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Diagnosis and Treatment of Patent Ductus Arteriosus

By Jonas Wilson, Ing. Med.

Patent ductus arteriosus (PDA) is a congenital cardiac defect that occurs when the ductus arteriosus fails to close. The result is a persistent communication between the aorta and pulmonary artery, which has several significant consequences for the infant.

While the cause of PDA remains poorly understood, genetic and environmental risk factors are believed to play roles in the pathogenesis. Premature infants are especially at risk as well as those born into families with a positive history for cardiac and other genetic abnormalities.

Signs and Symptoms

Depending on the size of the PDA, the infant's symptoms may vary. The maturity of the baby (whether premature or full term) also determines the clinical presentation of the defect.

If the PDA is small, there might not be any signs or symptoms to indicate its presence, and as a result it may go undetected for many years.

In some cases, it may not be discovered until adulthood. Sometimes a heart murmur is the only sign that there may be an underlying PDA. However, murmurs can be due to multiple other causes and many are not harmful.

When the PDA is large, the baby will show signs and symptoms of a failing heart soon after birth. Such infants have rapid heart rates, are easily tired, remain persistently breathless, or have fast breathing. In addition to these, the baby may have poor appetite with a corresponding failure to thrive.

Eisenmenger syndrome may develop in infants with a large PDA. This occurs when the left-to-right shunt causes a buildup in pulmonary arterial pressure, which leads to a bidirectional flow of blood within the heart instead of the normal one-way flow. Congestive heart failure and sudden death may ensue.

Diagnostic Tests

Auscultation reveals the presence of a murmur. While many murmurs are uneventful findings, they may also be the first sign of a pathological process in the heart and/or its great vessels.

Suspicion of an underlying pathology requires further investigation with echocardiograms, electrocardiograms, chest X-rays, and possibly cardiac catheterization.

The latter is not really necessary for diagnosis of PDA, but helps to rule out the presence of other cardiac defects if present, and in the treatment of PDA.

Echocardiograms involve the use of ultrasound waves to produce an image of the heart. They are noninvasive and painless, and illustrate enlargement of the cardiac chambers.

Furthermore, they give a good indication as to how well the heart is functioning and may be used to monitor treatment. Chest X-rays help to examine the size and shape of both the heart and lungs, while electrocardiograms give information on the electrical activity of the heart.

An infant with a PDA may show electrocardiogram results that are consistent with cardiomegaly.

Therapy

The ultimate goal of treating PDA is to close the defect. This may require surgery as well as medication and catheterization. In many cases, a small PDA closes on its own without medical intervention.

This is not the case for larger PDAs, which often cause significant health problems as a result.

Pharmacotherapy is used in premature infants to close the PDA. Indomethacin and sometimes ibuprofen, which are both nonsteroidal anti-inflammatory drugs (NSAIDs), are drugs used for this purpose.

They cause the PDA to constrict, thereby closing the communication between

the great vessels. Indomethacin, however, is not as effective in full-term babies.

Babies who are mature enough may undergo cardiac catheterization. In this procedure a flexible, thin tube is used to insert a coil to close the PDA. Cardiac catheterization can be used in small PDAs if the infant is at risk of infective endocarditis.

Candidates for surgery are those who have serious congenital heart defects and are not able to undergo catheterization. PDAs are closed surgically with sutures.

Prognosis

Most children, provided they do not have other health issues, usually recover well after PDA closure. Those who underwent a surgical procedure may be hospitalized for a few days before going home.

The surgery itself rarely has complications. These can include bleeding, infection or a paralyzed diaphragm.

Complications in the long-term are also extremely uncommon, but reopening of the PDA is one such possible scenario.

Nonetheless, most children, who do not have other congenital anomalies, recover fully and go on to have a normal childhood.

Reviewed by Liji Thomas, MD

Sources

- pediatricct.surgery.ucsf.edu/.../patent-ductus-arteriosus.aspx
- www.mayoclinic.org/.../con-20028530
- https://www.nhlbi.nih.gov/health/health-topics/topics/pda/livingwith
- http://www.diseaseinfosearch.org/result/5628

Further Reading

- Patent Ductus Arteriosus (PDA) Overview

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