiac Surgery'*).

Analgesia/ Sedation:

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

COMPLICATIONS FOLLOWING PDA CLOSURE

Surgical:

1. Haemorrhage following ligation and division of ductus or tearing of ductus if the tissue is friable.
(*See guideline in 'General Complications Following Cardiac Surgery in the Neonate'.*)
2. Recurrent ductal patency (low 0.4-3%)
3. Ligation of wrong structure eg. aorta. Possible in very small premature infants and results in poor systemic perfusion in the lower half of the body. Look for absent femoral pulses, cool lower limbs, decreased urine output, gut ischaemia, metabolic acidosis, high lactate.
4. Stridor due to recurrent laryngeal nerve palsy.
(*See guideline in 'General Complications Following Cardiac Surgery in the Neonate'.*)

5. Cyllothorax due to damage to thoracic duct (unusual).
(See guideline in 'General Complications Following Cardiac Surgery in the Neonate'.)
6. Gastric distension/ paresis secondary to traction on the vagus nerve.

Other:

- 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.

References:

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- 3) Horrox, F. (2002). *Manual of Neonatal and Paediatric Heart Disease* (First ed.). Gateshead, Tyne and Wear, UK: Whurr Publishers.
- 4) *Neonatal Clinical Care Guidelines*. Perth, Australia: King Edward Memorial Hospital.
- 5) Koenig, P., Hijazi, Z. M., & Zimmerman, F. (2004). *Essential Pediatric Cardiology* (First ed.). USA: McGraw-Hill Companies, Inc.
- 6) Nichols, D. G., Ungerleider, R. M., Spevak, P. J., Greeley, W. J., Cameron, D. E., Lappe, D. G., & Wetzel, R. C. (2006). *Critical Heart Disease in Infants and Children* (Second ed.). USA: Mosby.