Patent Ductus Arteriosus (PDA)

Patient and family information, brought to you by the Education Committee of APSA

Overview - "What is it?"

The ductus arteriosus is a connection between the aorta (large blood vessel that carries blood to the entire body) and the pulmonary artery (blood vessel that carries blood to the lungs). This is a structure that is very important while the baby is developing inside the mother, because through it, the mother provides oxygen to the baby. When the baby is born, the baby starts breathing and the ductus arteriosus is not needed anymore. Normally it closes on its own after birth. Sometimes, especially in premature babies, the ductus stays open ("patent")—thus, the condition is named "patent ductus arteriosus" (PDA).

Blood that is supposed to go to the body will instead go to the lungs. This situation can cause too much blood to go to the lungs, causing heart failure and not enough blood flowing to other areas of the body. PDA happens in 7-38% premature babies.

Signs and Symptoms - "What symptoms will my child have?"

Early signs:

- Loud heart murmur
- Needs oxygen
- Blood pressure changes

Later signs/symptoms:

- Heart failure—heart needs to work harder and over time, it may not be able to keep up
- Need to be on the ventilator a long time
- Heart murmur can be heard on exam in older kids

Diagnosis - "What tests are done to find out what my child has?"

Labs and tests:

- **Exam:** Murmur heard with stethoscope
- **Chest X-ray**: Findings of an enlarged heart or fluid in the lungs
- **Echo** (ultrasound of the heart) shows the presence and size of the PDA and the flow of blood in PDA

Conditions that mimic this condition: Lung disease due to prematurity (bronchopulmonary dysplasia). These babies will also have lung problems requiring ventilator, but no murmur or PDA seen on echo.

Treatment - "What will be done to make my child better?"

Observation: There is increasing evidence that if left alone, many open ducts will close on their own. Therefore, if the baby has no symptoms, treatment may not be needed

Medicine: Medicines that can be given to help close the ductus are Indomethacin and acetaminophen. The risk of indomethacin includes association with intestinal perforation, bleeding, and kidney abnormality.

Surgery/Embolization:

Surgery is the may be the best option for small babies if the baby has a duct causing symptoms and fails medical therapy or if complications result from the medicines given to close the duct.

In larger infants and children, the duct can often be closed by a cardiologist in a radiology suite by placing coils into it under Xray guidance through a very small incision in the groin or neck.

Procedure: The procedure can be done in the operating room or in the neonatal intensive care unit (NICU). A left thoracotomy (incision on side of left chest between ribs) allows for the placement of a titanium clip on the PDA to close the duct.

Preoperative preparation: Antibiotics are given by vein to decrease risk of infection.

Postoperative care: A Chest X-ray is obtained and supportive care (fluids, possible blood pressure medication, ventilator, pain medication) after surgery. It will take some time for the baby to recover from surgery and get used to new blood circulation.

A small tube may be placed in the chest cavity after the surgery to drain extra air and fluid. This will be removed a few days after the operation.

Risks:

- Bleeding
- Damage to lung, surgery is no longer the preferred first option due to concerns about worsening lung disease of prematurity.
- Damage to the nerve (recurrent laryngeal nerve) which can affect the vocal cord on the left side. The voice is preserved but they may have swallowing problems.
- Injury to muscles of the chest wall which may not be obvious initially, but more apparent over time.
- Death (low incidence but can happen due to bleeding, or inability of the heart to tolerate the change in blood flow).

Benefits:

- May help baby to get off the ventilator
- Improve blood flow to intestines and rest of body
- Improve heart function

Informed consent: A consent form is a legal document that states the tests, treatments or procedures that your child may need and the doctor or practitioner that will perform them. Before surgery, your doctor should tell you what the operation is, the goal of the surgery and other possible treatment options that are available. Your doctor should explain the risks and benefits of the surgery. You give your permission when you sign the consent form. You can have someone sign this form for you if you are not able to sign it. You have the right to understand your child's medical care in words you know. Before you sign the consent form, make sure all your questions are answered. It is important to know that during surgery, there are things that can happen that your doctor may have not predicted before going in. He or she will explain these to you after the surgery.

Home Care - "What do I need to do once my child goes home?"

Diet: Formula or breast milk appropriate for the baby.

Activity: By the time the baby goes home, activity should be normal.

Wound care: The incision on the chest can be washed with soap and water.

Medicines: Nothing particular to this condition.

What to call the doctor for: Redness, warmth, drainage from incision, fever, problems breathing

Follow-up care: The surgeon usually sees the baby two weeks after surgery (if baby is still in hospital, the surgeon will usually see baby while still in hospital).

Long Term Outcomes - “Are there future conditions to worry about?”

No significant long-term outcomes except that the titanium clip (if used) will always be visible on chest X-ray (but will not go off in metal detectors or have problems with MRIs).

Updated: 11/2021
Author: Grace Mak, MD
Editors: Patricia Lange, MD; Marjorie J. Arca, MD; Mary Edwards, MD