Little Pipes, Big Problems: Unveiling Ductal Dependent Lesions in Pediatrics

Emily C Dawson MD

May 2, 2024

Disclosures

Dr. Dawson has no significant financial relationships to report

Session Objectives

1. Recognize the clinical manifestations of ductal dependent lesions in pediatric patients

2. Implement effective emergency management strategies for ductal dependent lesions in the pediatric population

3. Gain knowledge of pharmacological interventions and their role in stabilizing pediatric patients with ductal dependent lesions

4. Understand the importance of interdisciplinary collaboration in emergency situations involving ductal dependent lesions

What is your job?
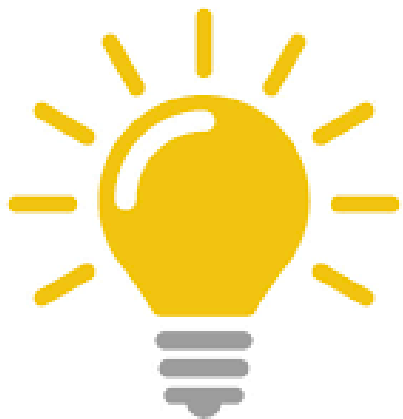
Fetal & Neonatal Circulation

Ductus/Ligamentous arteriosus

Foramen/Fossa Ovale

Ductus/Ligamentous Venosus
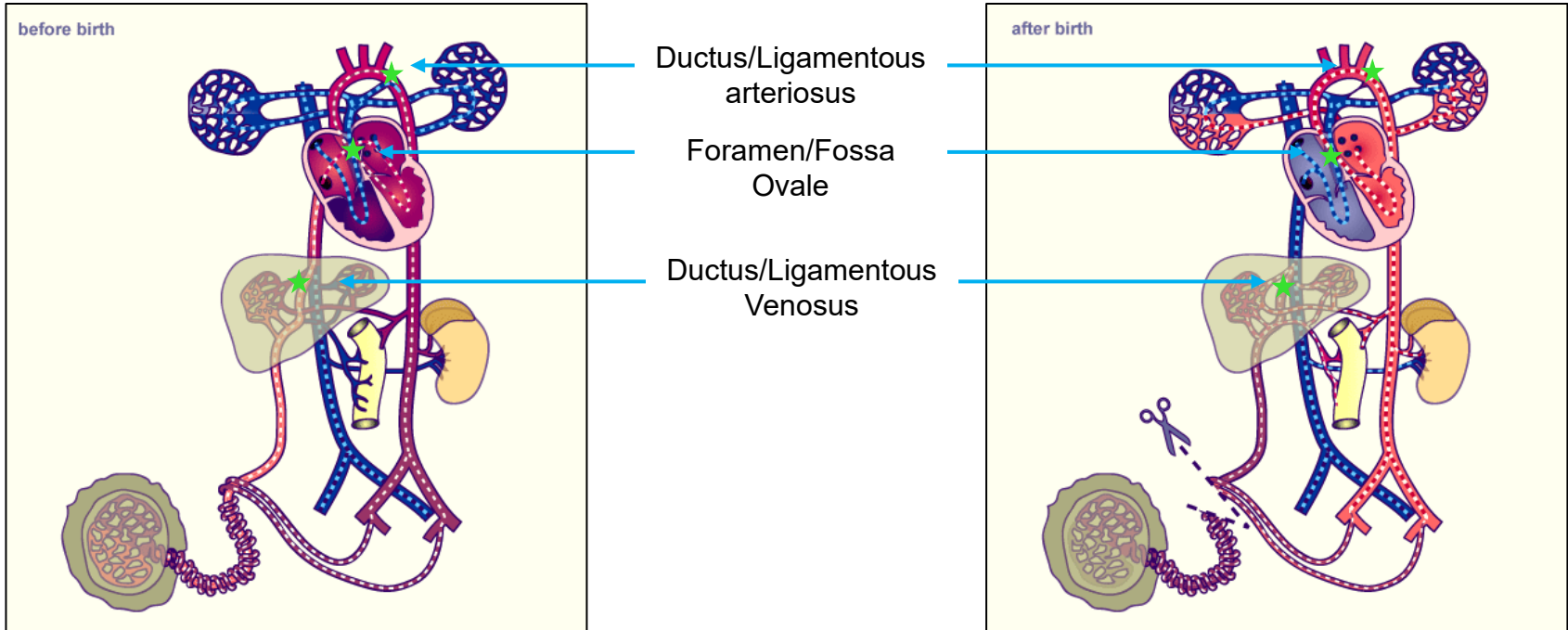
What is a Ductal Dependent Lesion?

1. Congenital heart defects in which the circulation of blood through the body is dependent on the patency of the ductus arteriosus (connects the pulmonary artery to the aorta in fetal circulation)

2. In these lesions, the ductus arteriosus needs to remain open for blood to flow properly to the body.

3. Closure of the ductus arteriosus can lead to severe cardiovascular compromise and life-threatening consequences.

Ductal Dependent Circulation
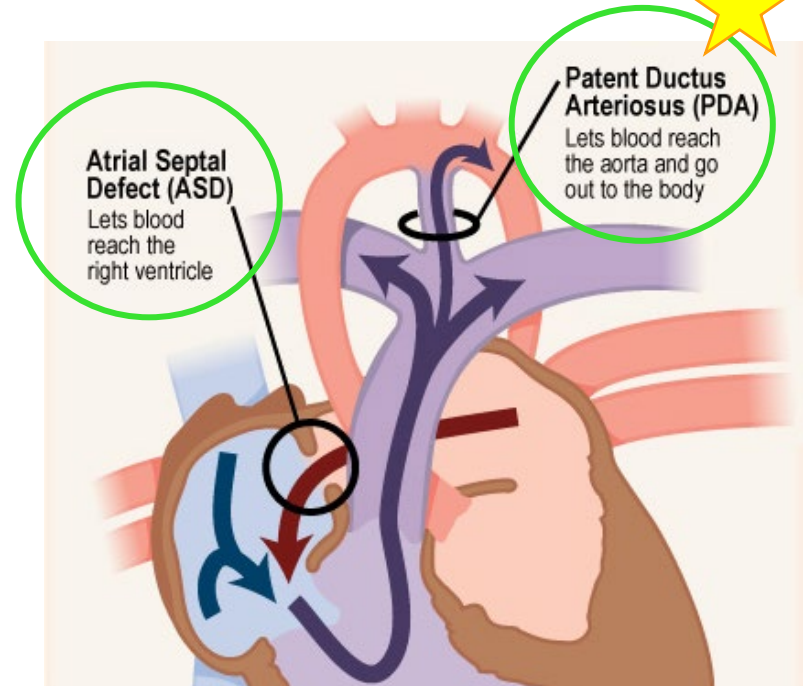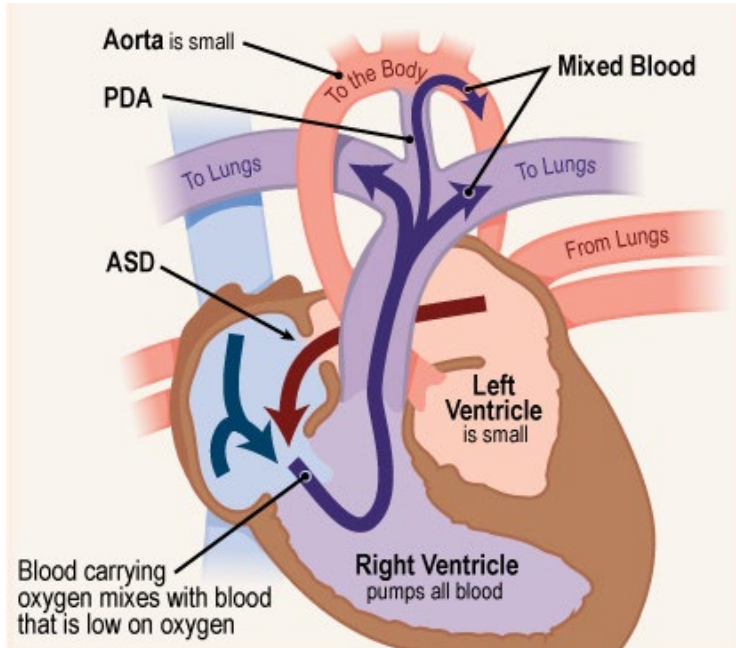
Recognize

Recognize: Cardiovascular Shock

- Presentation: most common within <u>2 weeks after birth</u>
- Hx: doing well initially, acute change in previous 24h, poor feeding, poor uop, change in color, change in activity
- Birth Hx: limited or no prenatal care, home birth
- Tachycardic or bradycardic, low BPs, axillary vs femoral pulses
- Increased wob, grunting, nasal flaring
- Hepatomegaly secondary to poor cardiac function
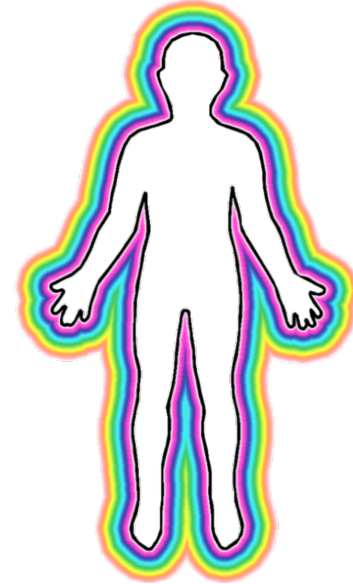- Limp, listless or obtunded

Management: Band-Aids

- **A**: airway → protected airway, to intubate or not to intubate??

- **B:** breathing → support WOB, decrease metabolic demand

- **C:** circulation → access, keep the duct ***OPEN***

- **D:** dextrose → treat hypoglycemia

Balance the Circulation

$$\frac{Qp\ (1):\ Sat\ Ao\ (75) - Sat\ SVC\ (50)}{Qs\ (1):\ Sat\ PV\ (100) - Sat\ PA\ (75)}$$

ABG goal: 7.40/40/40

O2 sat ~ 75%

↓

Helps ensure Qp:Qs 1:1

Equation Reminder!

BP = CO x SVR

$\downarrow$

HR x SV

$\downarrow$

preload, afterload, contractility

Balance the Circulation

R ⟷ L

PVR
pH
O2
CO2
parenchyma
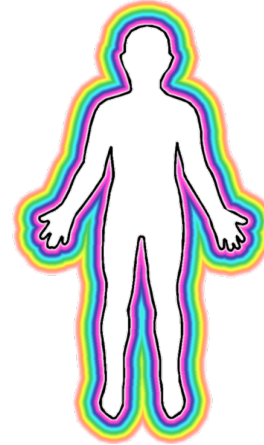
SVR
pH
O2
CO2
crying
volume status
afterload
reduction/
support

Advocate Children's Hospital®
Now part of ADVOCATE HEALTH

Management: Band-Aids

Management: Band-Aids

- ***Keep the pump full, keep the duct open, balance the circulation, support CO and get the baby out!***
  - Have someone call for transfer and connect with a pediatric cardiologist while you start resuscitation
  - Get PGE ordered!!!!!!!
  - HFNC, Intubate, limit FiO2
  - Access: Umbilical, IO, IV

Management: Band-Aids

- ***Goals: Open Duct, balance Qp:Qs, support CO***
  - Minimize supplemental O2 → goal O2 sat ~ 75%
  - IV fluid bolus: 10ml/kg isotonic, repeat prn
  - PGE infusion: 0.05 – 0.1 mcg/kg/min
    - Side effects: apnea, bradycardia, hypotension
  - Epinephrine infusion: 0.03 mcg/kg/min
    - Titrate maintain MAP = 40 (gestation age in weeks)
  - Ca & HCO3 prn
    - CO in neonates is
    - HCO3 to help balance acid/base status (pH goal 7.4)

Advocate Children's Hospital®
Now part of ADVOCATE HEALTH

Phone a Friend: HELP!!!

- Call ASAP, no reason to wait!

- Know how to contact the closest pediatric tertiary/quaternary care center to get additional direction from <u>pediatric cardiologist</u>

- ***Essential to ensure clear, concise, and effective communication to facilitate timely decision-making and interventions***

  - Prepare relevant information, identify yourself, brief summary of patient status, request assistance and guidance, closed loop communication – be sure to clarify

Hey, hey, hey...Good-Bye

- Pediatric Critical Care Transport

- Safest & fastest possible way to Tertiary Pediatric Center

- ***Communication & handoff during pediatric critical care transport from one hospital to another are crucial for ensuring the safety and continuity of care for the pediatric patient***

  - Appropriate handoff to transport team and to receiving hospital (RN to RN, Physician to Physician)

    - Overview of the patient's condition: current clinical status, recent interventions, changes in VS and anticipated care needs during transport
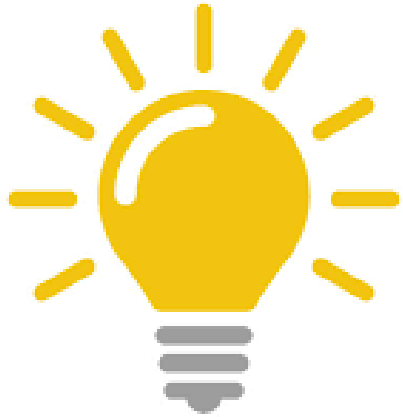
    - Closed loop communication

What Did We Learn Today

Questions