

# Neonatal Physiology for the Final FRCA

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# Session Outline

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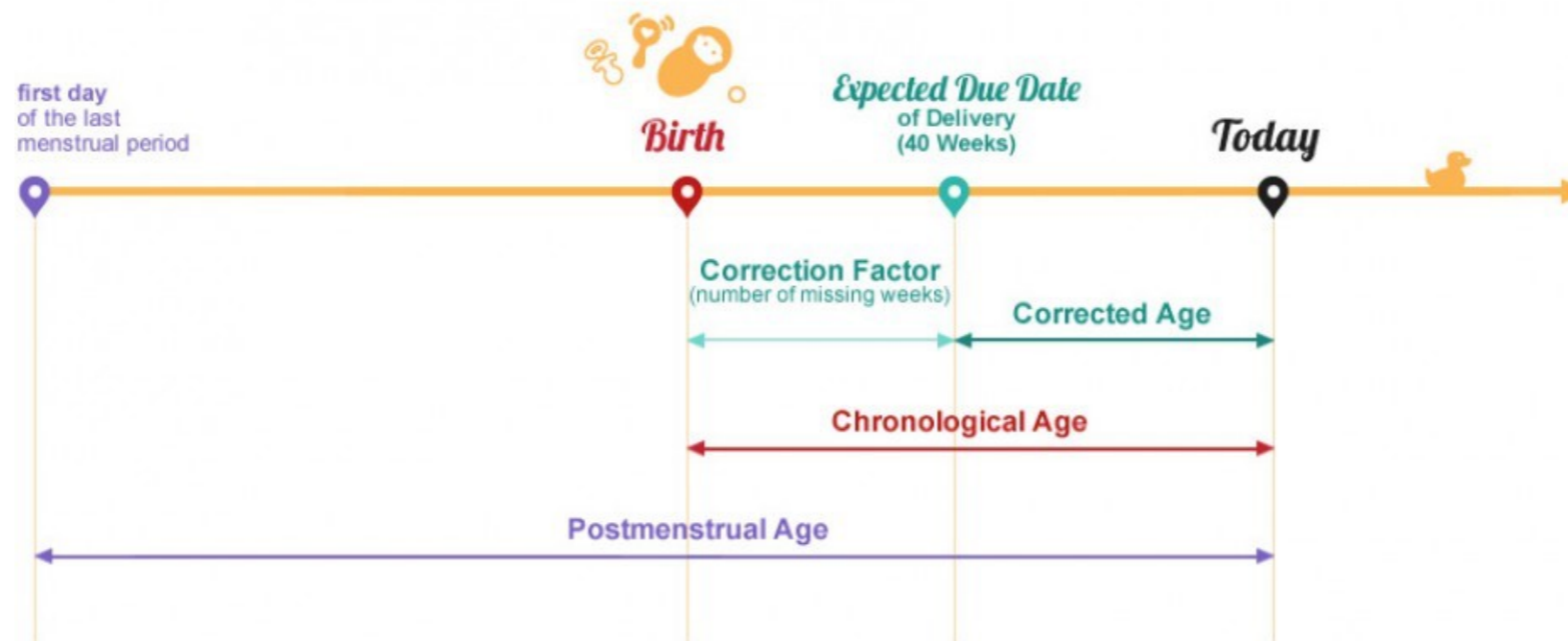
- Definitions
- Physiology: Airway
- Respiratory
- Cardiovascular
- Other organ systems
- Which procedures are relevant?
- Congenital Diaphragmatic Hernia in detail.

# What is a neonate?

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“Neonates include children up to age of 28 days of life, or older children who were born pre-term (<37 weeks)”

Preterm - “Babies with a birth date before 37 weeks completed gestation”

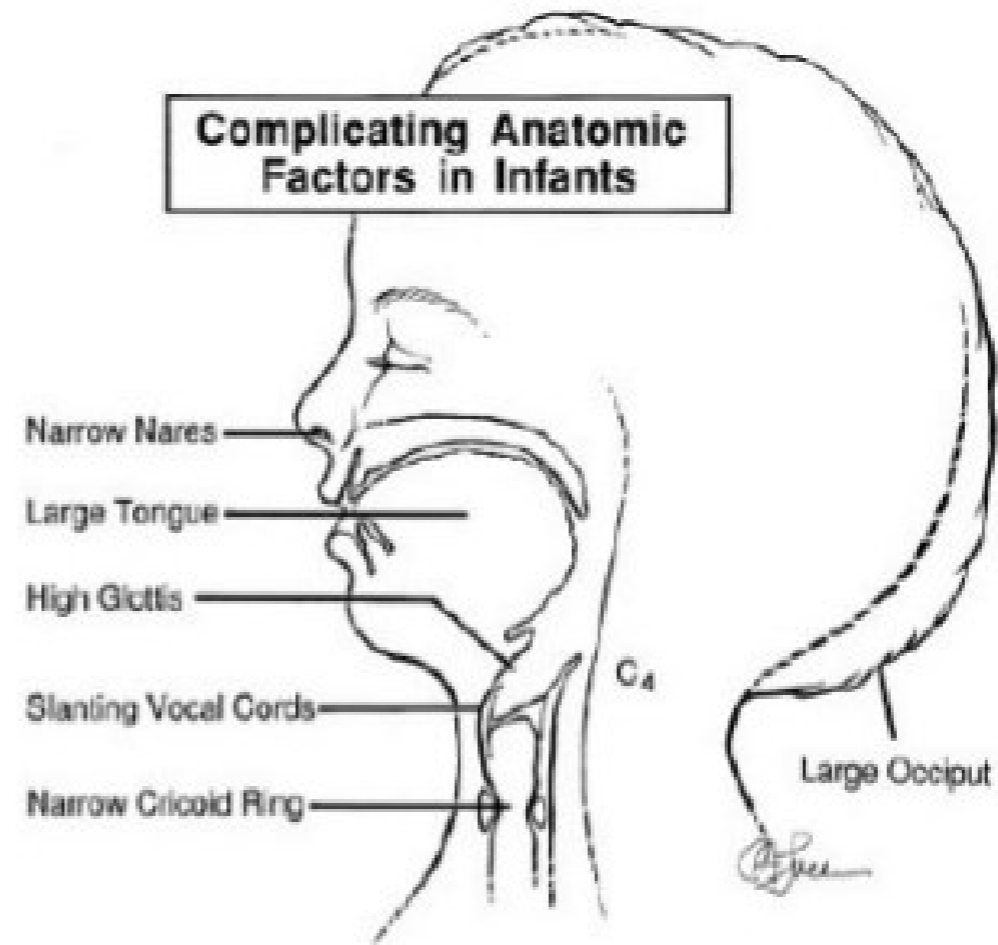


Physiology

# Physiology - Airway

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- High resistance
- Short trachea
- Pronounced reflexes



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**FIGURE 43-5.** Complicating anatomic factors in infants. (Modified with permission from Smith RM: *Anesthesia for Infants and Children*, 4th ed, p 16. St Louis, Mosby, 1980.)

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# Physiology - Respiratory


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- ↑ RR / minute vent. / WoB
- Diaphragmatic breathing
- ↓ FRC
- BPD
- Apnoea's

Apnoea Risk factors
Ex prem.
GA
Hx of apnoea
Hb <100
Neurological disease
Chronic lung disease
<60 weeks (PMA)

# Physiology - Circulation

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-  HR/CO (100-200bpm)
- Fixed SV
- Blood volume
- Hb (180-200 at term, 130-140 in prematurity)
- Shunts (PFO/PDA)

# Physiology - Other systems

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- Glucose
- Renal - Immaturity of nephrons, (body water = 80% TBW)
- Hepatic
- Temperature



# Relevant procedures

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**Table 1** Surgical conditions requiring anaesthesia in the premature baby

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PDA ligation (20–30% incidence in moderately premature neonates)

Laparotomy for NEC or spontaneous bowel perforation

Laparotomy for re-anastomosis of bowel or relief of adhesions

Inguinal hernia repair (2% incidence in females and 7–30% incidence in males with 60% risk of incarceration)

Fundoplication for unresolving and symptomatic oesophageal reflux

Vascular access under X-ray control

Vitrectomy or laser surgery for retinopathy of prematurity

CSF drainage or ventriculoperitoneal shunt insertion for obstructive hydrocephalus after intraventricular haemorrhage

CT and MRI scanning to evaluate cerebral damage

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# Congenital Diaphragmatic Hernia

the diaphragm allowing abdominal organs to protrude into the thorax

# Introduction

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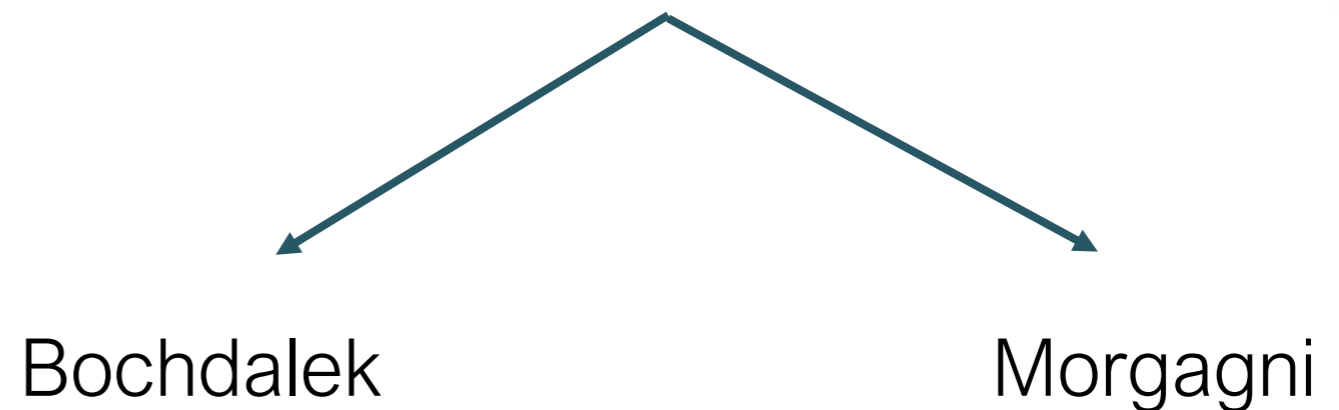
- Aetiology

- Classification

- Diagnosis

**Table 2** Classification of CDH according to size of defect

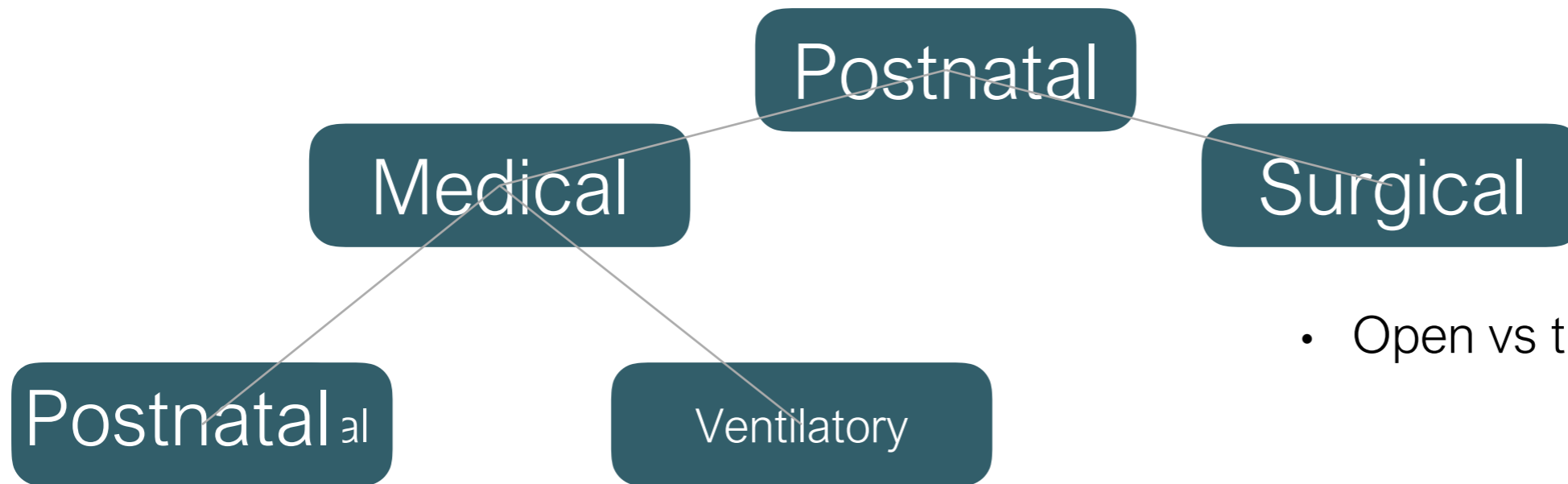
Type	Defect
A	Small defects entirely surrounded by muscle
B	<50% chest wall with absent diaphragmatic tissue
C	>50% chest wall with absent diaphragmatic tissue
D	Complete absence of hemidiaphragm



# Management

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- Antenatal - FETO



- Open vs thoracoscopic

- Sildenafil
- Prostacyclin
- Prostglandin E1
- ?NO
- Inotropes/pressors
- NMBs

- Peak <25cmH20
- PEEP 3-5cmH20
- Permissive hypercapnia
- HFOV
- ECMO

# Timing of surgery

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- Normal MAP (for gestation)
- Pre-ductal sats 85-95%  $FiO_2 < 0.5$
- Lactate  $< 3 \text{ mmol/L}$
- UO  $> 1 \text{ ml/Kg/h}$

**OR**

Repair on ECMO

# Pre-op assessment

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- Standard neonatal assessment
- Ventilatory settings (+/- ECMO need)
- CV support
- Pulm. HTN management
- Recent ABG

# Peri-operative management

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- Ventilation
- CV support
- Fluid balance
- NICU post op -initial deterioration expected.

# Prognosis

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**Table 3** Antenatal and postnatal prognostic indicators in CDH

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**Indicators of a poor prognosis**

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*Antenatal*

Liver herniation

Early gestational age at diagnosis

*Postnatal*

Large defect size

Cardiac abnormalities

Chromosomal abnormalities

Severe pulmonary hypertension

Low birth weight

Low Apgar score at 5 min

Small contralateral lung

Bilateral CDH

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# Long term sequelae

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- 31% mortality - 87% morbidity
- Respiratory
- Gastrointestinal
- Neurological

Any Questions?