Patent Ductus Arteriosus (PDA)

Concise, exam-oriented notes for MBBS Final Year

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Shunt	Left → right (aorta → pulmonary artery)
Murmur	Continuous, “machinery” murmur at left infraclavicular area
Pulse	Bounding pulses, wide pulse pressure
Who	Common in preterm / low-birth-weight infants
Confirm	Echocardiography with Doppler (visualize duct & flow)

1. Introduction

Definition: A congenital persistence of the fetal ductus arteriosus—an aortopulmonary connection—that fails to close after birth.
Normal closure: Functionally closes within ~72 hours in healthy term newborns; persistence causes aortic blood to flow into the pulmonary artery.

2. Pathophysiology

Fetal: Ductus shunts right-sided output away from lungs into the aorta.
Postnatal persistence: Left-to-right shunt → ↑ pulmonary blood flow → pulmonary overcirculation, left-sided volume overload, LV dilation/hypertrophy, and heart failure if significant.

3. Risk Factors & Etiology

- Prematurity (immature ductal smooth muscle responsiveness).
- Low birth weight.
- Maternal rubella infection.
- Genetic associations (e.g., trisomy 21, trisomy 18).

4. Clinical Features

Symptoms by size:

Small PDA	Usually asymptomatic; incidental murmur.
Moderate–Large PDA	Failure to thrive, tachypnea, diaphoresis with feeds, recurrent chest infections, features of heart failure.

Characteristic signs:

- Continuous, machinery-like murmur at left infraclavicular area.
- Wide pulse pressure and bounding peripheral pulses.

5. Diagnosis

- Chest X-ray: Cardiomegaly with ↑ pulmonary vascularity (if shunt is large).
- Echocardiography with Doppler (confirmatory): Visualizes duct, direction/velocity of flow; quantifies shunt.
- ECG: LVH ± LA enlargement in significant PDAs.
- Cardiac catheterization: Rarely for diagnosis; used for device closure planning.

6. Management

Approach	Who/When	What	Notes
Conservative	Preterm neonates with mild symptoms	Watchful waiting	Spontaneous closure can occur
Medical	Preterm infants (first 2 weeks)	Indomethacin / Ibuprofen (↓ PGE_2)	Monitor renal perfusion, platelets; contraindications apply
Interventional	Term infants/children with significant shunt	Transcatheter device (coil/occluder)	Preferred when anatomy suits; short stay
Surgical	Failed medical/device, unsuitable anatomy, very small infants	Ligation/division	Excellent outcomes in experienced centers

Supportive/adjunctive care:

- Diuretics and fluid optimization for heart failure symptoms pending closure.
- Nutritional support in failure to thrive.

7. Complications

- Congestive heart failure (left-sided volume overload).
- Pulmonary hypertension; if long-standing, risk of irreversible vascular disease.
- Infective endarteritis/endocarditis (turbulent flow).
- Eisenmenger physiology (rare): shunt reversal to right-to-left with cyanosis.

8. Prognosis

Small PDAs: Often close spontaneously; may be observed.
Moderate/Large PDAs: Intervention prevents heart failure and pulmonary vascular disease; outcomes excellent with timely closure.

9. Summary & Key Points

- Think PDA in preterm infant with wide pulse pressure and continuous murmur.
- Echo with Doppler confirms diagnosis and quantifies shunt.
- Preterm: trial indomethacin/ibuprofen early; Term/older infants: device closure preferred.
- Untreated significant shunts risk CHF, pulmonary hypertension, and rarely Eisenmenger syndrome.

Exam Triggers	Machinery murmur • Bounding pulses • Wide pulse pressure • Preterm infant • Echo confirms • Indomethacin/ibuprofen in preterm • Device closure in older infants