

Congenital heart diseases

Patent ductus Arteriosus



by Abdullah shadhan

Patent ductus arteriosus (PDA) is the persistent communication between the proximal left PA and the descending aorta just distal to the left subclavian artery.

It can be associated with a variety of CHD lesions, however, in adults, it is usually an isolated finding

A **PDA** occurs when the ductus arteriosus fails to close and regress after birth to form the ligamentum arteriosum.

It occurs in 1:2,000 live births, but it is relatively **uncommon among the adult population.**

In **infants**, it accounts for 10% to 12% of all congenital heart disease.

RISK FACTORS:

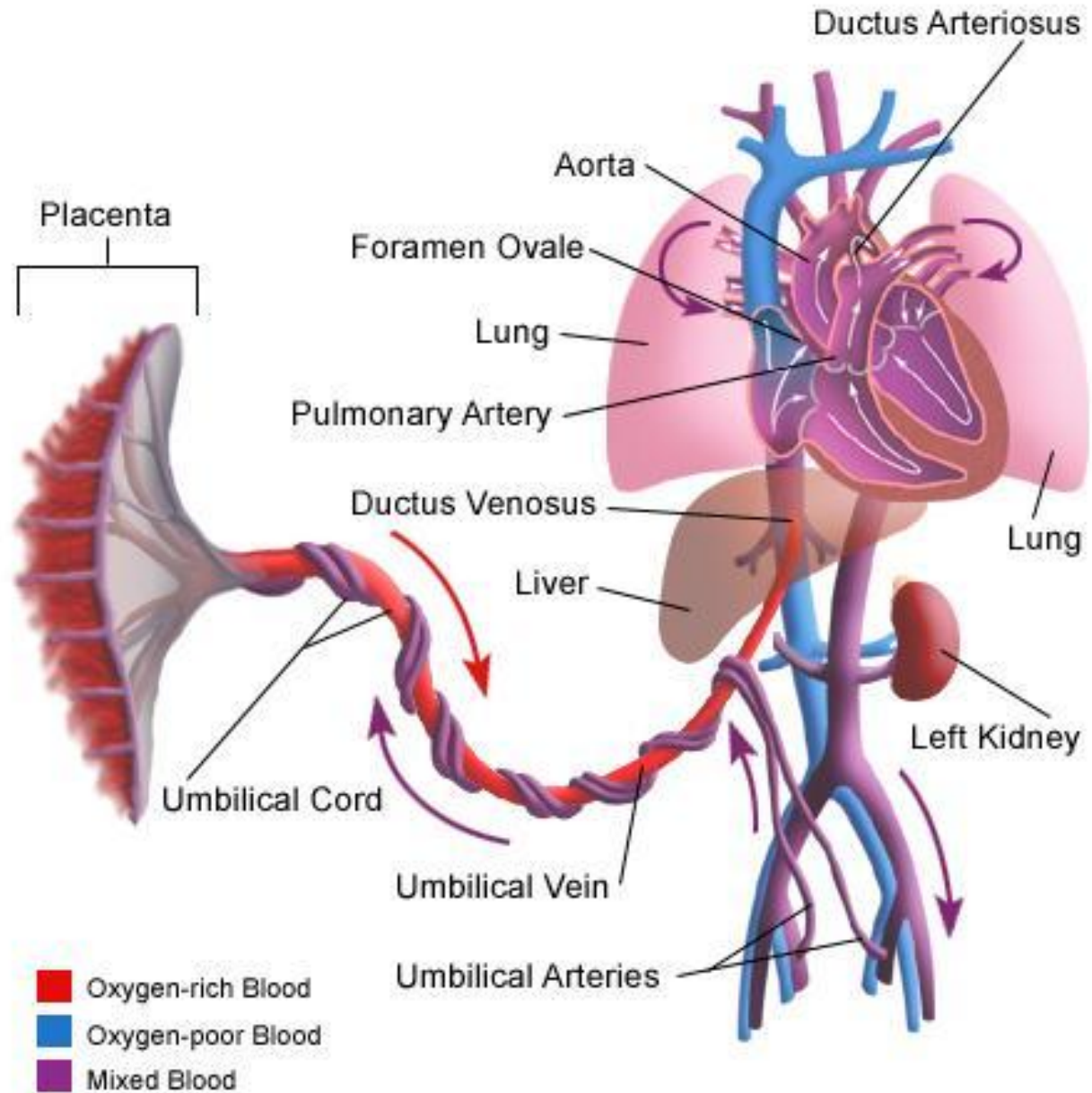
Factors that increase risk for PDA include maternal rubella infection, birth at high altitude, premature birth, female sex, and genetic factors.

In infants born at <28 weeks of gestation, there is a 60% incidence of PDA, and PDAs are twice as common in females as they are in males.

Most cases of PDA are seemingly sporadic, but it is likely a multifactorial inheritance with the requirement of genetic predisposition and an environmental trigger that is induced during a vulnerable period.

In a family in which one child has a PDA, there is approximately a 3% risk of having a PDA in subsequent offspring.

Fetal Circulation



Symptoms:

Severity of symptoms depends on the degree of left-to-right shunting, which in turn is determined by three interrelated factors: the size of the PDA, the pressure difference between the aorta and pulmonary artery, and the systemic and pulmonary vascular resistances.

PDA size is categorized by the degree of left-to-right shunting determined by the pulmonary-to-systemic flow ratio: $Q_p : Q_s$

Between 25% and 40% of patients with PDA are asymptomatic, especially those with a small PDA.

The most common symptom is exercise intolerance followed by dyspnea, peripheral edema, and palpitations.

Small duct with no LV volume overload (normal LV) and normal Pulmonary hypertension (**generally asymptomatic**).

- **Moderate** PDA with predominant LV volume overload: large LV with normal or reduced function (**may present with left heart failure**).
- **Moderate PDA with predominant PH:** pressure-overloaded RV (may present with **right** heart failure).
- **Large** PDA: **Eisenmenger physiology** with differential hypoxaemia and differential cyanosis (**lower extremities cyanotic, sometimes left arm too**)

Physical examination..

A harsh, continuous murmur (systole and diastole) may be heard at the left first or second intercostal space.

The murmur envelops the second heart sound (S₂) and decreases in intensity during diastole.

A small PDA has a soft, highfrequency, continuous murmur, whereas a large PDA classically has a machinery-like, loud murmur.

Complications.

The most common complications of PDA include:

CHF

Infective endarteritis,

PDA aneurysm

pulmonary hypertension.

DIAGNOSTIC TESTING

Standard two-dimensional transthoracic echocardiography (**TTE**) combined **with Doppler** is the preferred initial diagnostic modality because of its low cost and noninvasive nature

TTE has a 42% sensitivity and 100% specificity for the diagnosis of PDA.

The suprasternal notch view is usually best for demonstrating the PDA.

TEE may be required if TTE windows are suboptimal or nondiagnostic.

TTE and **TEE** have nearly 100% specificity for the diagnosis of PDA, but TEE has a much higher sensitivity (97%) than TTE (42%)

Cardiac catheterization is generally **discouraged** for diagnostic purposes.

In the most recent American College of Cardiology/American Heart Association (ACC/AHA) 2008 guidelines, there is a class **III recommendation** against using cardiac catheterization to diagnose uncomplicated PDA with adequate noninvasive imaging.

Rarely, PDAs that remain undiagnosed by physical examination or noninvasive testing may be diagnosed during left heart or right heart cardiac catheterization by recognizing the **unexpected course of the catheter as it crosses the PDA by measuring a step-up in the oxygen saturation at the level of the left pulmonary artery**

THERAPY.:

Recommendations for intervention in patent ductus arteriosus

Recommendations	Class ^a	Level ^b
In patients with evidence of LV volume overload ^c and no PAH (no non-invasive signs of PAP elevation or invasive confirmation of PVR <3 WU in case of such signs), PDA closure is recommended regardless of symptoms.	I	C
Device closure is recommended as the method of choice when technically suitable.	I	C
In patients who have developed PAH with PVR 3–5 WU, PDA closure should be considered when there is still significant L–R shunt (Qp:Qs >1.5).	IIa	C
In patients who have developed PAH with PVR ≥5 WU, PDA closure may be considered when there is still significant L–R shunt (Qp:Qs >1.5) but careful individual decision in expert centres is required.	IIb	C
PDA closure is not recommended in patients with Eisenmenger physiology and patients with lower limb desaturation on exercise. ^d	III	C

© ESC 2020

L–R = left-to-right; LV = left ventricle/ventricular; PAH = pulmonary arterial hypertension; PAP = pulmonary artery pressure; PDA = patent ductus arteriosus; PVR = pulmonary vascular resistance; Qp:Qs = pulmonary to systemic flow ratio; WU = Wood units.

^aClass of recommendation.

^bLevel of evidence.

^cLV enlargement with increased stroke volume.

The shape and size of a PDA determine the mode of therapy.

Small- or moderate caliber PDAs are generally closed percutaneously with coils.

Large PDAs may require surgery.

In adults, calcification of the PDA may cause a problem for surgical closure. so, it is relative contraindication Because of an increased risk of bleeding and incomplete closure with surgery.

Surgery is reserved for the rare patient with a duct too large for device closure or with unsuitable anatomy such as aneurysm formation.

- *Thank you for listening*