Neonatal Respiratory Distress

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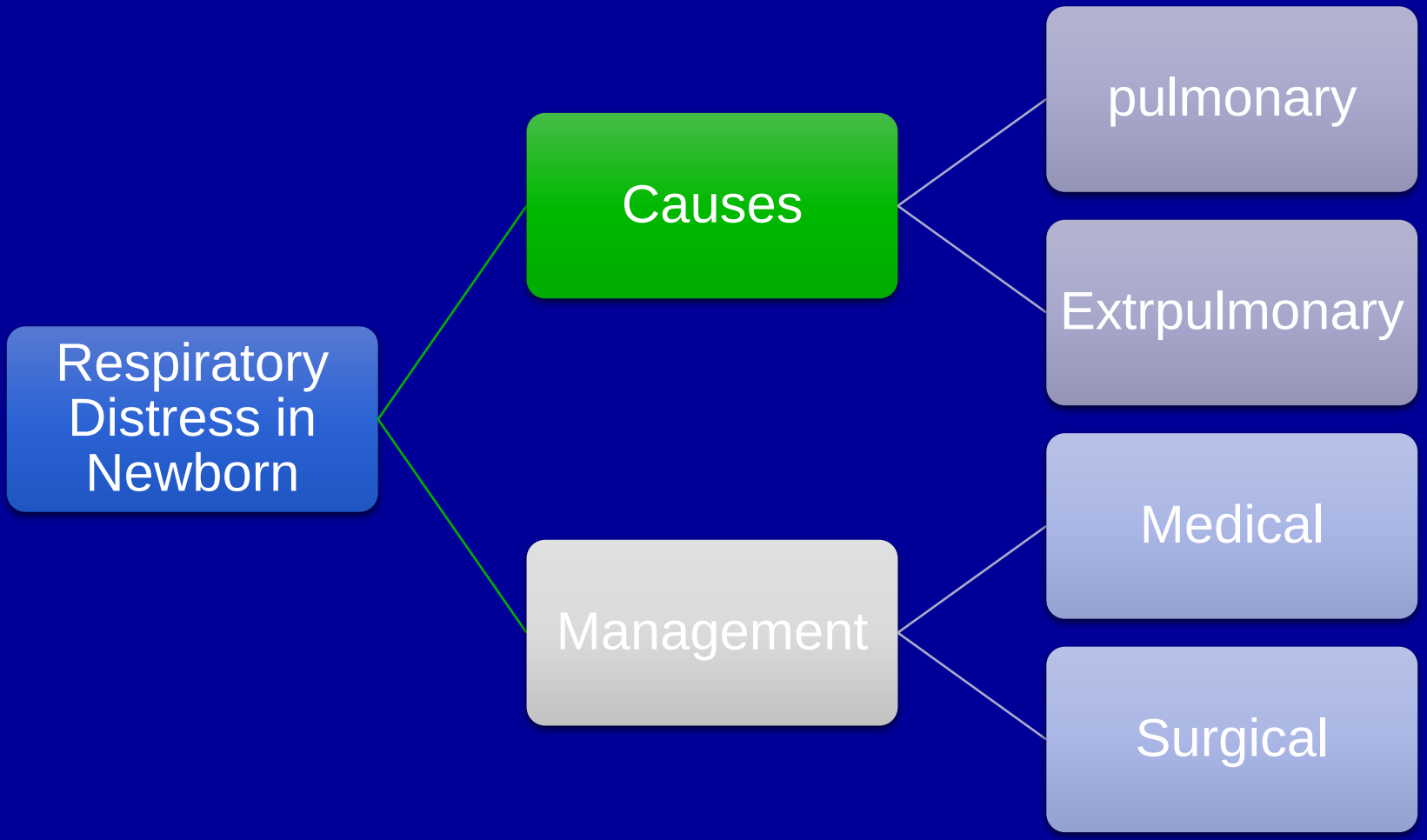
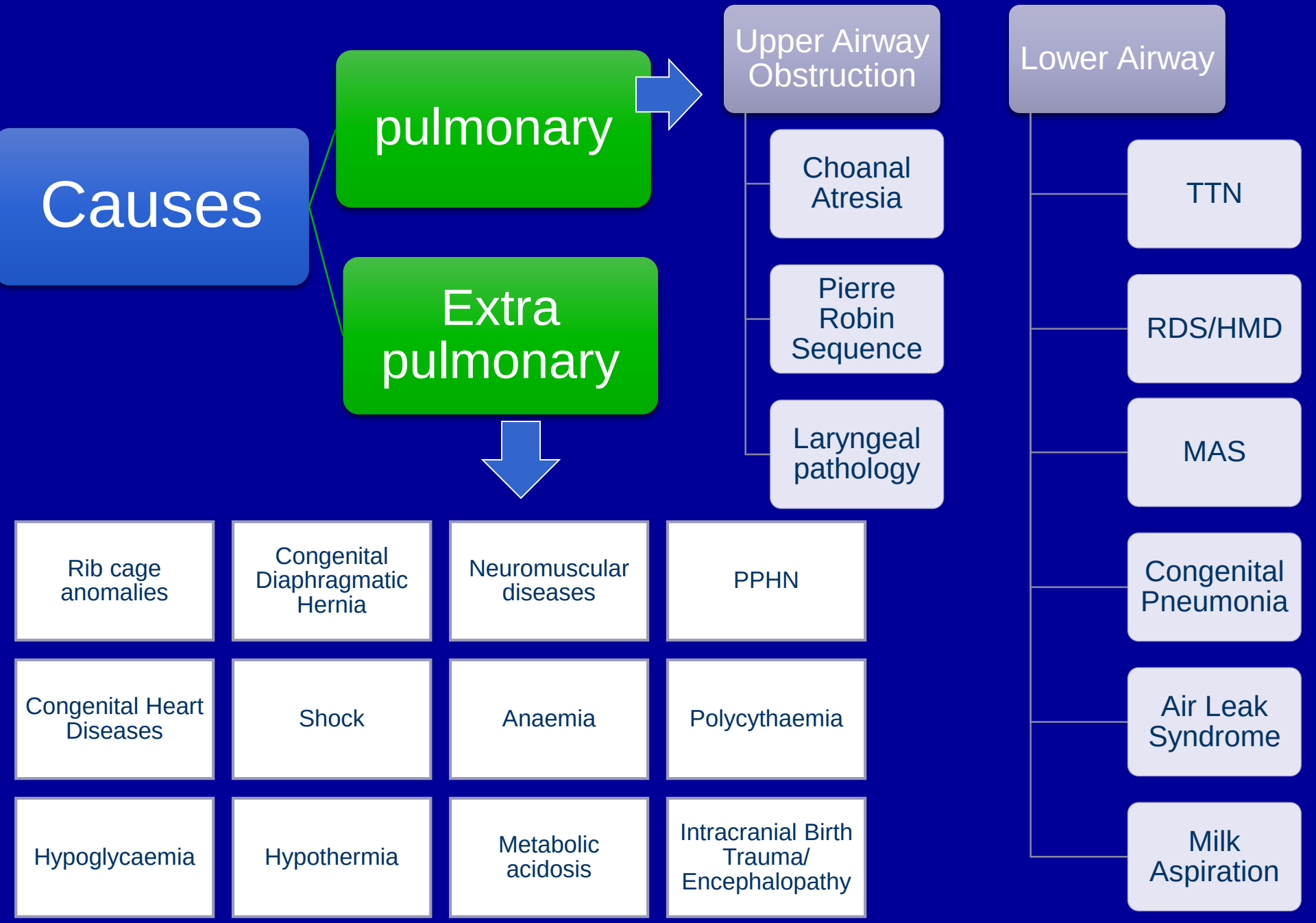
The objectives

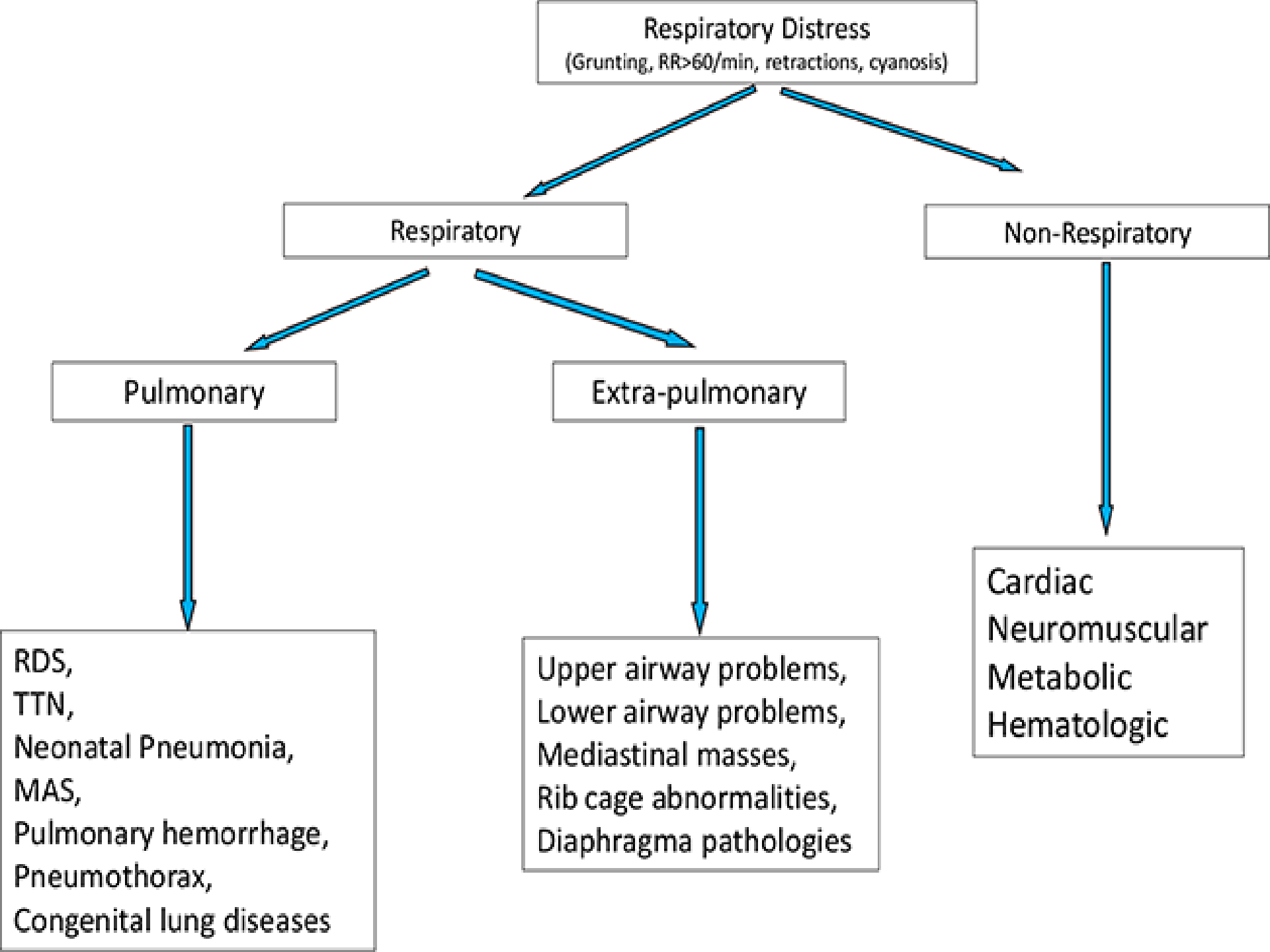
At the end of this lecture you should able to recognize :

- The causes and classification of neonatal respiratory problems
- The risk factors of RD in newborns
- Signs and symptoms of the common neonatal respiratory problems
- Prevention and management of RD in neonates

Causes and Classification

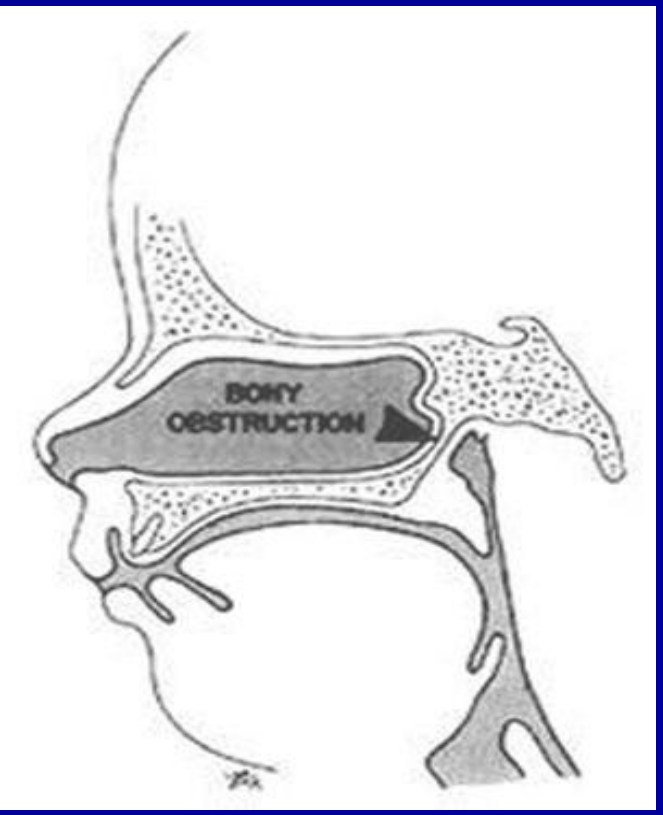



Causes
pulmonary
Extra pulmonary
Upper Airway Obstruction
Choanal Atresia
Pierre Robin Sequence
Laryngeal pathology
Lower Airway
TTN
RDS/HMD
MAS
Congenital Pneumonia
Air Leak Syndrome
Milk Aspiration
Rib cage anomalies
Congenital Diaphragmatic Hernia
Neuromuscular diseases
PPHN
Congenital Heart Diseases
Shock
Anaemia
Polycythaemia
Hypoglycaemia
Hypothermia
Metabolic acidosis
Intracranial Birth Trauma/ Encephalopathy


Respiratory Distress
(Grunting, RR>60/min, retractions, cyanosis)
Respiratory
Non-Respiratory
Pulmonary
Extra-pulmonary
RDS,
TTN,
Neonatal Pneumonia,
MAS,
Pulmonary hemorrhage,
Pneumothorax,
Congenital lung diseases
Upper airway problems,
Lower airway problems,
Mediastinal masses,
Rib cage abnormalities,
Diaphragma pathologies
Cardiac
Neuromuscular
Metabolic
Hematologic

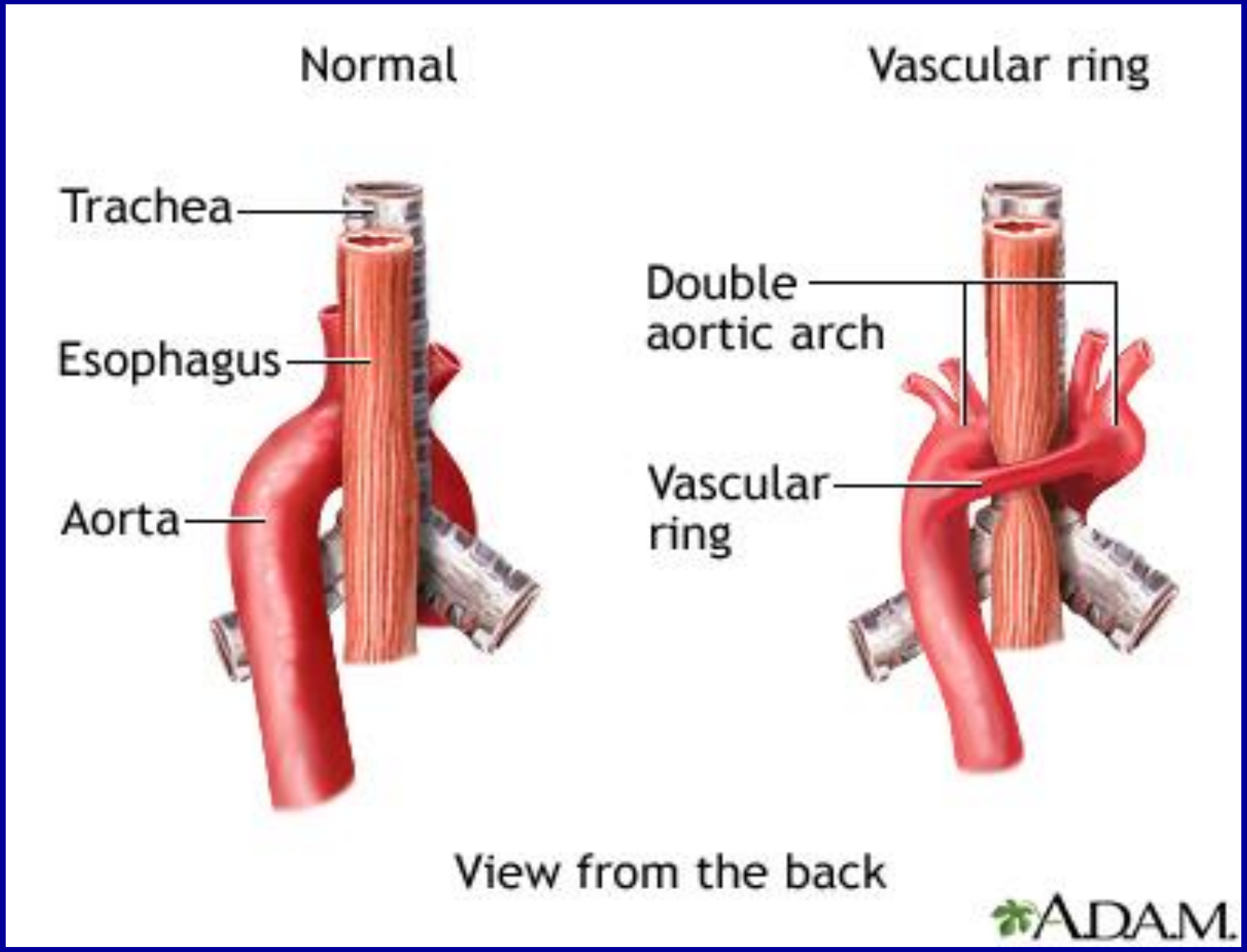
Upper Airway Disease

- Choanal atresia
- Pierre Robin sequence
- Vascular rings
- laryngomalacia



Choanal Atresia

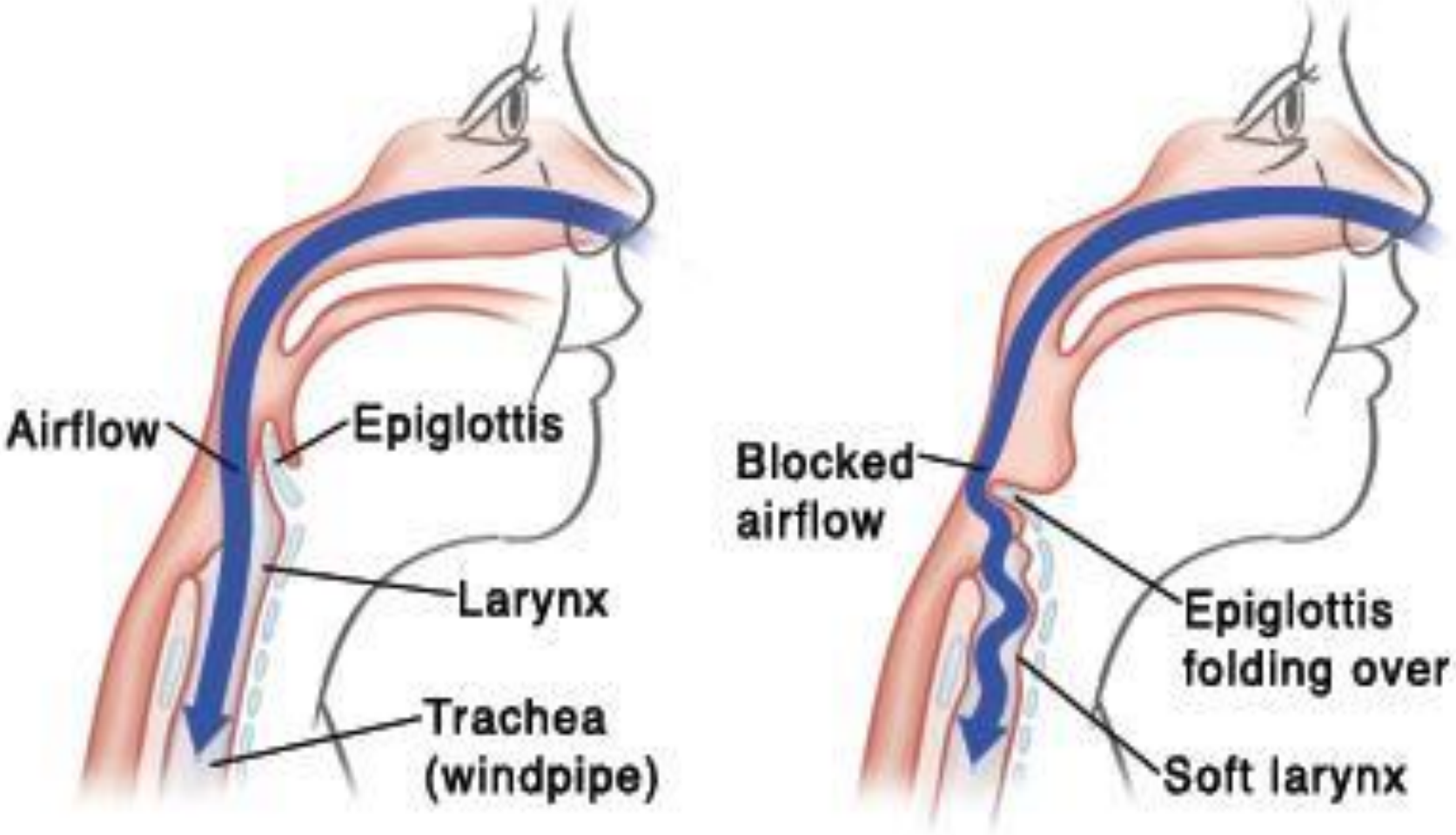
Pierre Robin Syndrome


Normal
Vascular ring
Trachea
Esophagus
Aorta
Double aortic arch
Vascular ring
View from the back
A.D.A.M.

What is laryngomalacia?

- Laryngomalacia (LM) is the commonest congenital laryngeal anomaly of the newborn characterized by **flaccid** laryngeal tissue and inward collapse of the **supraglottic** structures leading to **upper** airway obstruction

Jackson C, Jackson C. Diseases and injuries of the larynx. New York: MacMillan; 1942. p.63–9



A normal larynx and epiglottis allow air to flow freely into the trachea. With laryngomalacia, the soft larynx and epiglottis collapse as your child breathes in. This can partially block airflow, causing noisy breathing.

LARYNGOMALACIA

Normal larynx

Omega shaped larynx
(Laryngomalacia)

Laryngomalacia presents with inspiratory stridor which worsens with supine position, crying & feeding & improves in prone position.

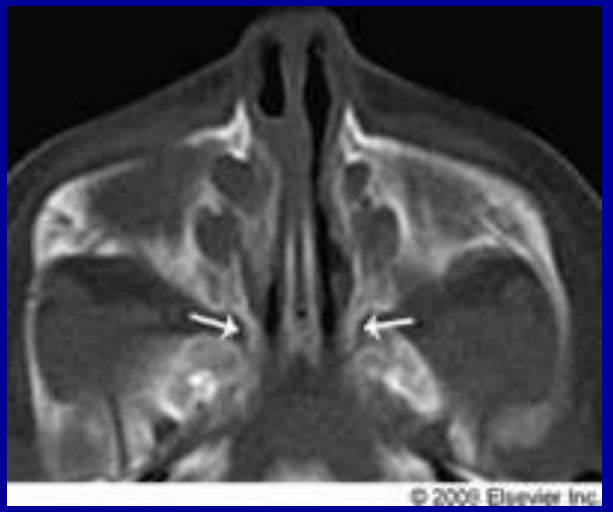
Choanal Atresia/Upper Airway Obstruction

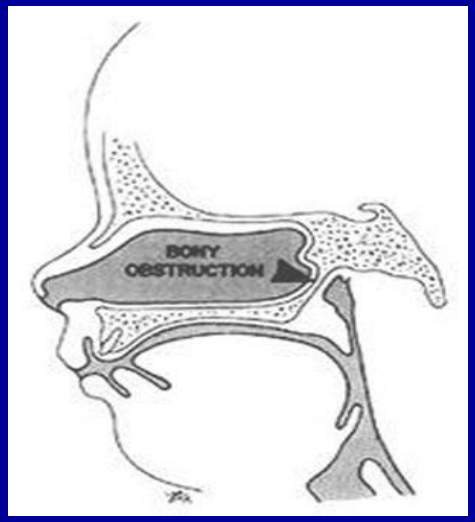
- Cyanotic when quiet or at rest, pink with crying
- Inability to pass suction catheter through nares
- Stridor

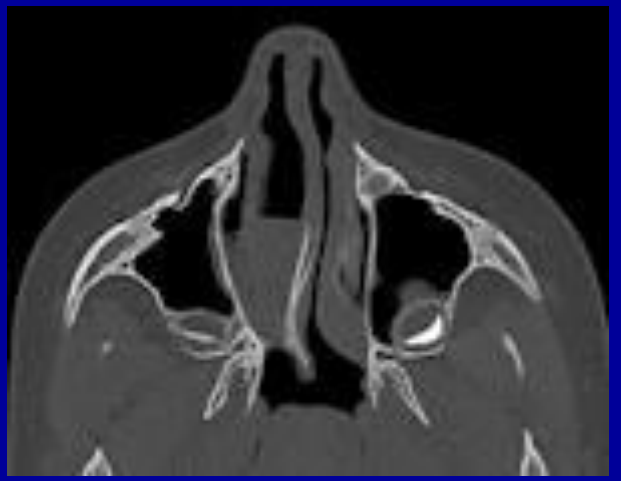
Types

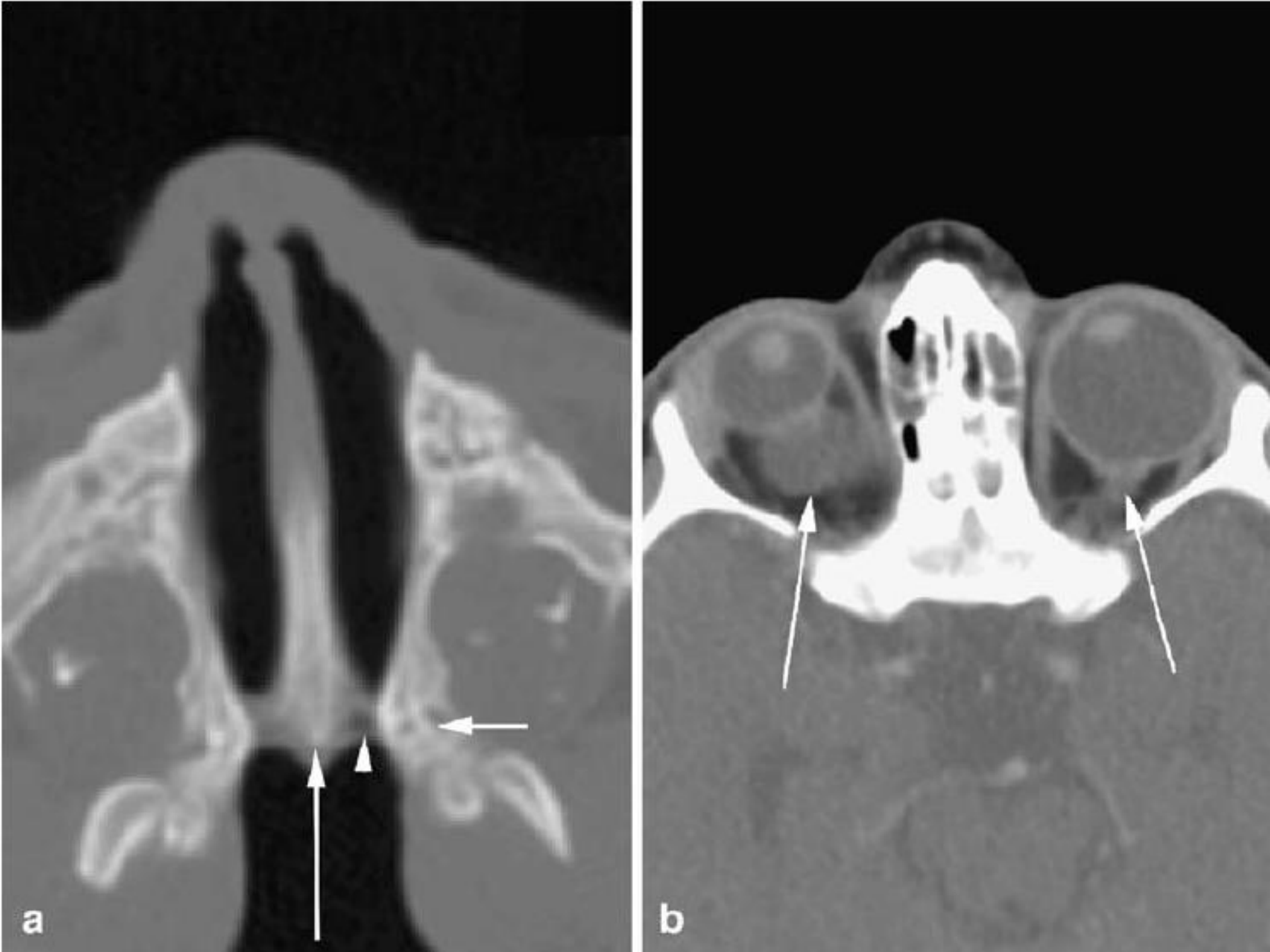
- Unilateral
- Bilateral

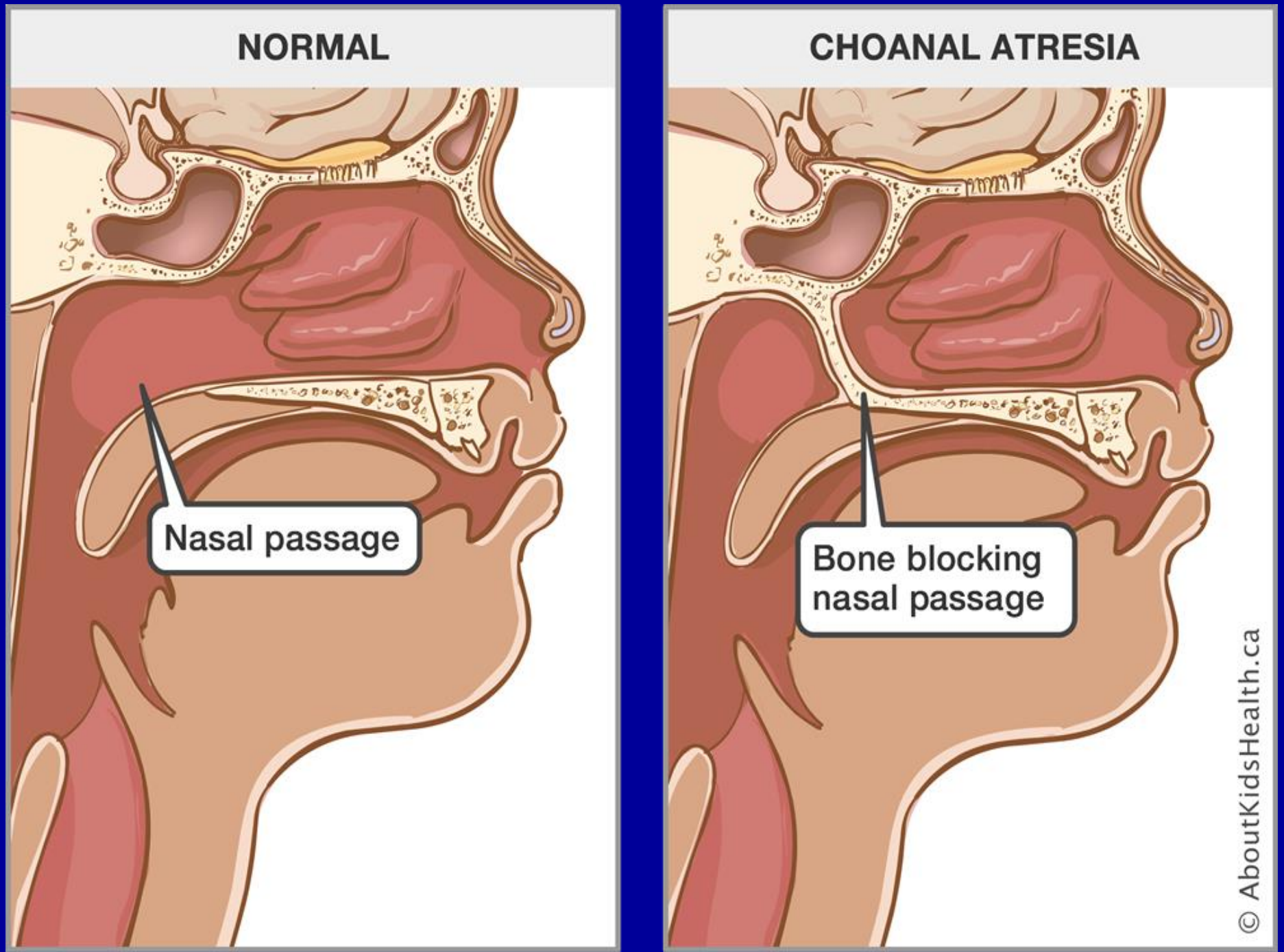
- Membranous
- Osseous








a
b


NORMAL
Nasal passage
CHOANAL ATRESIA
Bone blocking nasal passage
© AboutKidsHealth.ca

Upper airway obstruction

managment

- Insert an oral airway
- Provide oxygen
- Suction secretions
- May require intubation

Oropharyngeal airway

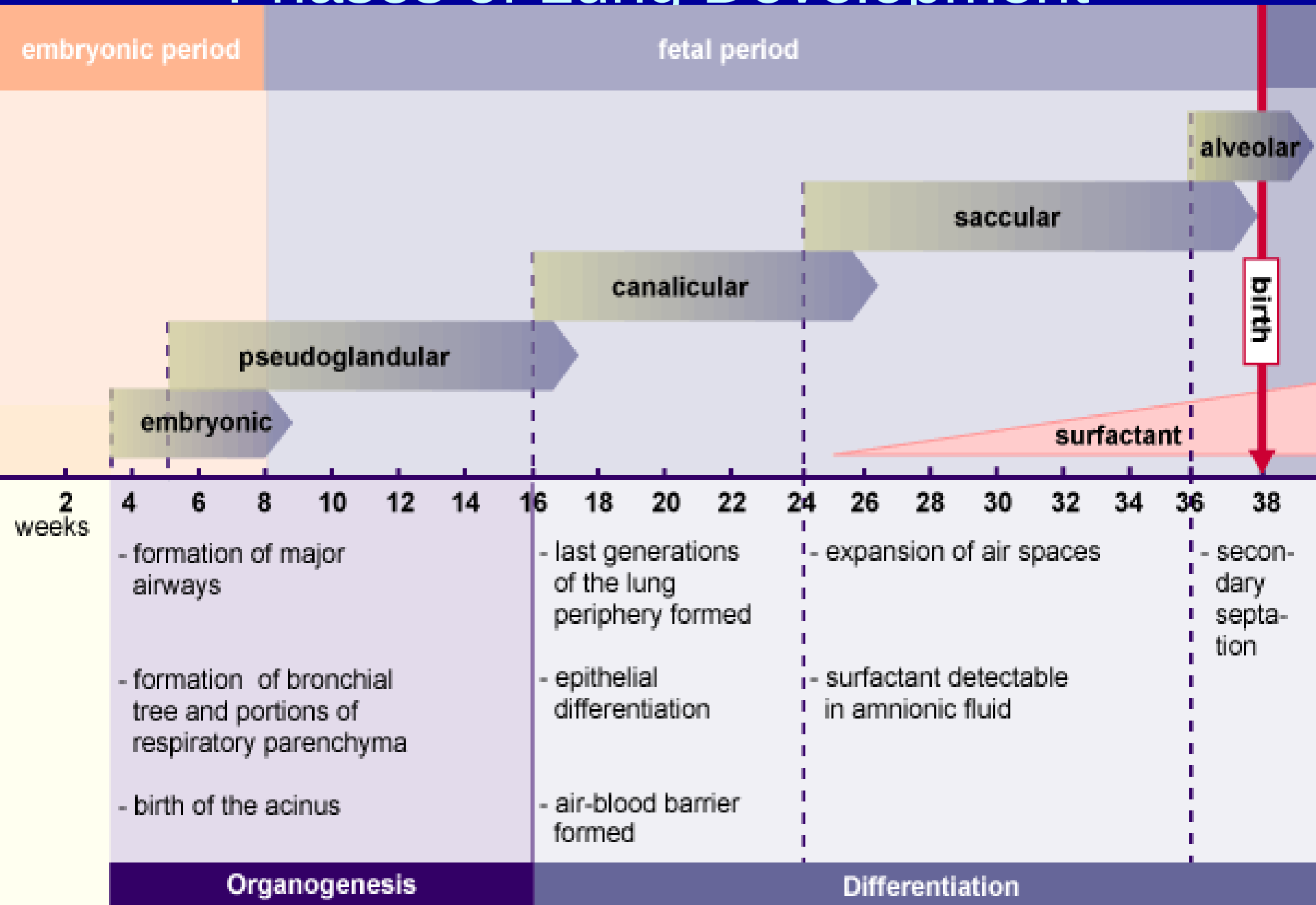
Fetal Lung Characteristics

- Decreased blood flow
  - caused by compression of the pulmonary capillaries by fetal lung fluid
- Pulmonary arteries
  - thick muscular layer present, very reactive to hypoxemia
- Lung fluid secretion
  - fetal lungs secrete fluid, adequate lung volume is necessary for fetal development
- Fetal breathing
  - contributes to fetal lung development, moves fluid in and out of fetal lung
- Surfactant
  - necessary amount to support breathing after birth, present after ~ 34 weeks gestation

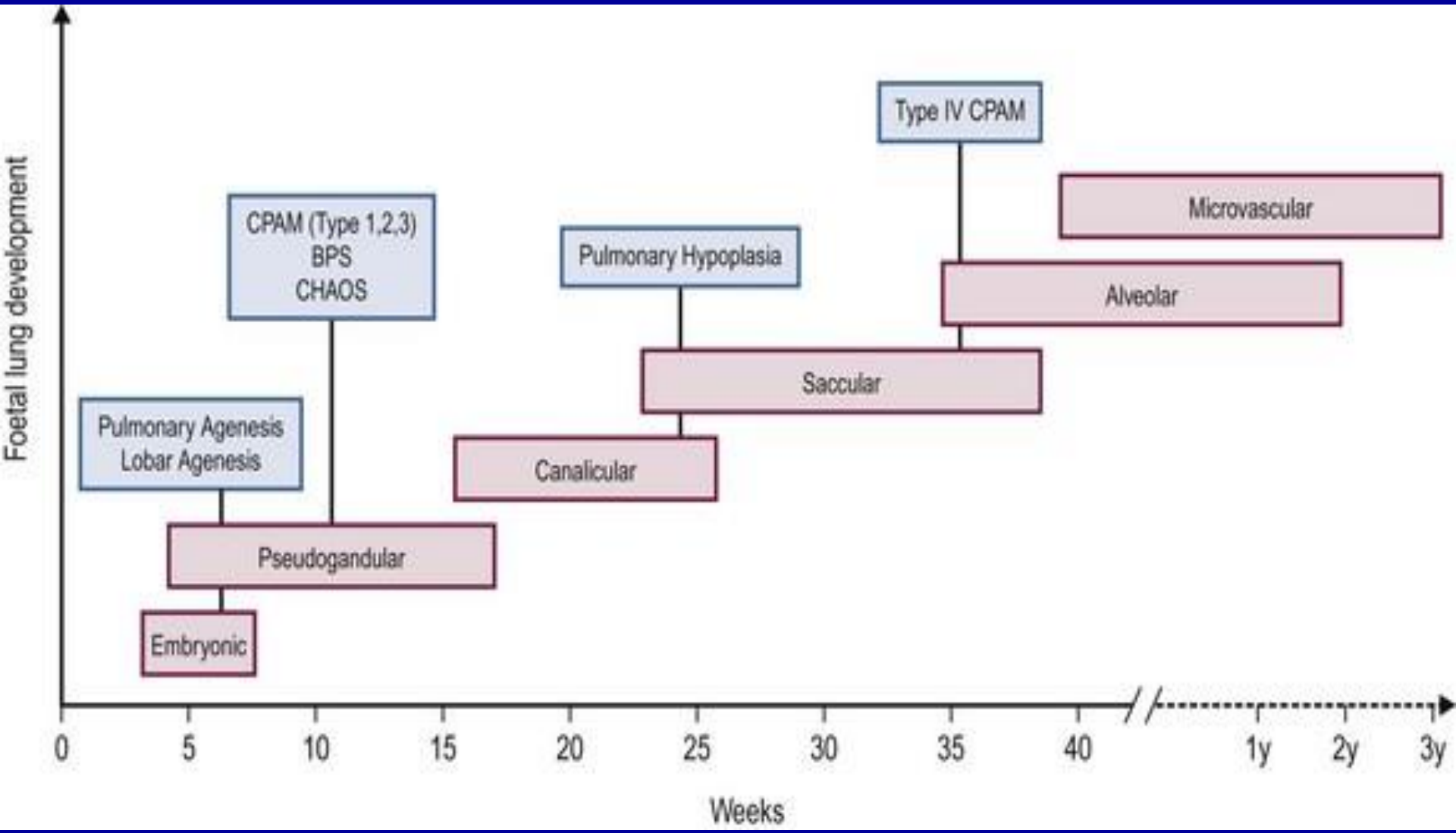
5 Major Phases Of FETAL LUNG DEVELOPMENT

Momjunction

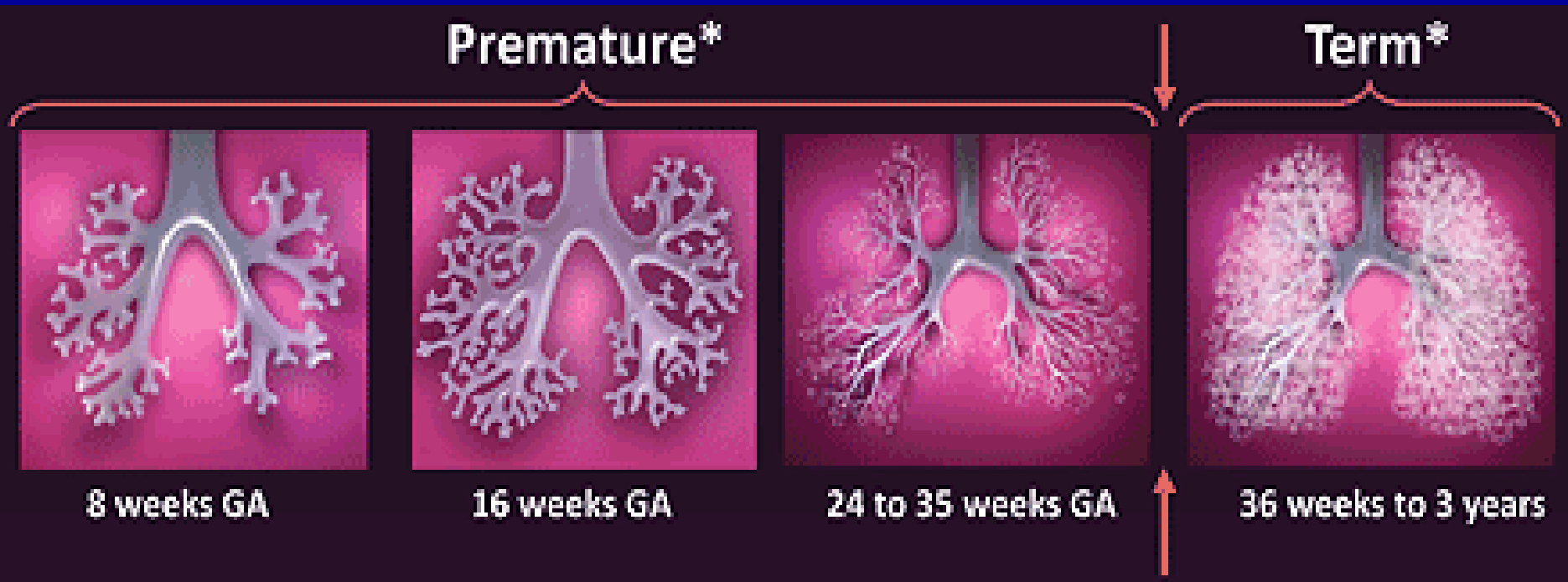
Phases of Lung Development



Lung Development



This graphic depicts milestones in fetal lung development and the timing for development of congenital bronchopulmonary malformations. CPAM, congenital pulmonary airway malformation; BPS, bronchopulmonary sequestration; CHAOS, congenital high airway obstruction syndrome.



- Although alveoli are present in some infants as early as 32 weeks GA, they are not uniformly present until 36 weeks GA[1]

*Pictures are artistic renditions of lung development and are designed to emphasize terminal acinus development and not the entire conducting airway system.[2]

1. Langston C et al. *Am Rev Respir Dis.* 1984;129:607-613.
2. Adapted from Moore KL, Persaud TVN. The respiratory system. In: The developing human: clinically oriented embryology. 7th ed. Philadelphia: Saunders, 2003. p. 241-53.

Assessment of Fetal Lung Maturity

- Lecithin/sphingomyelin (L/S) ratio
- Lamellar body counts
- Phosphatidylglycerol
  - After 35 weeks gestation

Fetal lung maturation tests

- Vaginal pool/amniosentesis for estimation of Phosphatidyl glycerol and L:S ratio (Lecithin-spingomyelin ratio), for assessment of fetal lung maturity
- Ratio is 1 upto 32 wk GA, then Lecithin increases while shingomyelin remains nearly the same
- Ratio of 2 or more at 35wk indicates lung maturity, <1.5 ass/c high risk of infant RDS
- Centrifuge at 1000 rpm for 3-5min, then TLC (thin layer chromatography)

Transition

- Clearance of fetal lung fluid
- Increased compliance
- Increased pulmonary blood flow

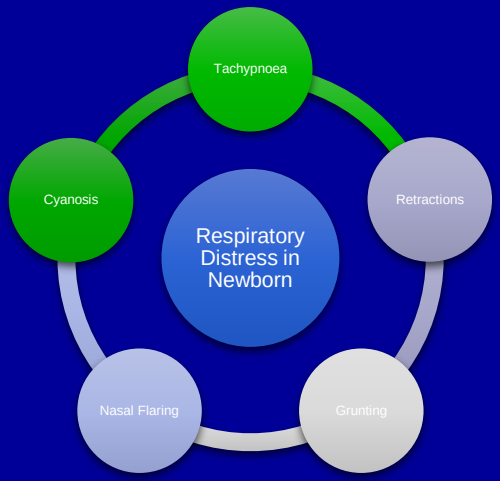
Respiratory distress in newborn

Neonatal Respiratory Distress Signs and symptoms

- Tachypnea (RR > 60/min)
- Nasal flaring
- Retraction
- Grunting
- Delayed or decreased air entry
- +/- Cyanosis
- +/- Desaturation

Normal nostrils

Flared nostrils

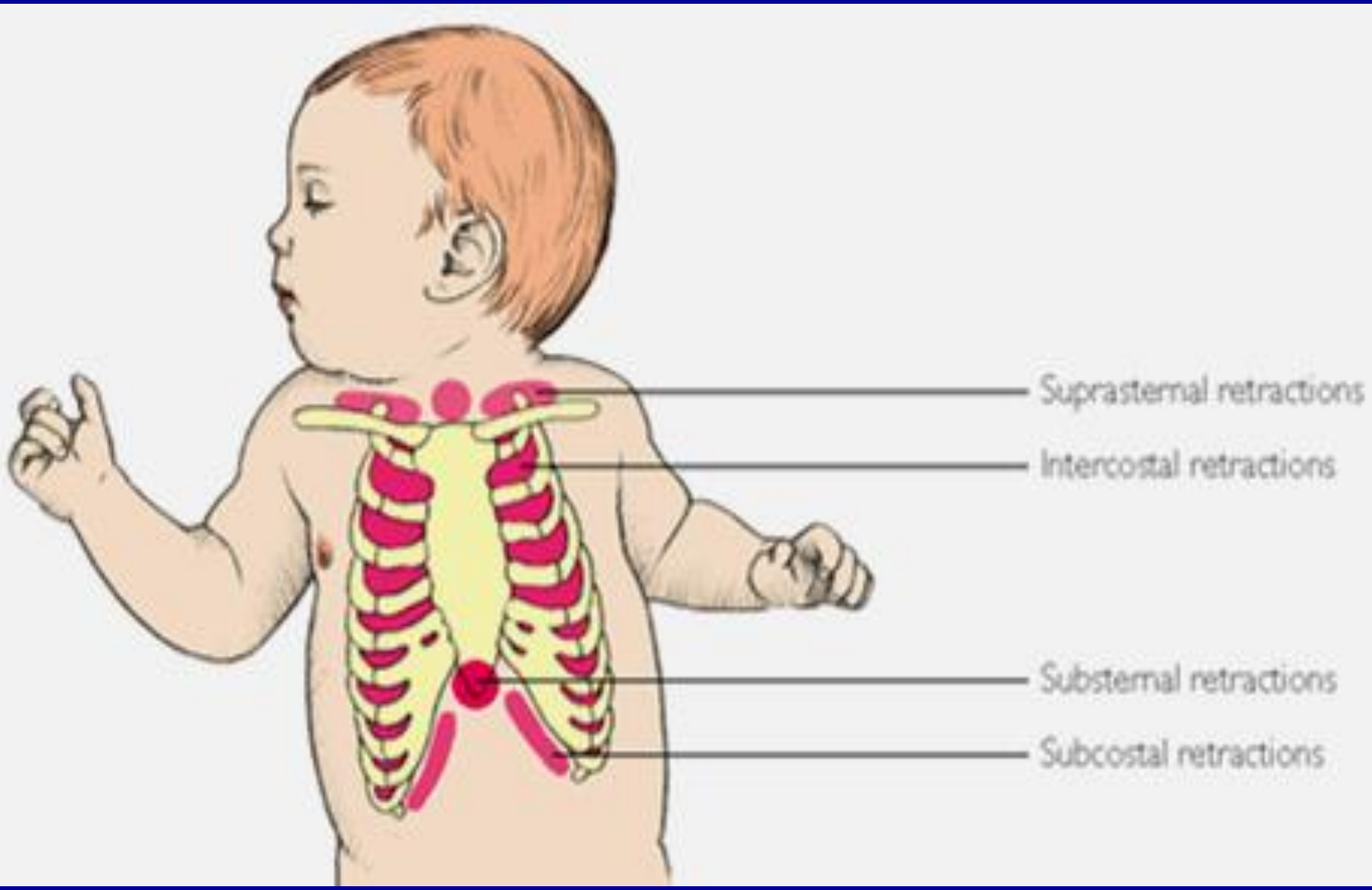


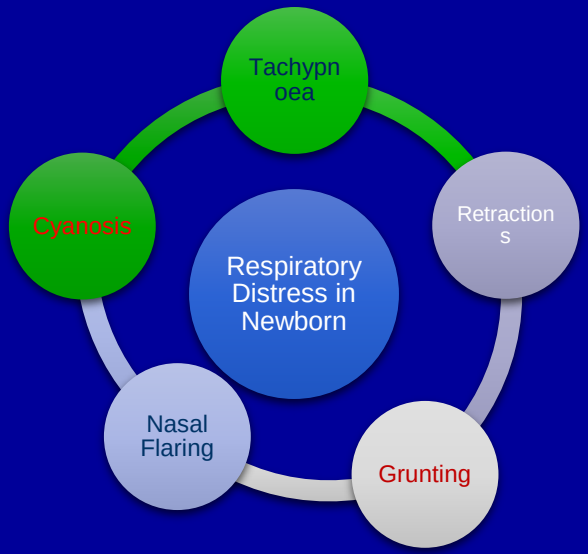
Nasal Flaring

- Narrow nasal space contributes to total lung resistance
- Nasal flaring decreases the work of breathing

Subcostal Retraction SCR

Intercostal Retraction
ICR

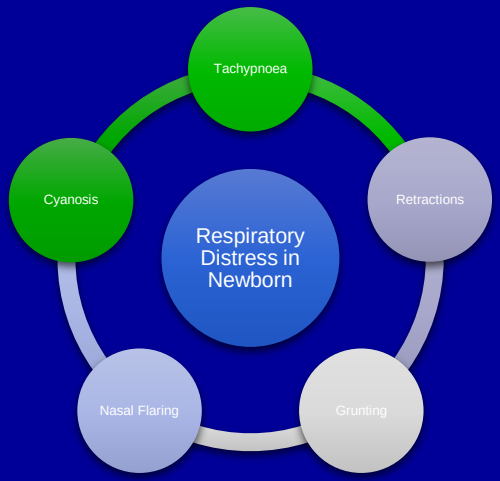

Suprasternal retractions
Intercostal retractions
Substernal retractions
Subcostal retractions

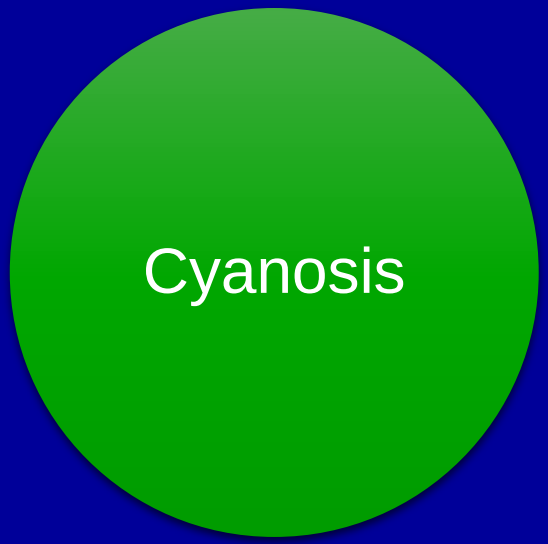


Grunting

- Expiration through partially closed vocal cords to increase airway pressure and lung volume resulting in improved ventilation-perfusion (V/P) ratio
- Low pitched expiratory sound.
- Protective phenomenon to prevent collapse of alveoli: PEEP

grunting





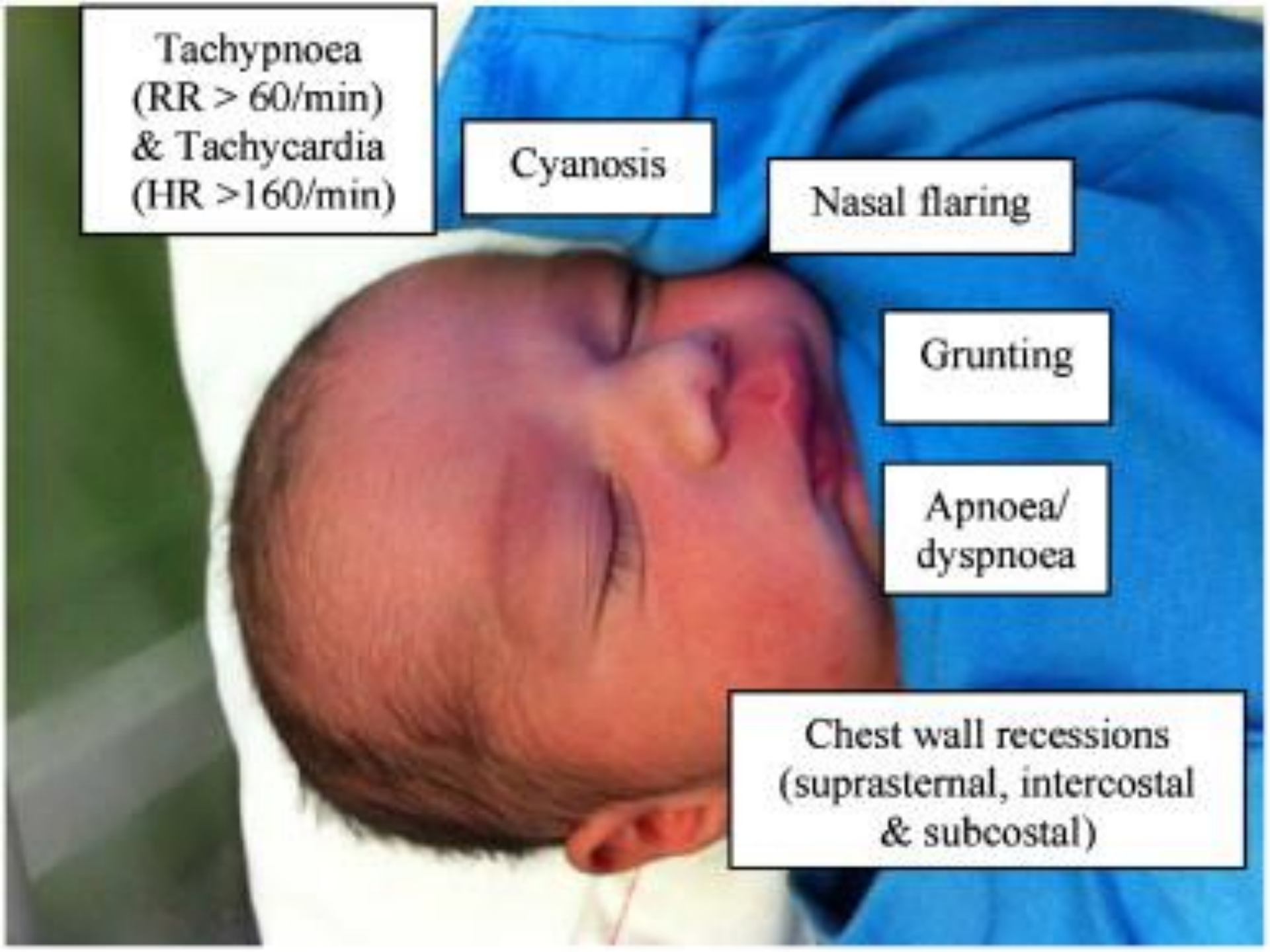
- Clinical detection of cyanosis depends on total amount of desaturated HB in blood
  - Anaemic infants may have low PaO_2 that is missed clinically
  - Polycythaemic infants with normal PaO_2 can appear cyanotic

Cyanotic Baby

Pink Baby

What respiratory distress signs you can see here in this child?

Central cyanosis, +ICR, +SCR, +NF


Tachypnoea
(RR > 60/min)
& Tachycardia
(HR >160/min)
Cyanosis
Nasal flaring
Grunting
Apnoea/
dyspnoea
Chest wall recessions
(suprasternal, intercostal
& subcostal)

score		0	1	2
Respiratory Rate (breaths/min)		60	60 – 80	>80 or apnea episode
cyanosis		None	In room air	In40%oxygen
retraction	Retraction	None	Mild	Moderate to severe
	Grunting	None	Audible with a stethoscope	Audible without a stethoscope
Crying		clear	decreased	Barely audible

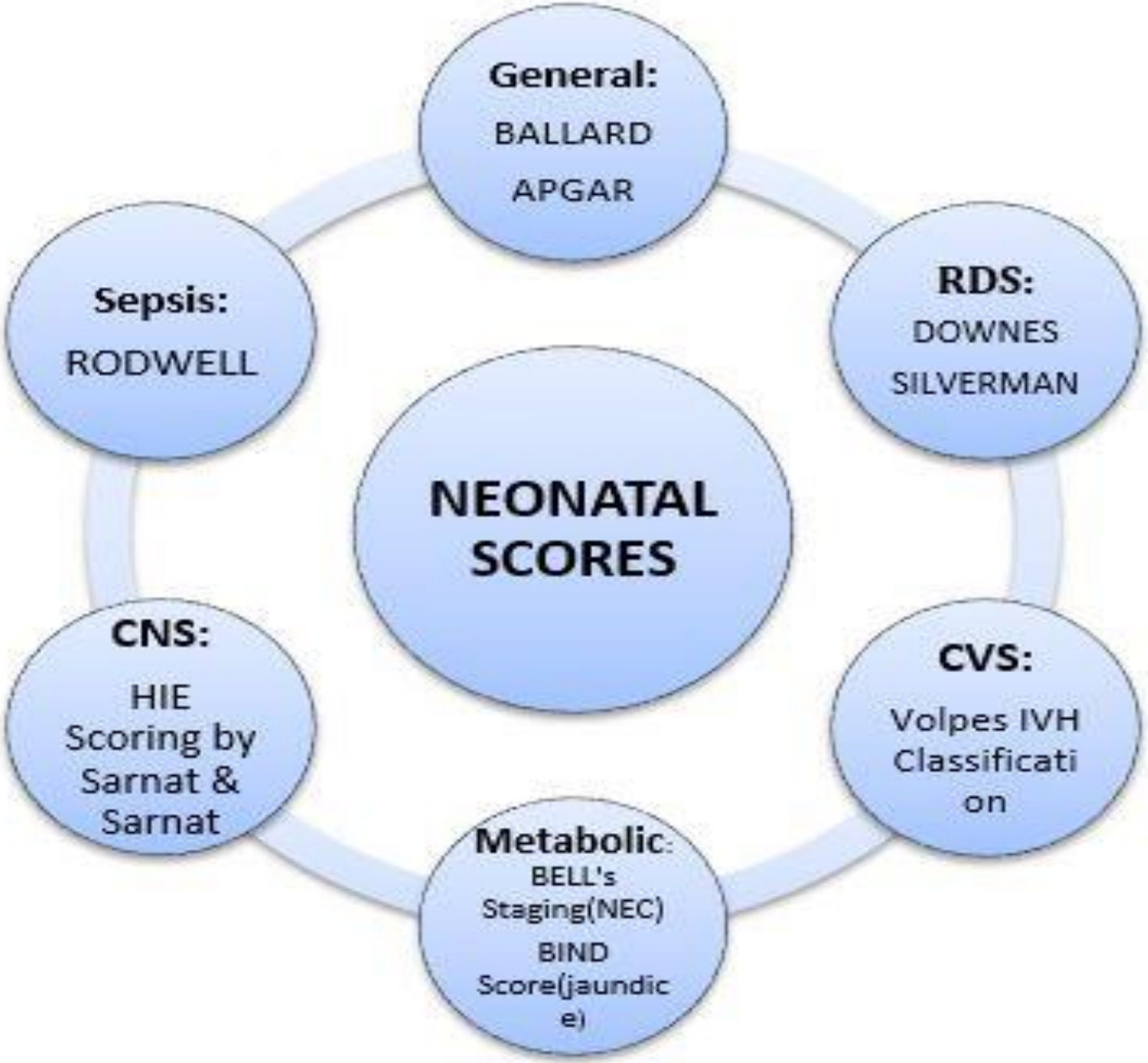
Downes' score

Score	Respiratory rate	Cyanosis	Air entry	Grunt	Retraction
0	<60/min	Nil	Normal	None	Nil
1	60- 80/min	In room air	Mild ?	Ausc with stethoscope	Mild
2	>80/min	present	Marked ?	Audible with naked ear	Moderate

- Mild: 0-3, moderate: 4-6 , severe: 7-10
- A score of >6 is indicative of impending respiratory failure.

Score

Feature observed	0	1	2
Chest movement	 Synchronized respirations	 Lag on respirations	 Seesaw respirations
Intercostal retraction	 None	 Just visible	 Marked
Xiphoid retraction	 None	 Just visible	 Marked
Nares dilation	 None	 Minimal	 Marked
Expiratory grunt	 None	 Audible by stethoscope	 Audible by unaided ear


General:
BALLARD
APGAR
RDS:
DOWNES
SILVERMAN
CVS:
Volpes IVH
Classificati
on
Metabolic:
BELL's
Staging(NEC)
BIND
Score(jaundic
e)
CNS:
HIE
Scoring by
Sarnat &
Sarnat
Sepsis:
RODWELL
NEONATAL
SCORES

Neonatal Respiratory Distress

Etiologies

Pulmonary causes

- RDS
- Pneumonia
- TTN
- MAS
- Other aspiration syndrome
- Air leak syndrome
- Lung hemorrhage
- Lung hypoplasia
- Congenital malformations

Systemic causes

- Infections
- Metabolic causes
- Temperature
- Anemia Polycythemia
- Congenital heart disease
- Pulmonary hypertension
- Neuromuscular disorder

Anatomic causes

- Upper airway obstruction
- Airway malformation
- Space occupying lesion
- Rib cage anomalies
- Phrenic nerve injury

diagnosis : Hx, Phx and L.F

Neonatal Respiratory Distress Algorithm

Respiratory Distress

(tachypnoea, retractions, grunt)

Preterm

< 6hrs old

HMD (RDS)
Pneumonia
Lung anomaly

> 6hrs old

Pneumonia
CHD
Pul. Hemorrhage

Term

< 6hrs old

TTN
MAS/PPHN
Asphyxia
Lung anomaly
Air leak

> 6hrs old

Pneumonia
CHD

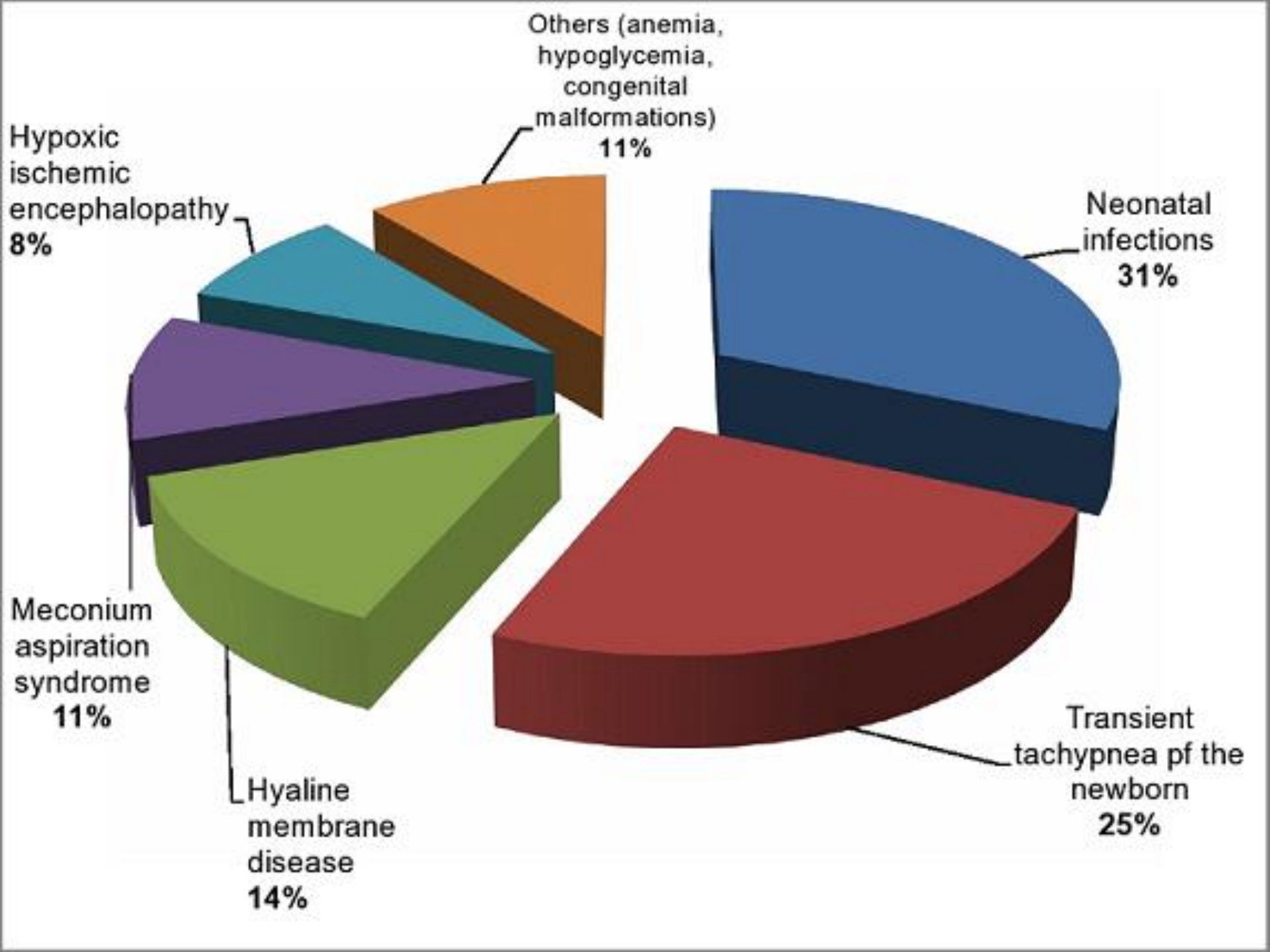
Differential diagnosis of Respiratory Distress in Newborn

- Most common cause

1. **Transient tacypnea of newborn**
2. **Respiratory distress syndrome**
3. **Meconium aspiration syndrome**

- Less common causes

1. Infection (pneumonia, sepsis)
2. Pneumothorax
3. Diagphragmatic hernia
4. Persistent pulmonary hypertension of newborn


Others (anemia, hypoglycemia, congenital malformations) 11%
Hypoxic ischemic encephalopathy 8%
Neonatal infections 31%
Meconium aspiration syndrome 11%
Hyaline membrane disease 14%
Transient tachypnea pf the newborn 25%

Respiratory Distress Syndrome

Introduction

- The most frequent cause of respiratory distress in premature infants.
- 60-80% of <28wk GA ; 15-30% of 32-36wk GA ; 5% of 37wk-term.
- Classic presentation of grunting, retractions, increasing O_2 requirement, reticulogranular pattern and air bronchograms on CXR and onset < 6hrs age

Respiratory Distress Syndrome

- 0.5 (-1.0) % of all births
- Increases with decreasing gestational age (GA < 28 weeks 60%)
- Most important neonatal morbidity and mortality factor

Pathology

- Biochemical :
  - Diminished surface-active phospholipid (phosphatidylcholine)
  - Diminished apoprotein content(SP-A, B, C, D)

Pathophysiology

- Reduced lung compliance (1/5th -1/10th)
- Poor lung perfusion (50-60% not perfused), decreased capillary blood flow
- R--> L shunting (30-60%)
- Alveolar ventilation decreased
- Lung volume reduced
- Increased work of breathing
- Hypoxemia, hypercapnia, acidosis

Physiologic abnormalities

- Lung compliance 10-20% of norm
- Atelectasis…areas not ventilated
- Areas not perfused
- Decrease alveolar ventilation
- Reduce lung volume

Risk factor

Prematurity
Acidosis
Hypoxia
Hypercapnia
Hypothermia
C/S
Asphyxia and stress
Male
Familial
DM mother

Respiratory Distress Syndrome

Symptoms and Signs

- **Tachypnoe > 60 breaths per min**
- **Expiratory grunting**
- **Retractions (sternal, inter- and subcostal)**
- **Cyanosis in room air**
- **Duration > 24 hrs**

signs

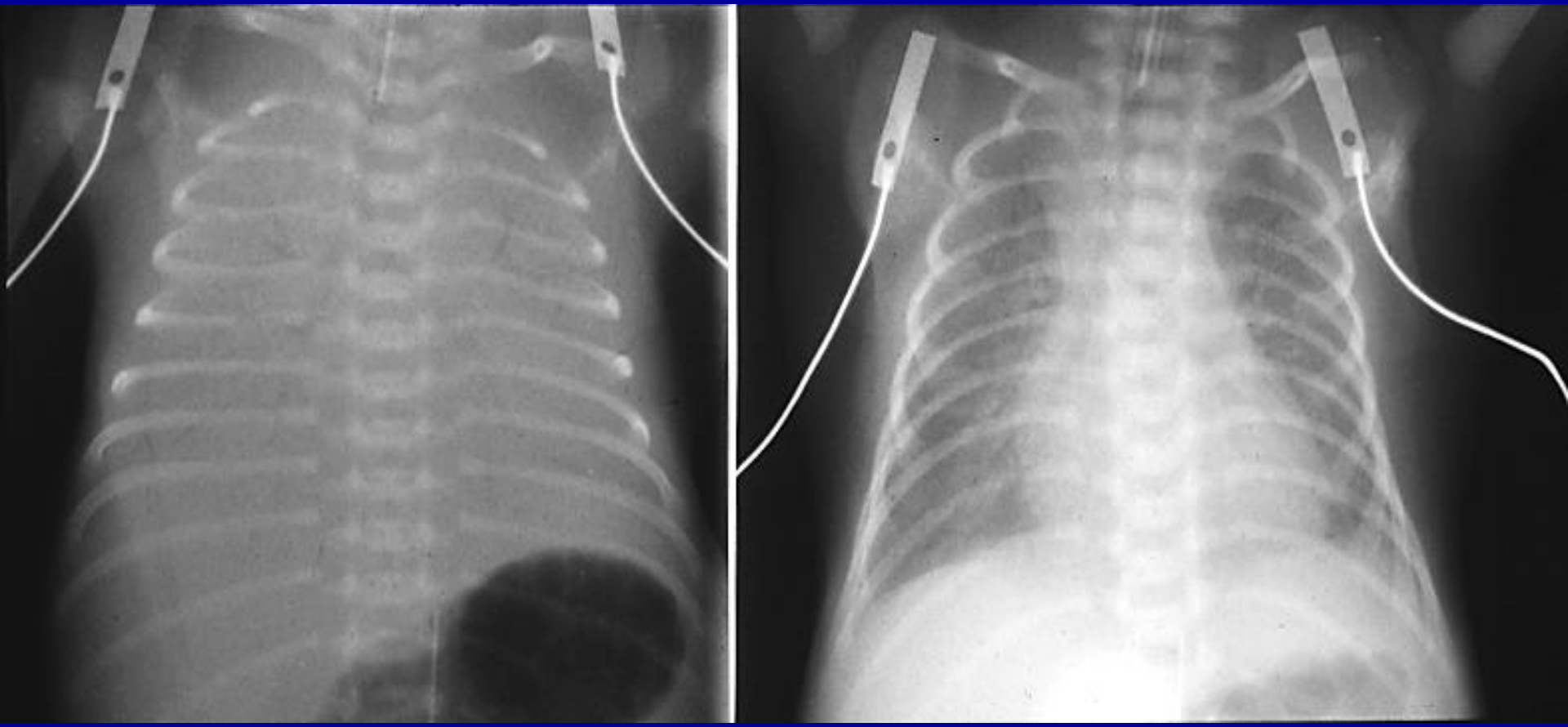
- tachypnea
- retraction
- grunting
- Nasal flaring
- apneic episode
- cyanosis
- extremities puffy or swollen

Chest X-ray

- Ground glass appearance
- Reticulogranular
- With air bronchograms

Before Surfactant

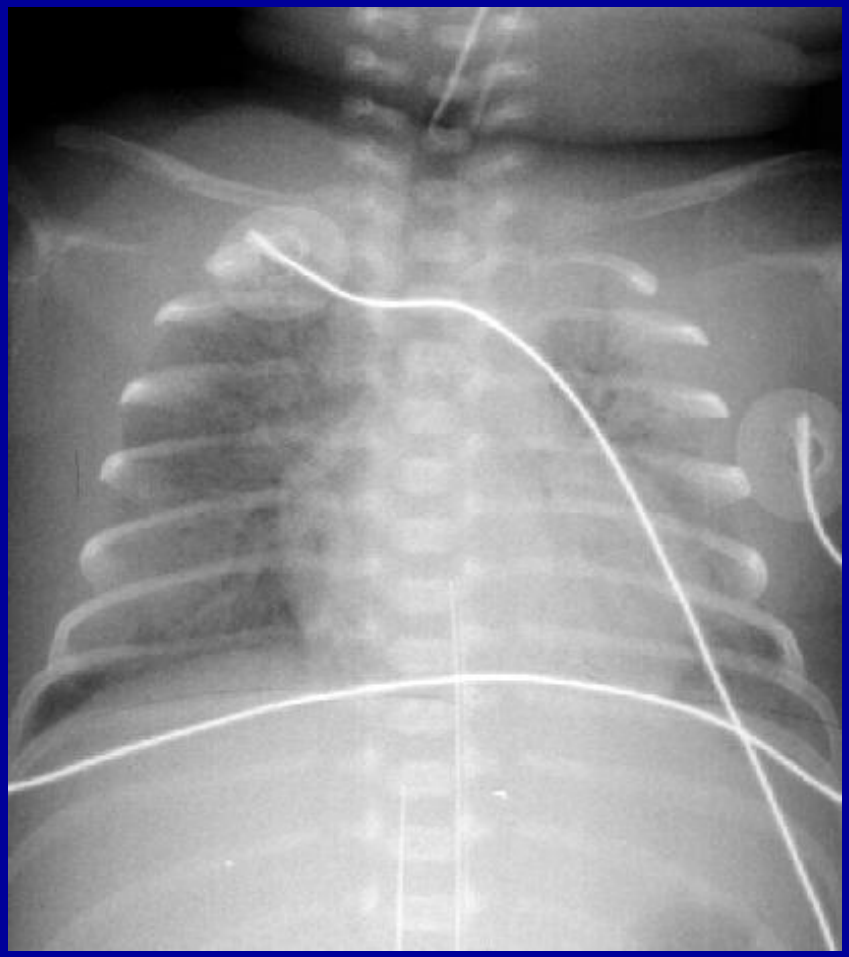
1 hr after Surfactant



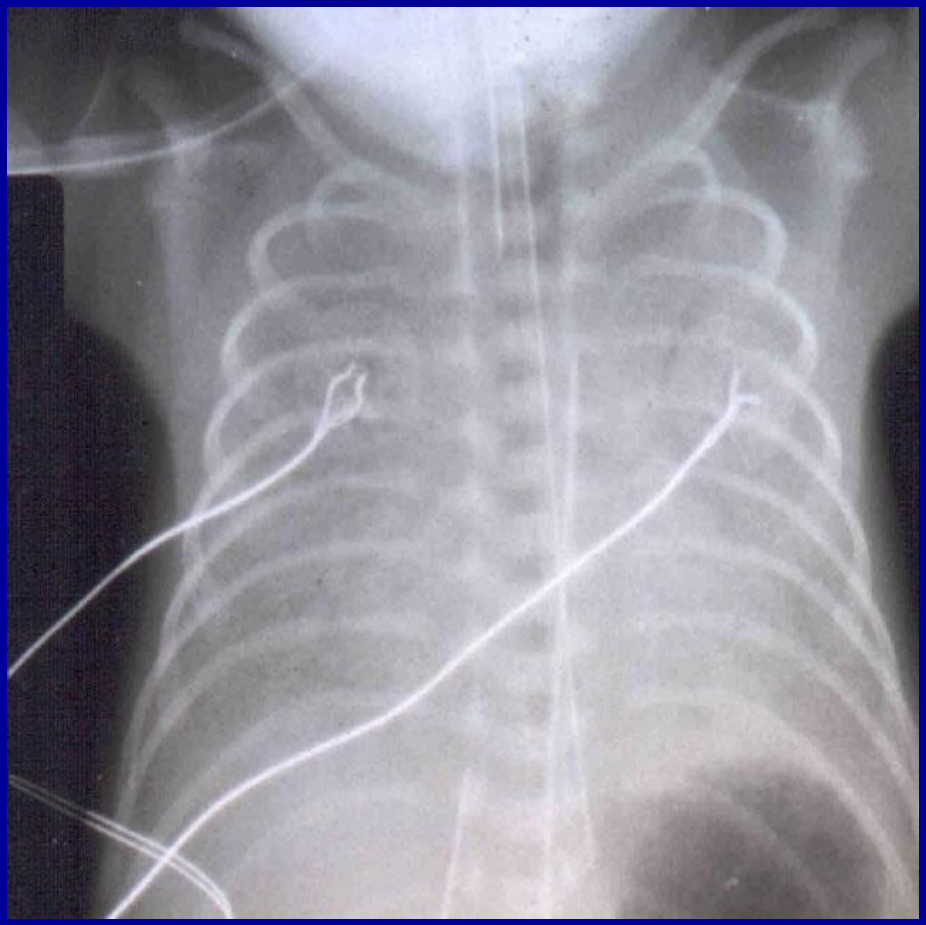

L

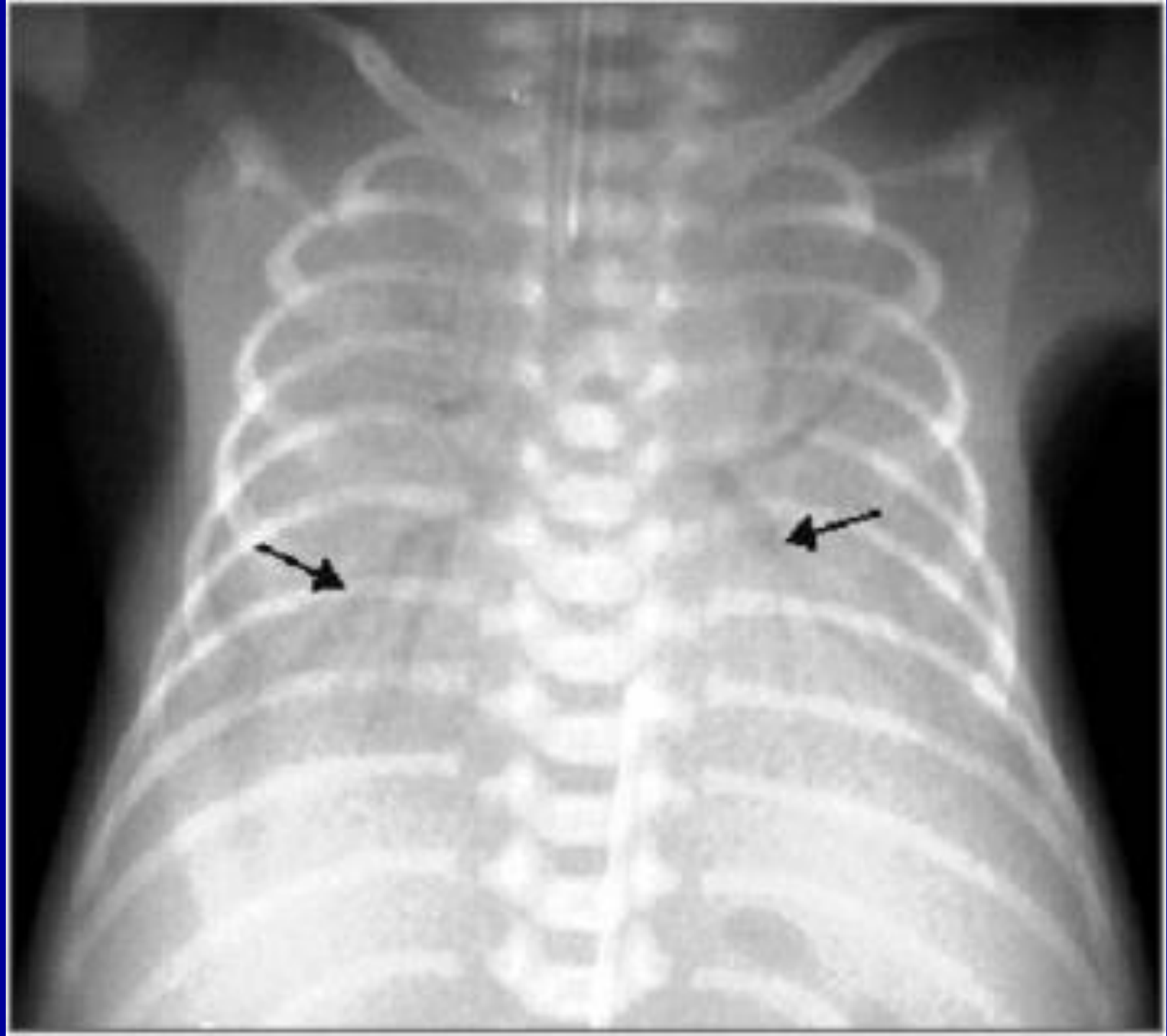
Mild RDS

Moderate RDS



Severe RDS





The natural course of Respiratory Distress Syndrome:

- Maximum after 24 -36 hrs
- Spontaneous breathing in room air in uncomplicated cases
- Deterioration at 3-5 days due to an open ductus arteriosus

Antenatal Steroids Decrease RDS

Gest. age	Rate of RDS without steroids	Rate of RDS with Steroids
<30 weeks	60%	35%
30-34 weeks	25%	10%
>34 weeks	5%	5%

Effects of Corticosteroids on Surfactant Synthesis

- Increase surfactant phospholipids
- Increase CP-cytidyltransferase activity
- Increase fatty-acid synthase activity
- Increase surfactant proteins gene expression
- Induce ion and water transport proteins

Antenatal steroid and Surfactant goes hand in hand

Dr Ajay Agade

Treatment

- Surfactant
  - Prevention
  - rescue
- Supportive
  - Thermal
  - Fluid and nutrition
  - oxygen
- Mechanical ventilation

Surfactant Therapy for RDS

Significant reduction in:

- Mortality
- Pneumothorax

Unaltered:

- Bronchopulmonary dysplasia
- Intraventricular hemorrhage
- Sepsis
- Patent ductus arteriosus

Surfactant Replacement Therapy

- Administer less than 2 hours after birth
- Consider delivery room use in infants < 1000 grams
- Most infants require 2 doses

Surfactant deficiency is common in:

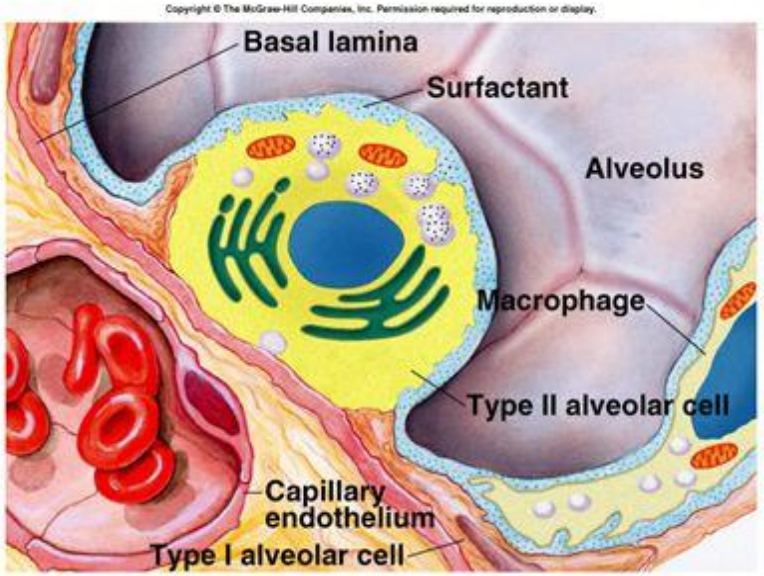
- Premature babies
- Babies born from thyroid deficient mothers
- Babies born from diabetic mothers
- Babies born from smoker mothers (smoking decreases surfactant secretion)

Surfactant

- ***Def***:

  It is the surface active agent
- ***Composition***: Phospholipid (dipalmitoyl lecithin), protein and Carbohydrates
- ***Secretion***: produced by alveolar type II cells.
- ***Action***: Lowers surface tension.
- ***Functions of surfactant***:

1) Facilitates lung expantion
2) Prevent lung collapse As alveoli radius decreases, surfactant's ability to lower surface tension increases.
3) Prevent pulmonary oedema



Surfactant Deficiency:

RDS of the newborn. The lung is rigid and oedematous and the alveoli collapse

Surfactant therapy

- Types available- Survanta (Bovine); Curosurf(porcine); Infrasurf (Calf); Exosurf(synth)
- Indications:
  - Prophylactic therapy – immediately after birth
  - Early-rescue therapy – during the 1st few hours after birth.
    - AAP recommends to give when the diagnosis of RDS is established;
  - Continued therapy - clinical evidence of persistent disease


8 mL Single Use Vial
SURVANTA®
(beractant)
intratracheal
suspension
8mL
Sterile Suspension
For Intratracheal
Administration Only–
NOT FOR INJECTION
DO NOT SHAKE
PROTECT FROM LIGHT
R℞ only
SURVANTA®

Exogenous Surfactant Administration

- Indicated for surfactant deficiency, such as in infant respiratory distress syndrome and following lung lavage

Respiratory Distress Syndrome – Therapy

- Reduce prematurity rate
- Antenatal steroids 24 - 168 hrs before birth gives a 50% reduction in the incidens and 40% reduction in mortality
- Surfactant therapy reduces mortality/Chronic lung disease 30-40%
- General therapy: Oxygen, respirator, fluid-electrolytes, nutrition, antibiotics

The short-term risks of surfactant replacement therapy

- Bradycardia and hypoxemia during instillation,
- Blockage of the endotracheal tube
- Increase in pulmonary hemorrhage following surfactant treatment
- However, mortality ascribed to pulmonary hemorrhage is not increased and overall mortality is lower after surfactant therapy.

complications

- Pneumothorax
- PDA
- Infection
- Line problems
- ROP
- Chronic lung disease

Meconium aspiration

composition

- Cellular particle
- Bile pigment
- Lango
- Mocus
- Vernix
- Pancreatic secretion
- One gr meconium = one mg Billirubin

Meconium aspiration

- First stool that constitutes the GI epithilium and secretion during fetal life
- Stress and intra-uterine meconium in term infant
- Gasping cause the aspiration
- Chemical diffuse peumonitis
- Same signes of distrss and PPHN.
- Treatment maily supprtive

Meconium Aspiration Syndrome (MAS)

- 1:10 - 1:5 meconium stained amniotic fluid
- 1:1000 - 1:5000 birth develop MAS
- Term-post term children
- Inhalation before and during birth
- Plugging the airways (acute effects)
- Inflammation (later effects)
- Inactivates surfactant

pathophysiology

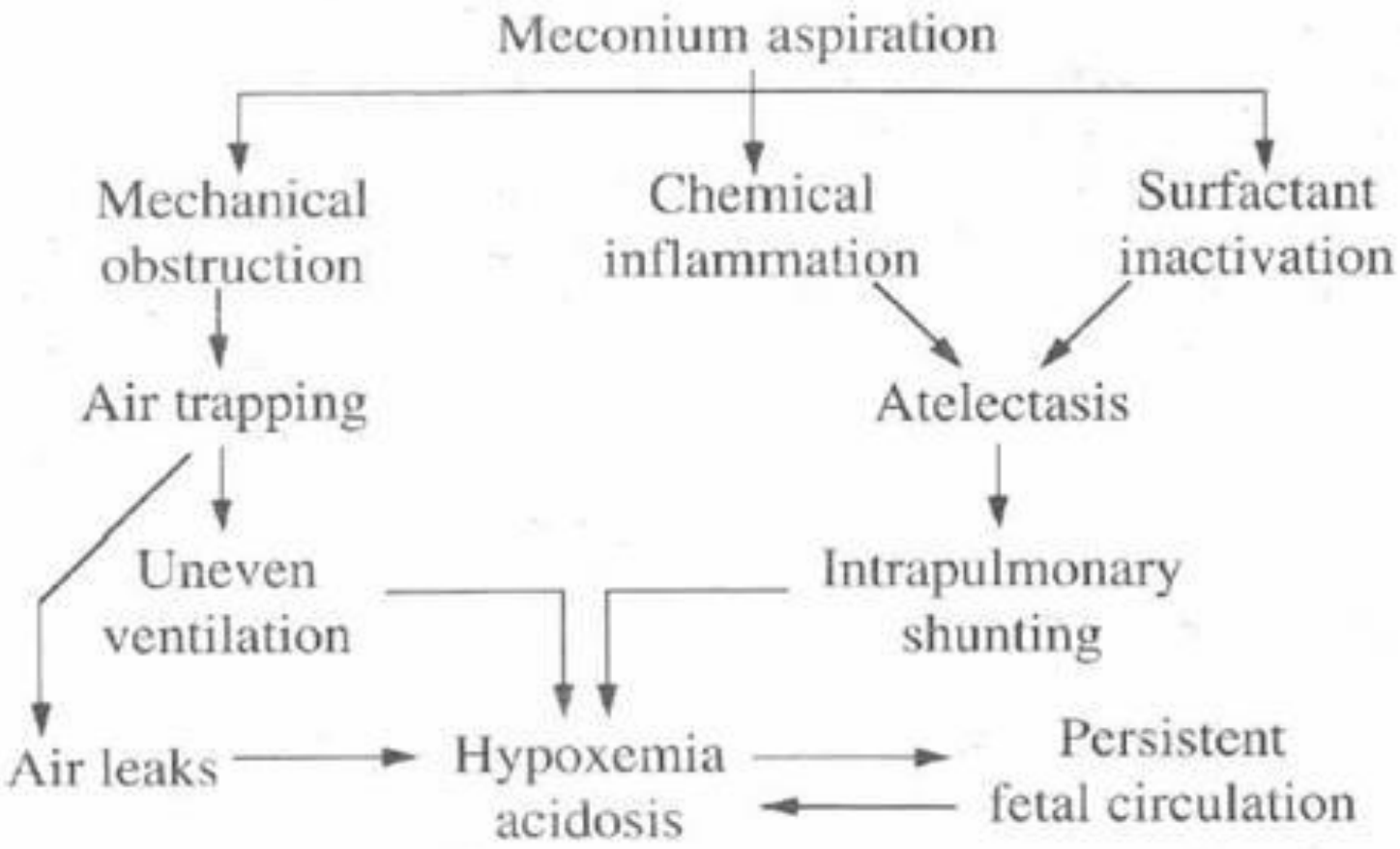


FIG. 41-31 Pathophysiology of meconium aspiration syndrome.

Alarm of MAS

1- Thick meconium

2-Fetal tachycardia

3- lack of increase heart rate during intra partum monitoring

4-Low cord PH

DETECTION OF PASSAGE OF MECONIUM

GRADE ONE

small amount of meconium staining liquor light green or Yellow	LABOUR can be allowed to progress

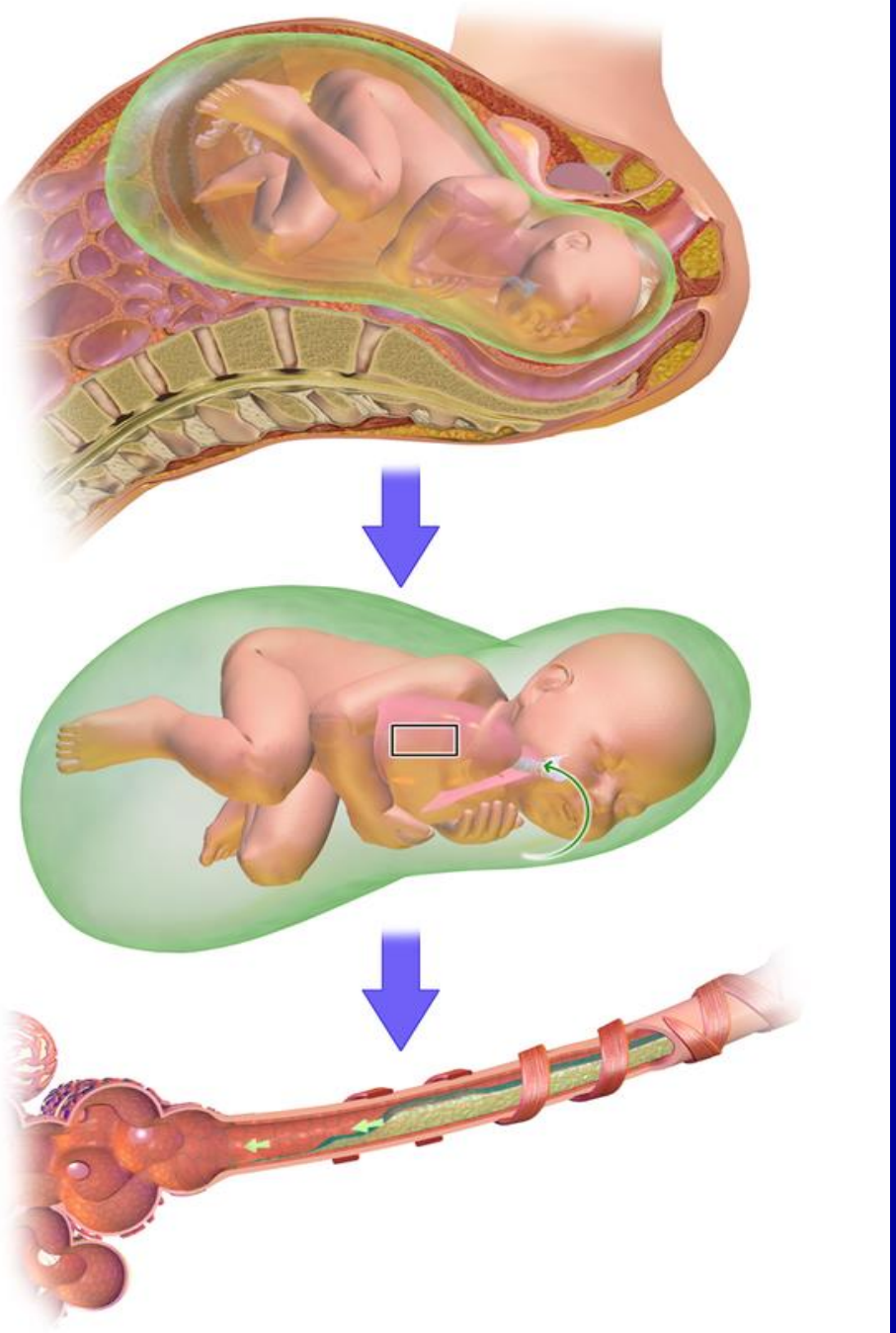
GRADE TWO

both liquor & meconium are drained in equal amounts giving it a dark green appearance	Fetal distress,labour allowed in selected cases only

GRADE THREE

Meconium dominates over liquor passed as semisolid material or black paste	Immediate delivery is indicated


blausen



Meconium Aspiration Syndrome

MAS

Clinical sign

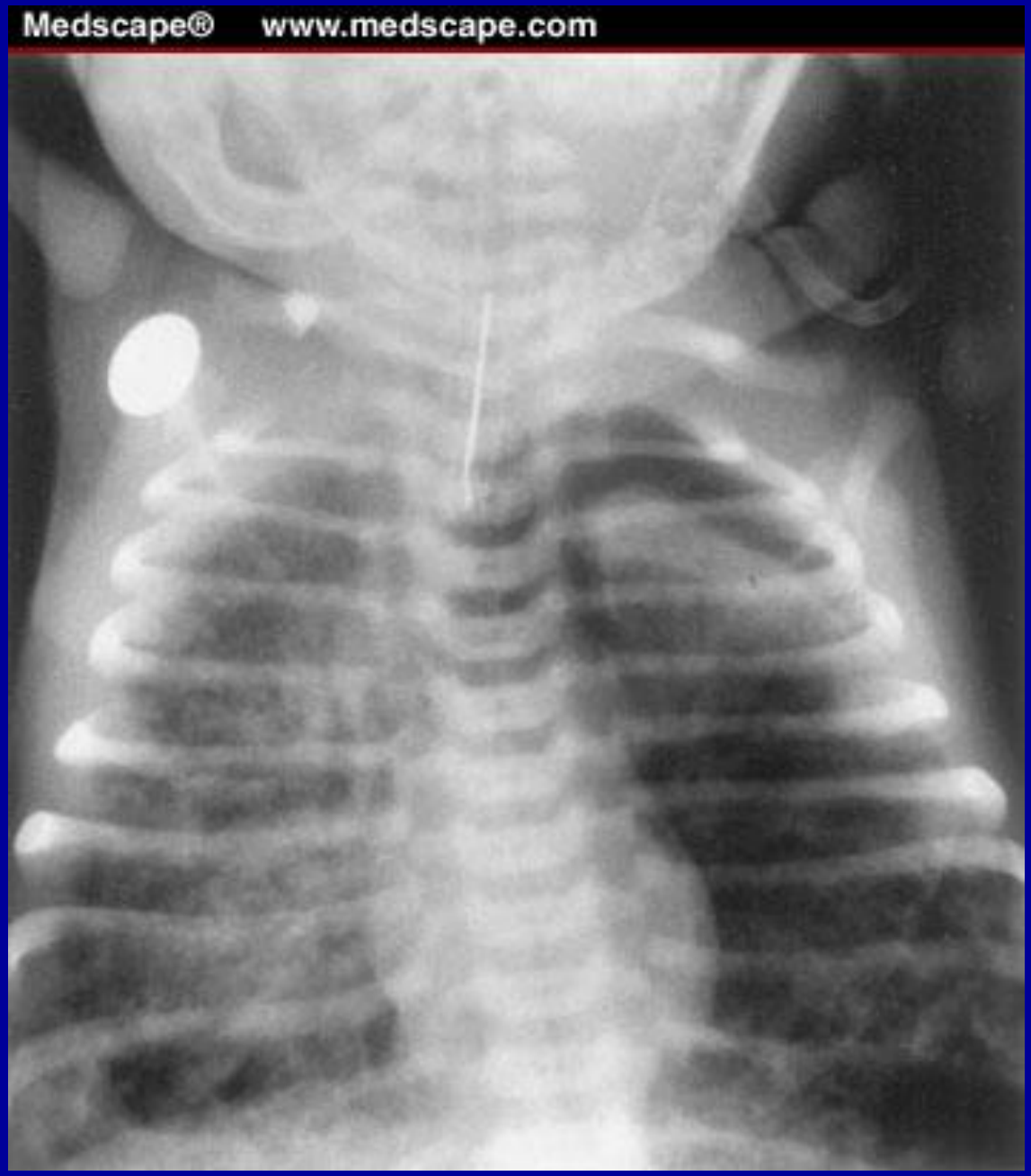
- Classic sign :Post maturity
  nail, skin , umblical cord are heavily stained with a yellowish pigment
- Early sign (resp . Distress) : grunting & cyanosis & nasal flaring & retraction & marked tachypnea
- Characteristic sign : chest overinflation and Rale

Radiography of M.A.S

- **Coarse , nodular , irregular pulmonary densities with areas of diminished aeration or consolidation.**
- **Hyperinflation of the chest .**
- **Atelectasis**
- **Flattening of diaphragm**
- **Cardiomegally**

(manifestation of the underlying prenatal hypoxia)


1 D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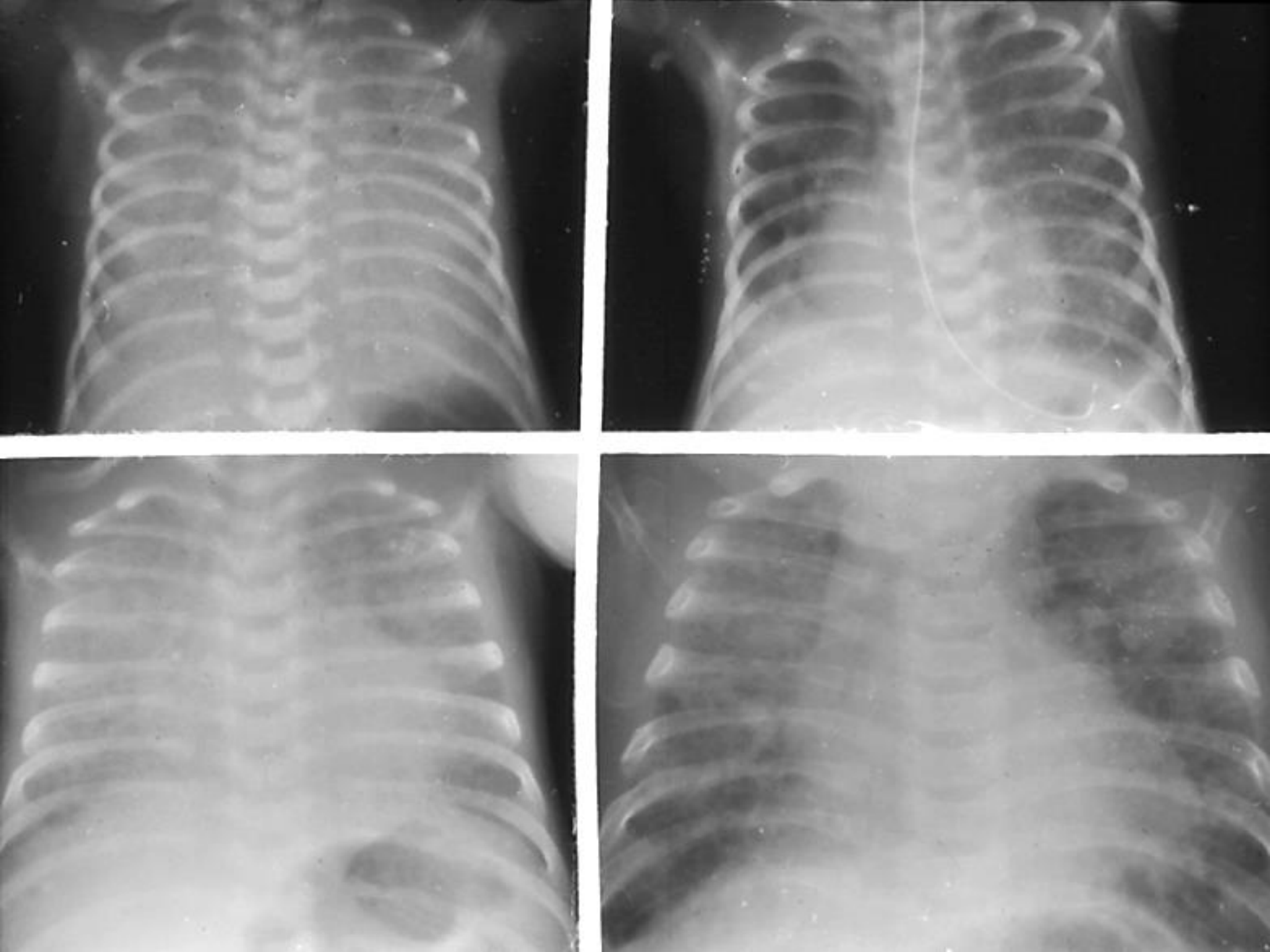
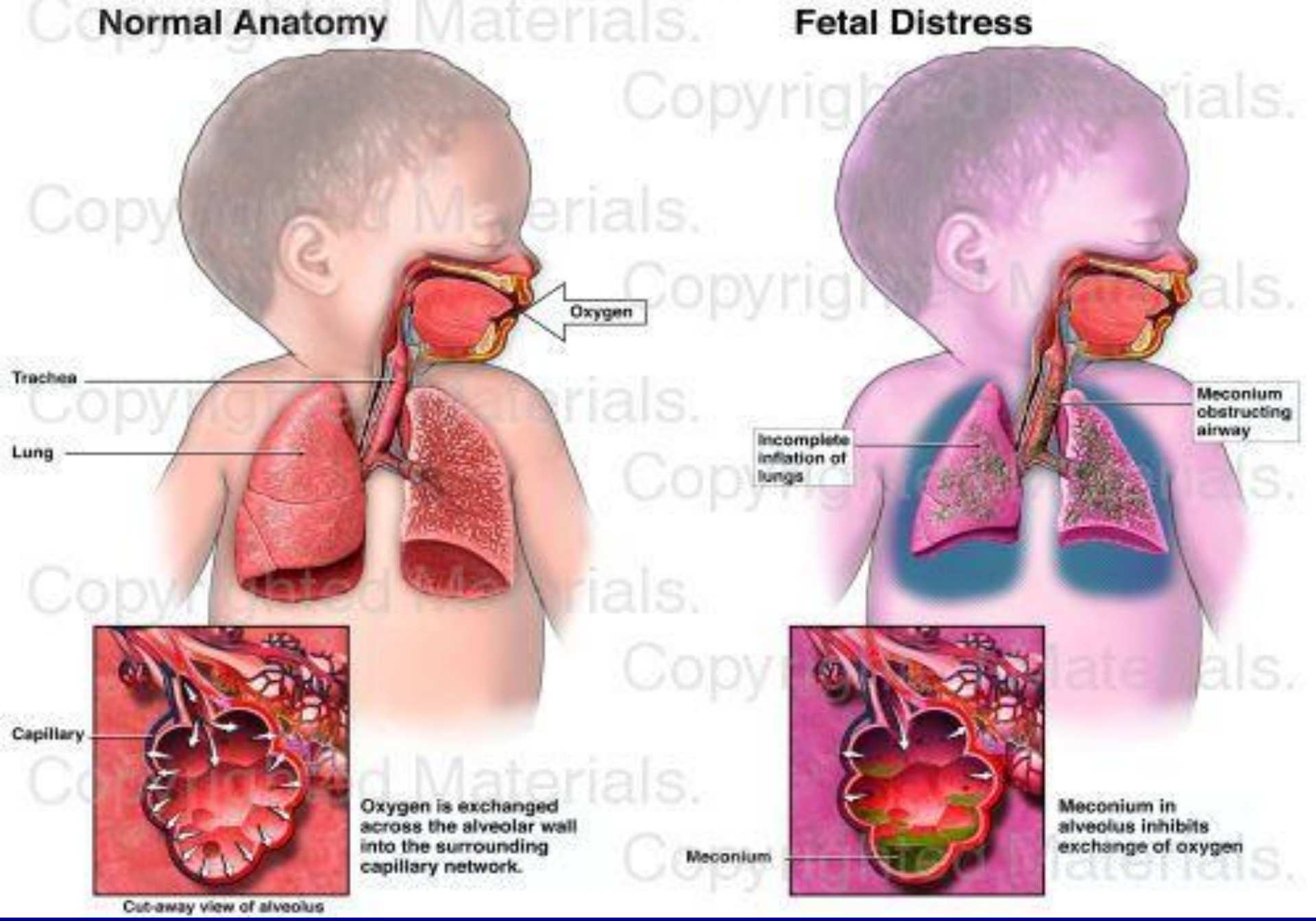
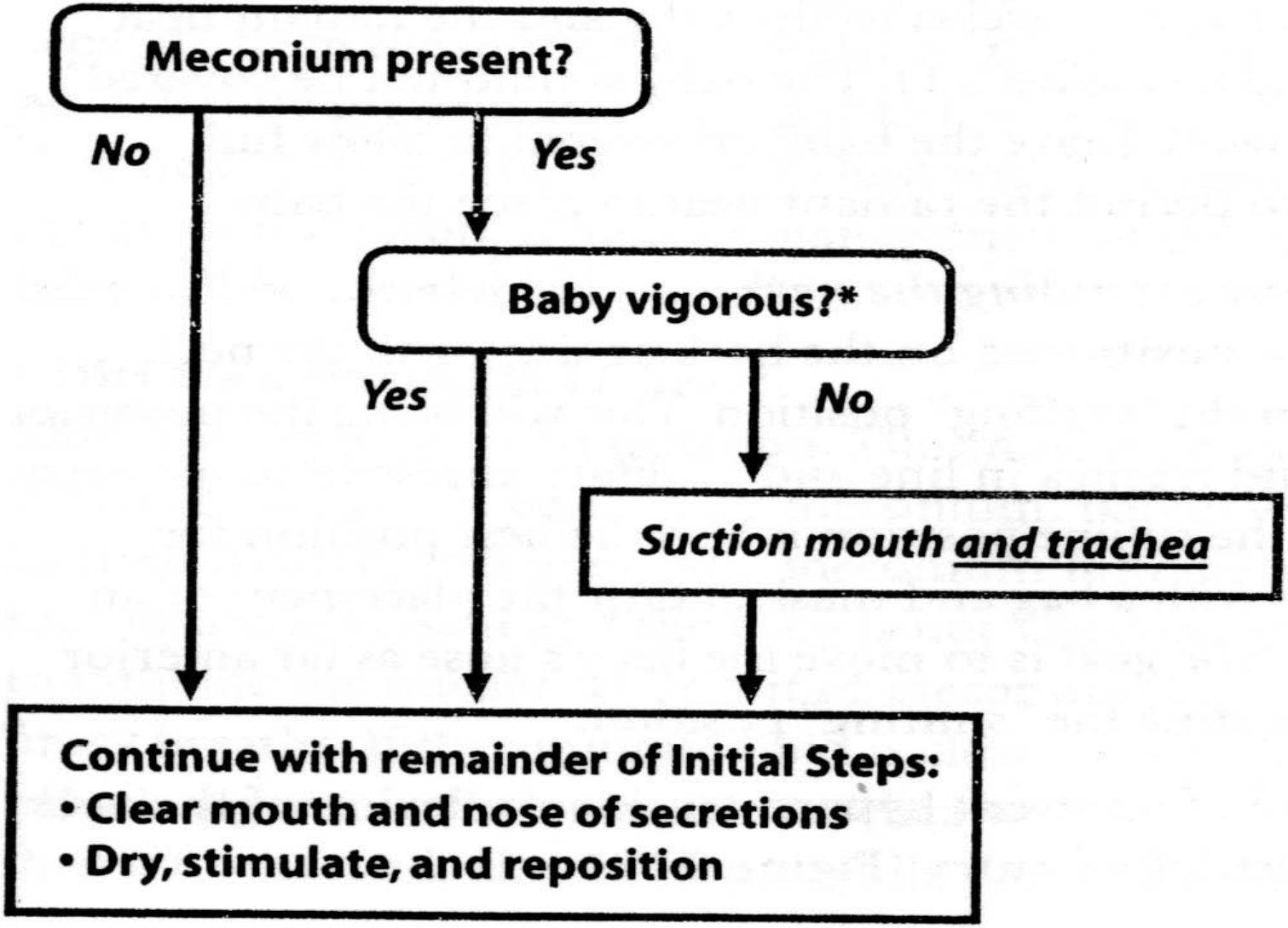


Fetal Distress Due to Aspiration of Meconium

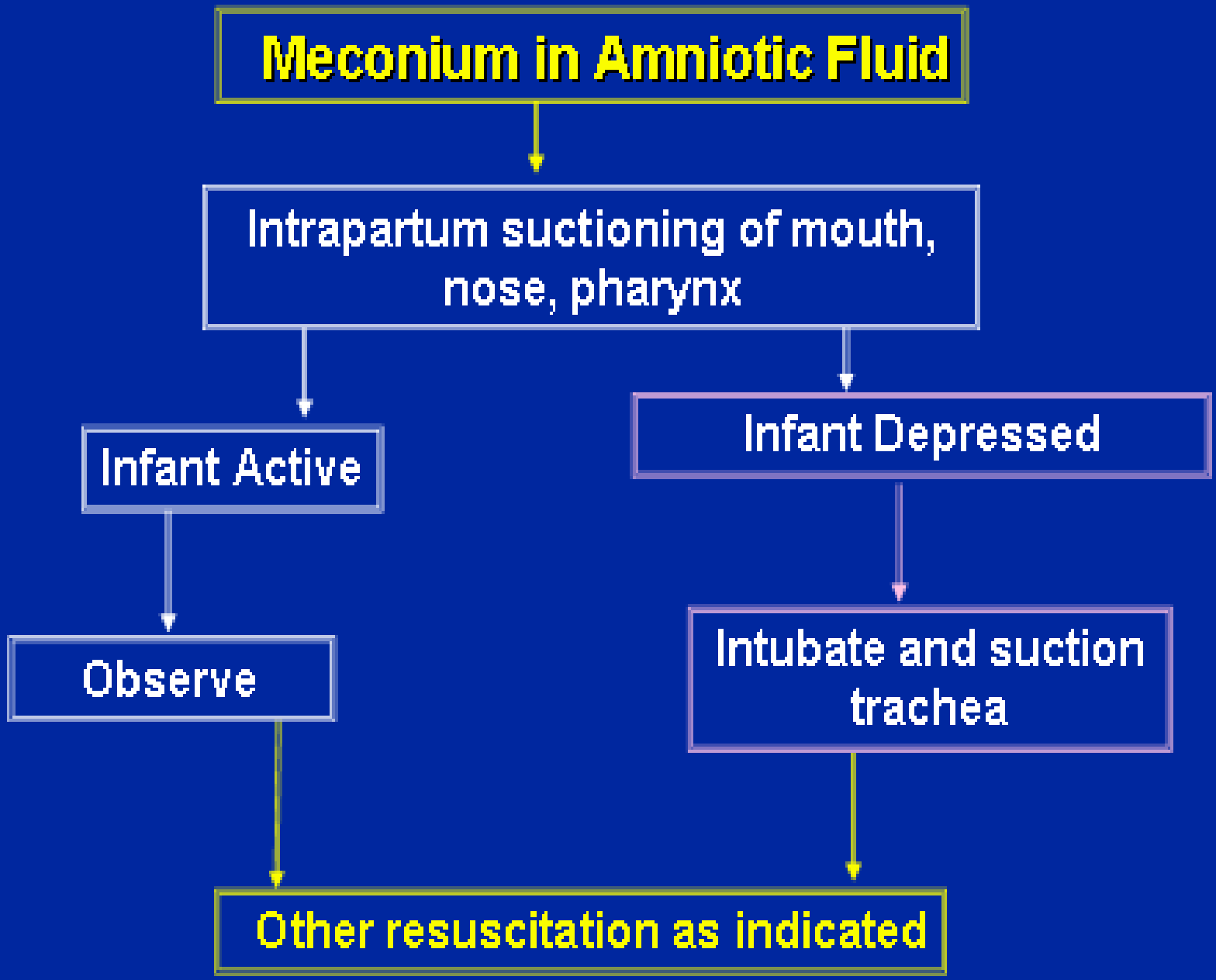


Meconium Aspiration Syndrome

Meconium Aspiration Syndrome



* Vigorous is defined as strong respiratory efforts, good muscle tone, and a heart rate greater than 100 bpm. The technique of determining the heart rate is described later in this lesson.


Meconium in Amniotic Fluid
Intrapartum suctioning of mouth, nose, pharynx
Infant Active
Infant Depressed
Observe
Intubate and suction trachea
Other resuscitation as indicated

MANAGEMENT OF INFANTS DELIVERED THROUGH MECONIUM STAINED FLUID.

Initial assessment

Whether the infant is vigorous, demonstrated by

- heart rate > 100 beats per minute,
- spontaneous respirations, and
- good tone (spontaneous movement or some degree of flexion).

1. If the infant appears vigorous, provide routine care regardless of the consistency of the meconium.

2. If respiratory distress develops or the infant becomes depressed intubate under direct laryngoscopy and intra tracheal suctioning.

INTRAPARTUM SUCTIONING: Result of the Trial

- The incidence of MAS did not differ between groups.
- There were no significant differences between the control and suction groups detected in any of the secondary outcomes: the need for mechanical ventilation for MAS, mortality, duration of mechanical ventilation, duration of oxygen therapy, or length of hospital stay.
- No complications of suctioning were noted.

The American Academy of Paediatrics, and the Neonatal Resuscitation Program Steering Committee, no longer recommend routine intrapartum suctioning of the oropharynx and nasopharynx of neonates delivered following labours complicated by meconium.

MANAGEMENT

1. Prevention
    - Monitor fetal status
    - Amnioinfusion
    - Suctioning +/- intubation and immediate suctioning
    - Avoid harmful techniques
2. Intervention
    - Optimal thermal environment & minimal handling
    - Respiratory care, Oxygen therapy & ECMO
    - Keep stable V/S
    - Surfactant therapy

Steroid therapy for meconium aspiration syndrome in newborn infants

- Conclusions:

  At present, there is insufficient evidence to assess the effects of steroid therapy in the management of meconium aspiration syndrome

  (no significant reduction in mortality, duration of hospital stay, Duration of mechanical ventilation, incidence of air leak, increase in duration of oxygen therapy was seen with the use of steroids)

Role of antibiotics in meconium aspiration syndrome

- CONCLUSION:

  Routine antibiotic therapy is not necessary for managing MAS. No significant difference

  - period of oxygen dependency (5.8 vs 5.9 days)
  - day of starting feeds (4.0 vs 4.2)
  - day of achievement of full feeds (9.4 vs 9.3)
  - clearance of chest radiograph (11.7 vs 12.9 days)
  - duration of hospital stay (13.7 vs 13.5 days)

Surfactant for meconium aspiration syndrome in full term/near term infants

- CONCLUSIONS: In infants with MAS, surfactant administration may reduce the severity of respiratory illness and decrease the number of infants with progressive respiratory failure requiring support with ECMO. The relative efficacy of surfactant therapy compared to, or in conjunction with, other approaches to treatment including inhaled nitric oxide, liquid ventilation, surfactant lavage and high frequency ventilation remains to be tested.

MAS complication

- Partial obstruction
- complete obstruction
- Surfactant destruction
- Chemical pneumonitis &Bacterial pneumonia
- Asphyxia

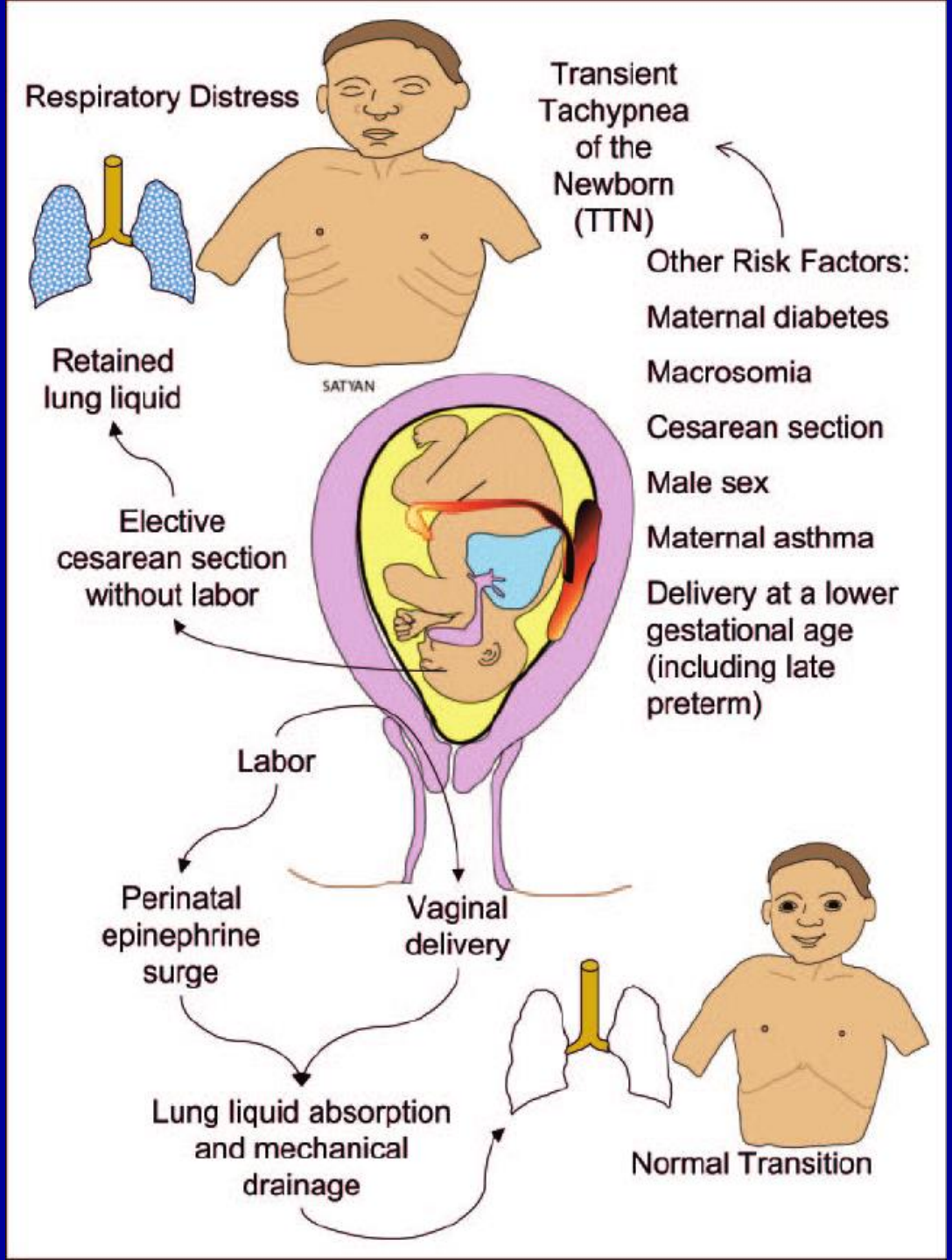
Transient tachypnea of newborn

Transient tachypnea of newborn (wet lung)

- **A mild respiratory disturbancy in newborn infants occasionally seen after birth**
- **Unknown etiology – increased lung water**
- **Duration max 5-6 days**

Transient Tachypnea of Newborn

- Most common cause of respiratory distress.
- Residual fluid in fetal lung tissues.
- Risk factors- maternal asthma, c- section, male sex, macrosomia, maternal diabetes


Respiratory Distress
Transient Tachypnea of the Newborn (TTN)
Other Risk Factors:
Maternal diabetes
Macrosomia
Cesarean section
Male sex
Maternal asthma
Delivery at a lower gestational age (including late preterm)
Retained lung liquid
SATYAN
Elective cesarean section without labor
Labor
Perinatal epinephrine surge
Vaginal delivery
Lung liquid absorption and mechanical drainage
Normal Transition

Transient tachypnea

- boys > girls
- GA 32-42 weeks (average 38 weeks)
- BW (average) 3200 gr
- Resp rate at 6 hrs age: 80 per min
- Oxygen in 60% of cases
- Incidens 0.37%

Transient tachypnea of newborn

- Term
- Cesarian delivery
- Usually tachypnea without O2 requirment
- Resolve in 48-72 houres
- Lung fluid
- X-ray

TTN

- Tachypnea immediately after birth or within two hours, with other predictable signs of respiratory distress.
- Symptoms can last few hours to two days.
- Chest radiography shows diffuse parenchymal infiltrates, a “ wet silhouette” around heart, or intralobar fluid accumulation

Transient tachypnea

Clinic	*Differential diagnosis*
Tachypnea	RDS
Cyanosis in room air	Pneumonia
Grunting	Meconium aspiration
Retractions	Cong Heart disease
Duration > 3 hrs	
Oxygen need not increasing	

Transient tachypnea –

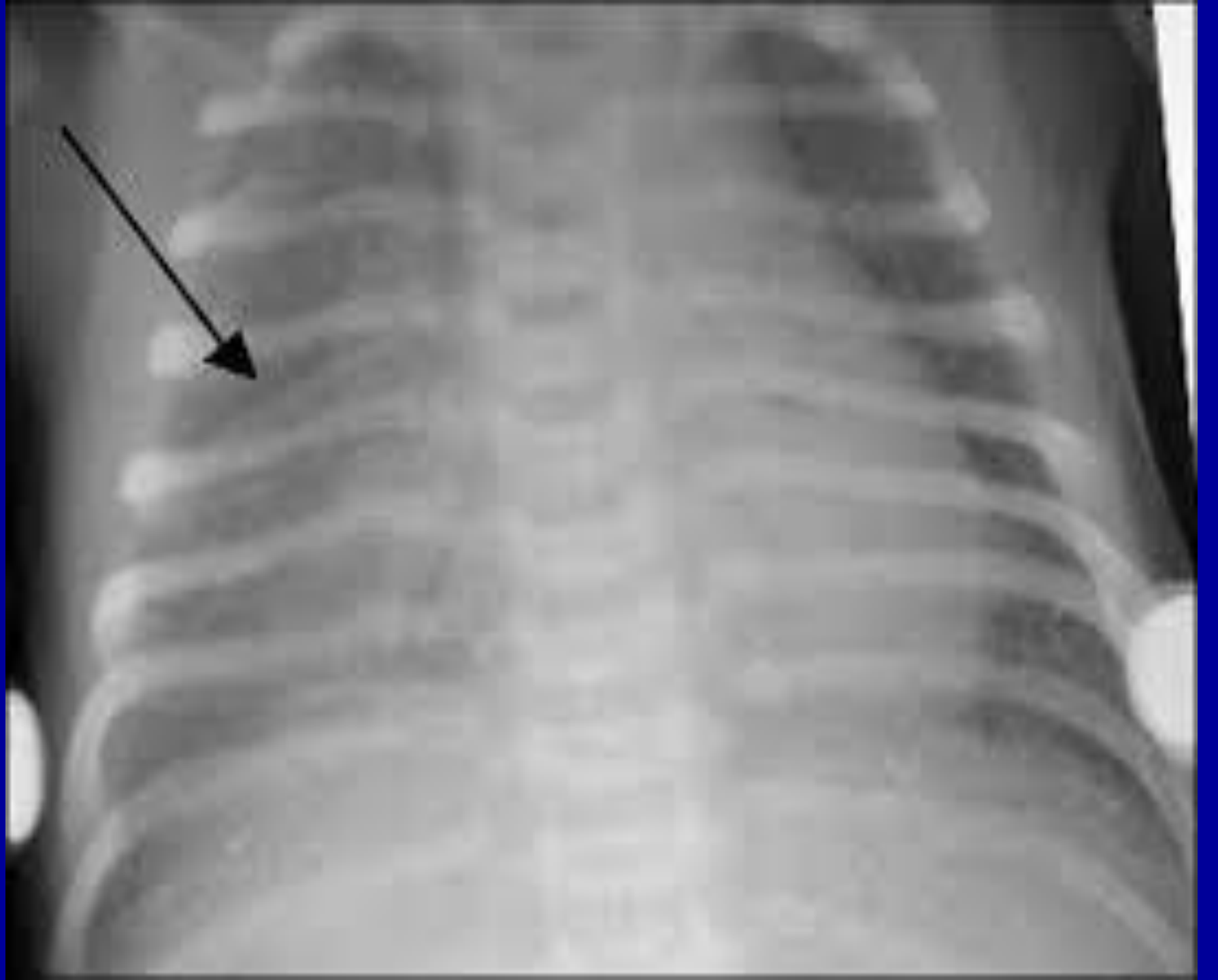
X ray findings

- perihilar streaking, patchy infiltrates
- Pleural effusion
- Reduced air and/or reticular pattern

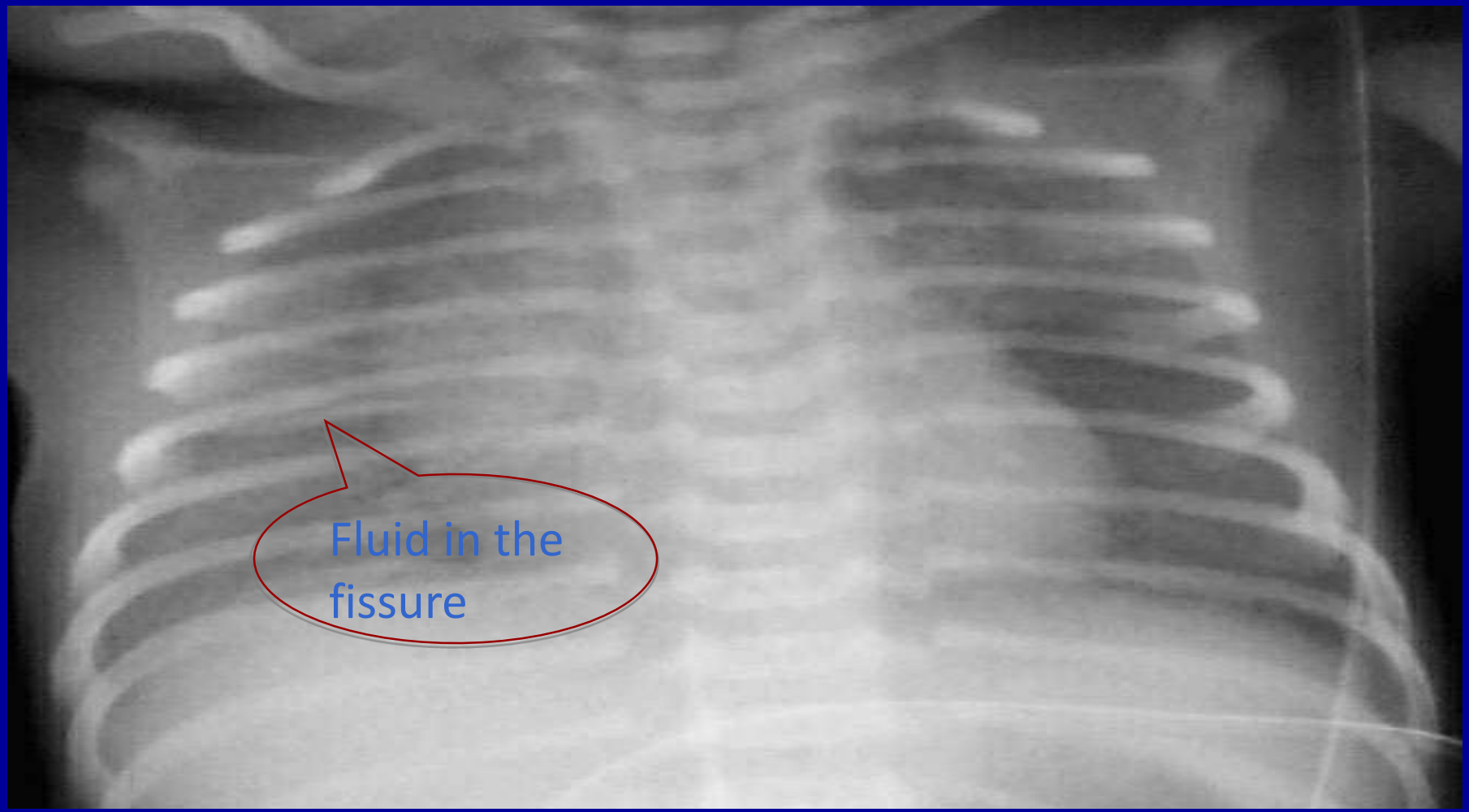
Therapy

- Observation in incubator
- Oxygen if needed
- Antibiotics until infection is excluded

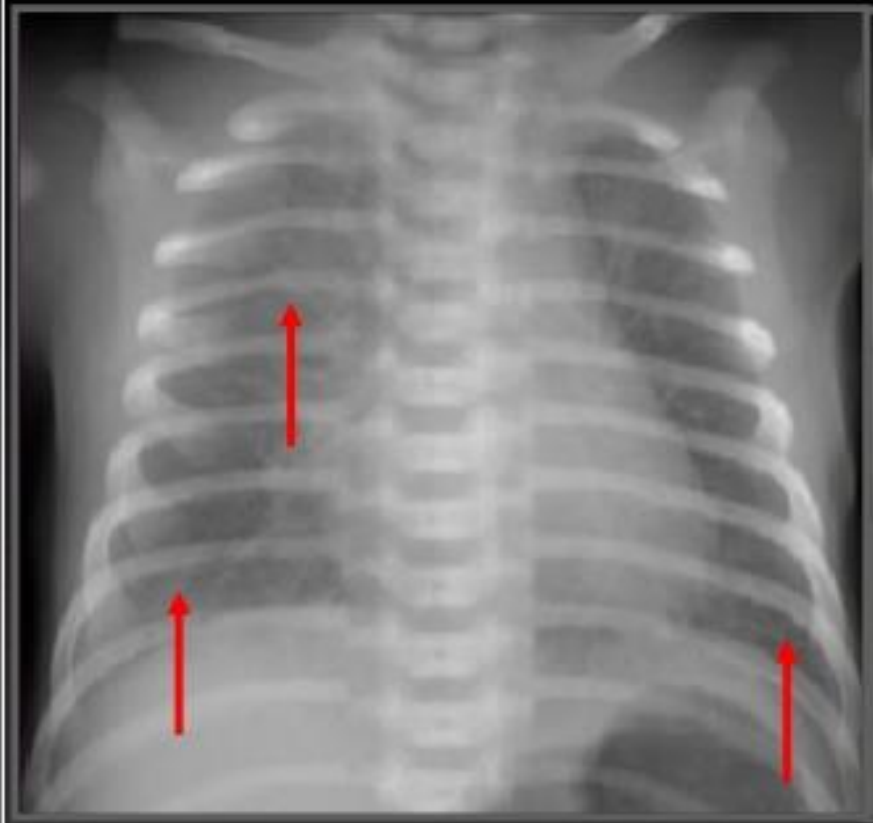
- Inhaled epinephrine for the **treatment** of **transient tachypnea** of the **newborn**
- B Kao, SAS de Ramirez, MB Belfort, A Hansen - Journal of Perinatology, 2008 - nature.com
- **Infants** with **transient tachypnea** of the **newborn** (TTN) have relatively low levels of epinephrine, which is known to mediate fetal lung fluid absorption. Providing exogenous epinephrine could be a valuable diagnostic and therapeutic intervention for this common **...**
- Furosemide for **transient tachypnea** of the **newborn**



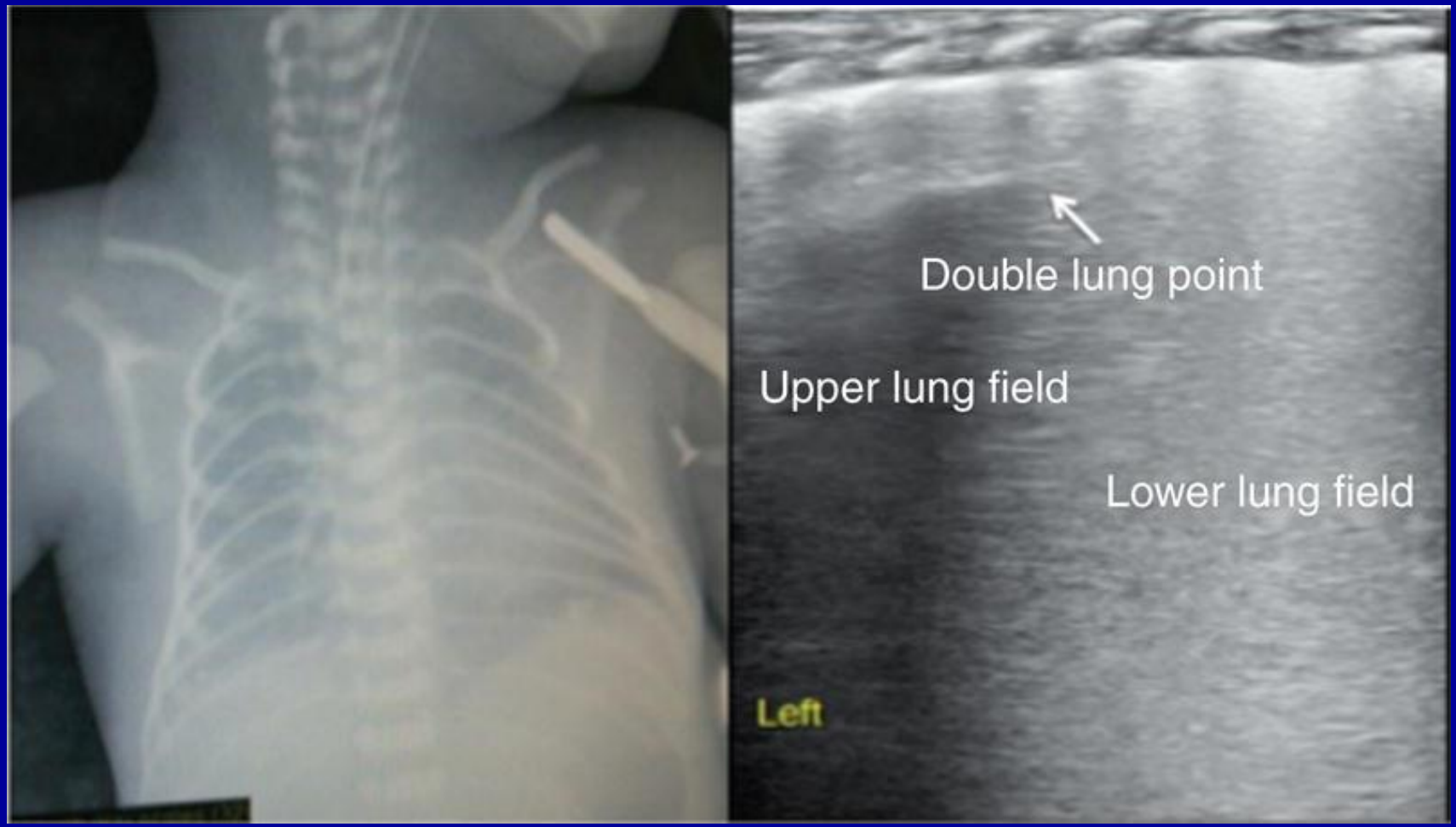
X-ray



Transient Tachypnea



- Interstitial edema
- Possible cardiomegaly
- Pleural effusion
- Rapid improvement in 24 hours


Double lung point
Upper lung field
Lower lung field
Left

Air leaks

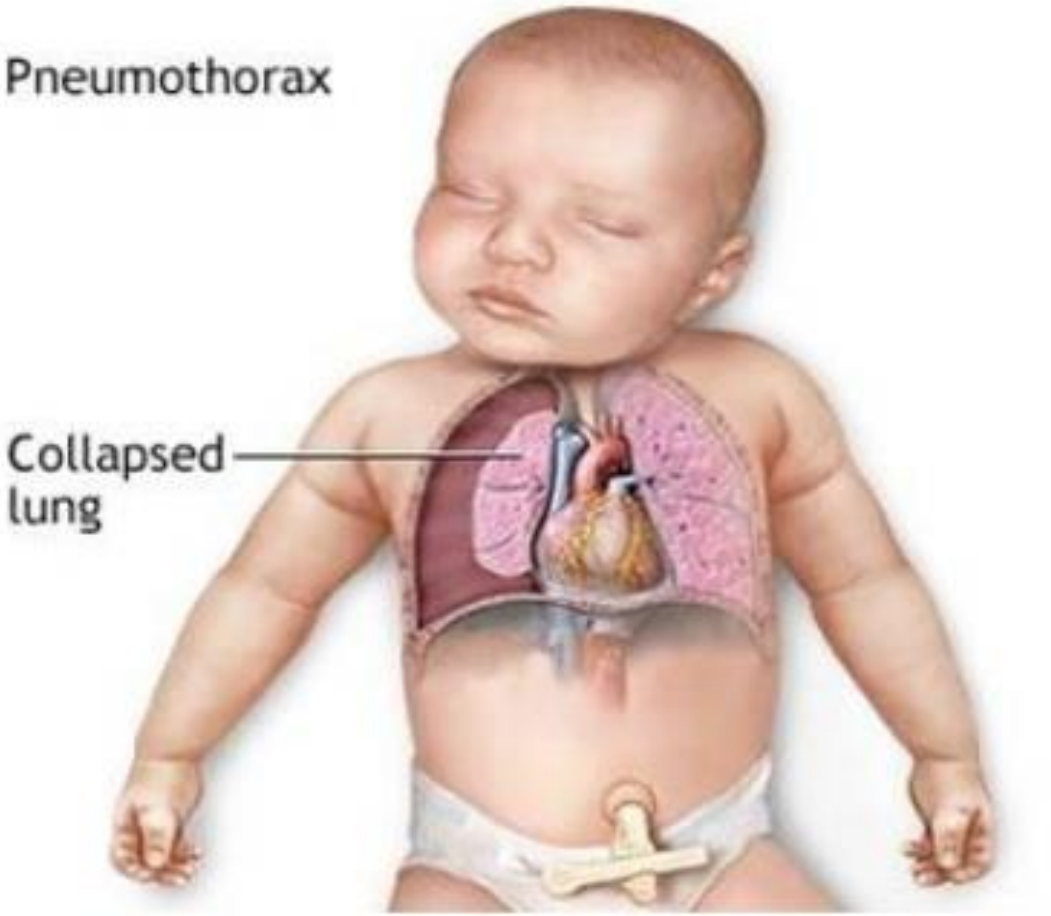
Air leaks

- **Pneumothorax/ pneumomediastinum**
- **1% of all newborn but only 1/10 are symptomatic**
- **Increased risk in positive pressure ventilation**

Pneumothorax

Tension pneumothorax

- (a life-threatening condition) → ↓cardiac output and obstructive shock; urgent drainage prior to a radiograph is mandatory.



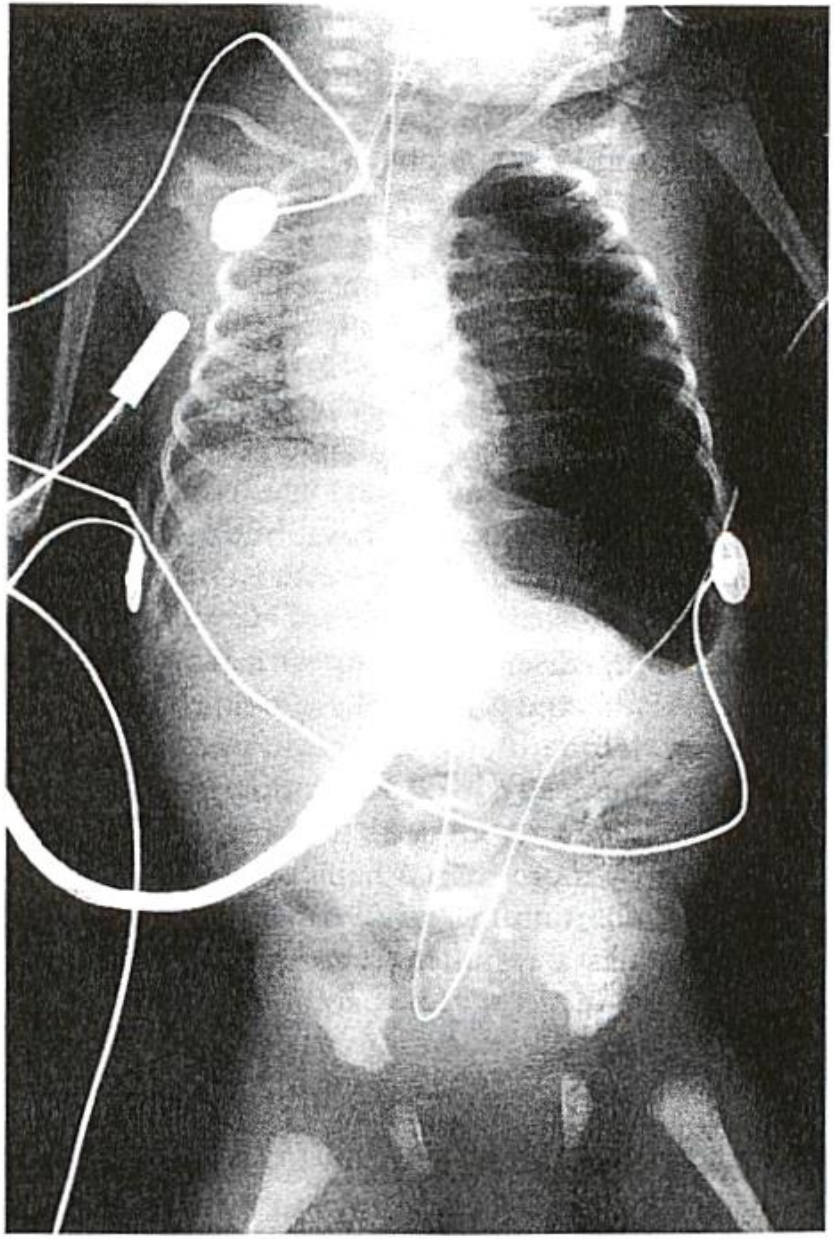


Fig. 29.43 Left tension pneumothorax, with displacement of left diaphragm downwards and mediastinum to the right. Note that the non-compliant left lung has only partially collapsed.

Diagnosis of Pneumothorax through transillumination

Chest.X.Ray

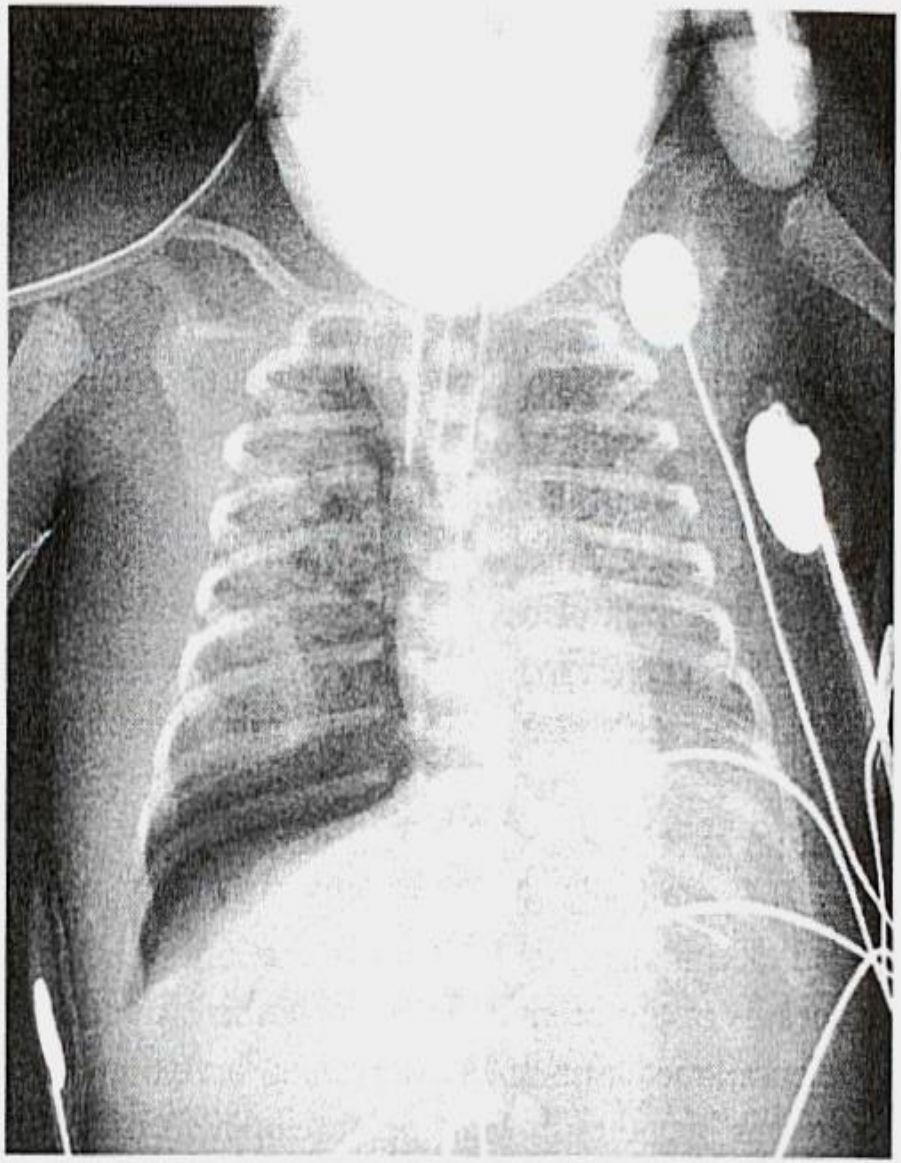


Fig. 29.42 Pneumothorax demonstrated by the difference in translucency of the two lung fields. There is also a small rim of paramediastinal and supradiaphragmatic gas.

Pneumopericardium

Other causes-

- Congenital malformations-Pulmonary hypoplasia, congenital emphysema, esophageal atresia & diaphragmatic hernia.
- Neurological causes- hydrocephalus & intracranial hemorrhage.
- Metabolic derangements-hypoglycemia, hypocalcemia, polycythemia.

Infections

Infections

- Pneumonia & Sepsis have various manifestations including typical signs of distress as well as temperature instability.
- Common pathogen- Group B Streptococcus, Staph aureus, Streptococcus Pneumonia,Gm neg. rods

Infections con..

- Risk factors- prolonged rupture of membranes, prematurity,& maternal fever.
- CXR- bilateral infiltrates suggesting in utero infection.

Congenital pneumonia

- Sepsis risk factors
  - PROM
  - Prematurity
  - Maternal fever, discharge, abdominal pain, leukocytosis
  - Colonization with GBS
- Same signs of RDS
- X-ray

GBS Pneumonia


891323
3d L

Congenital Heart disease

Cyanotic Heart Disease-

- Tetralogy of fallot- (VSD, Pulmonary stenosis, overriding aorta, RVH)
- Tricuspid atresia
- Transposition of great vessel
- Total anomalous pul. venous return
- Truncus arteriosus.

Diaphragmatic Hernia

CONGENITAL DIAPHRAGMATIC HERNIA

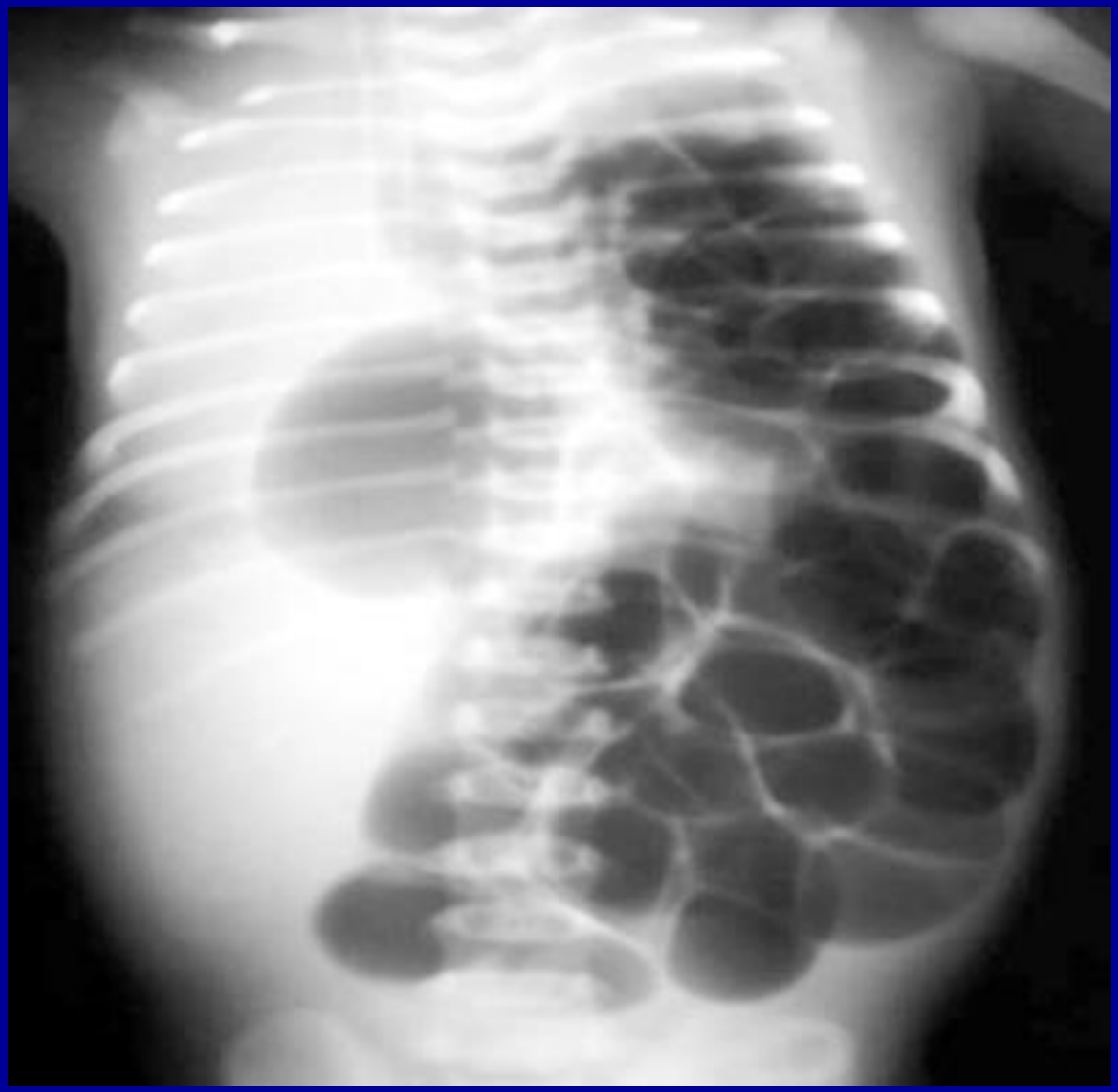
EPIDEMIOLOGY

- **INCIDENCE**: 1/2000- 1/5000 live births
- M:F – 1:2
- Left side more common (85%)
- B/L <5%
- Sporadic(most cases)
- Familial (autosomal recessive, multifactorial)

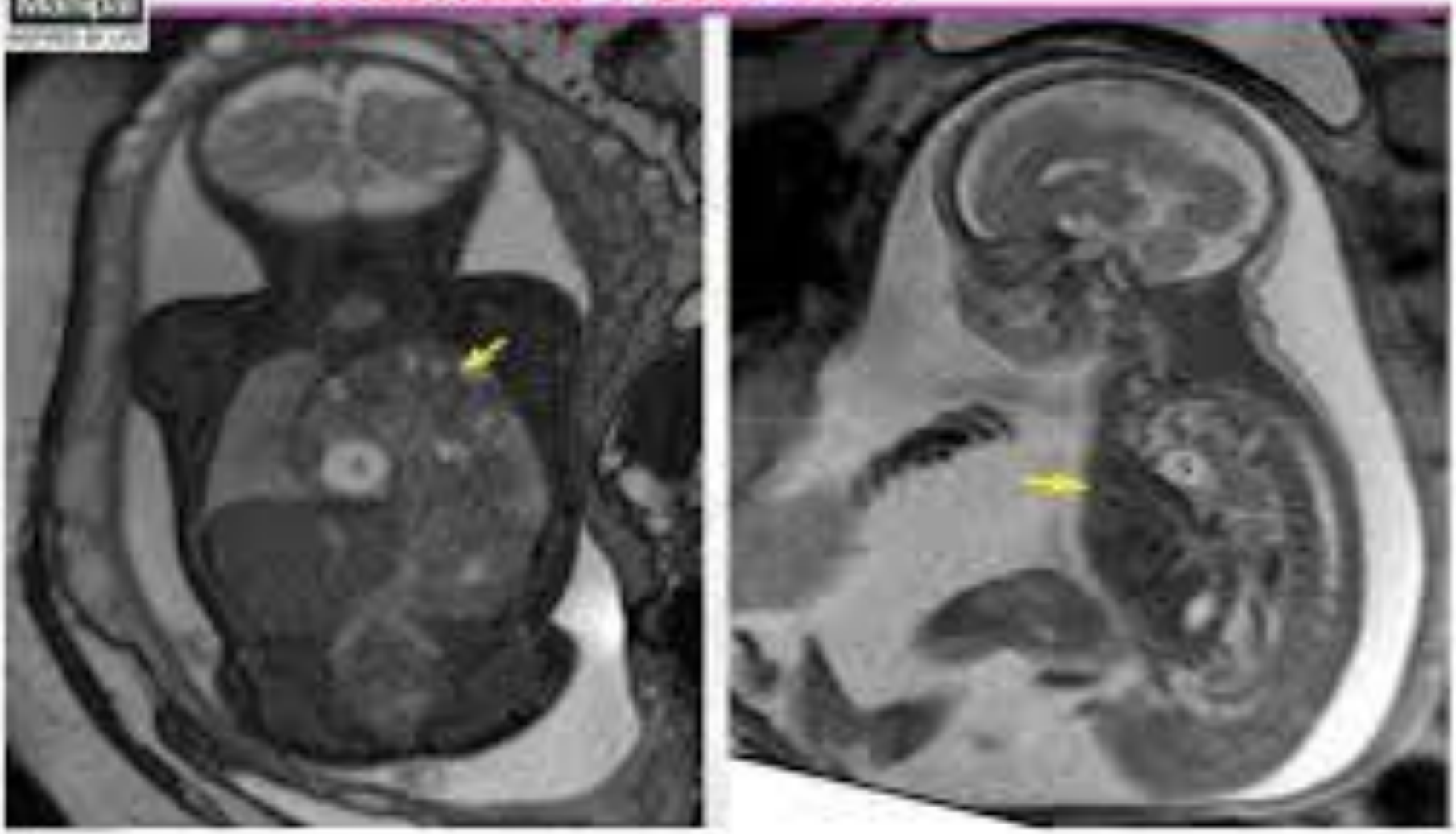
ASSOCIATED ANOMALIES

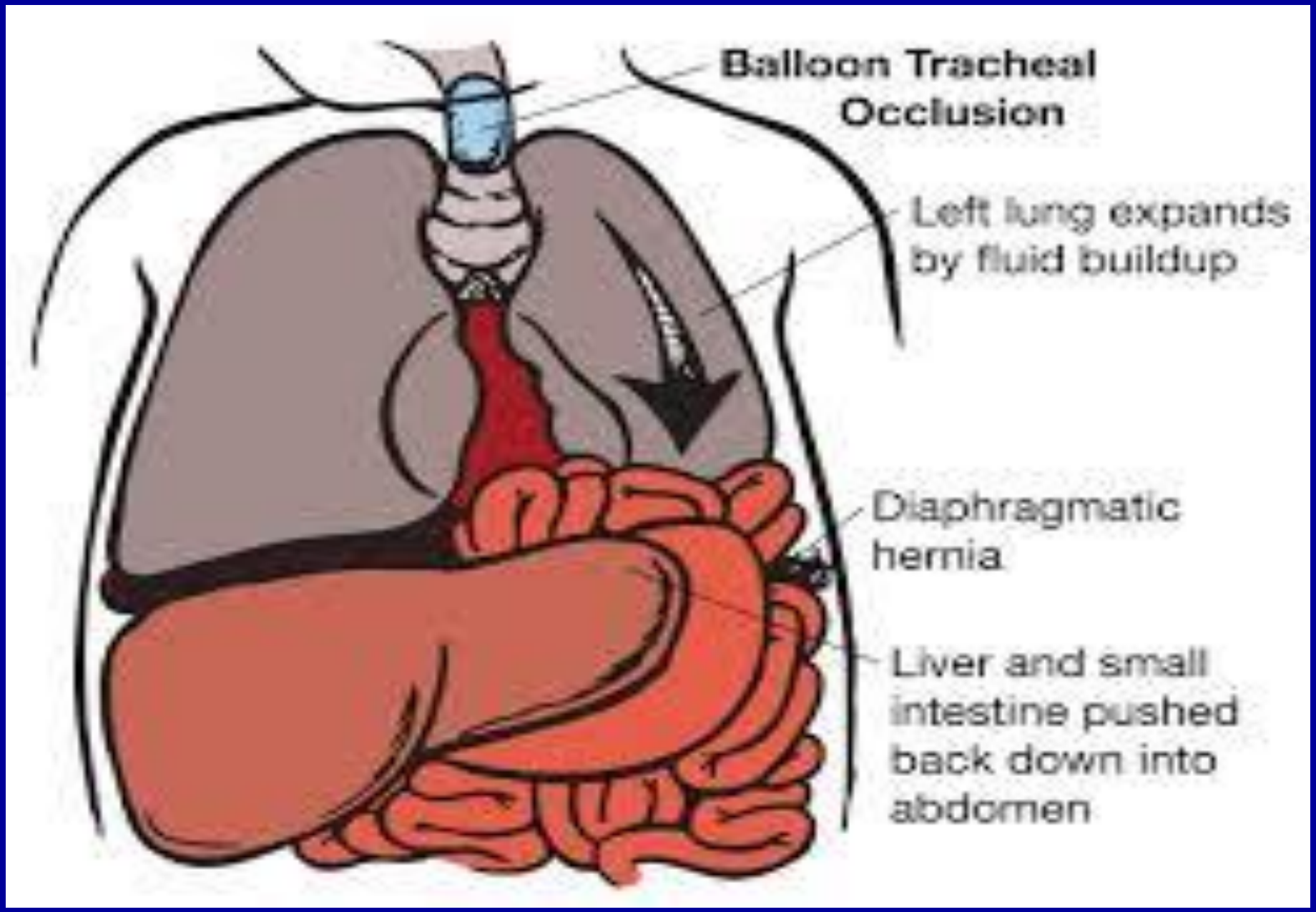
- CNS lesions
- Omphalocele
- Esophageal atresia
- Cardiovascular lesions
- Part of trisomy 21, trisomy 13, trisomy 18, fryns,

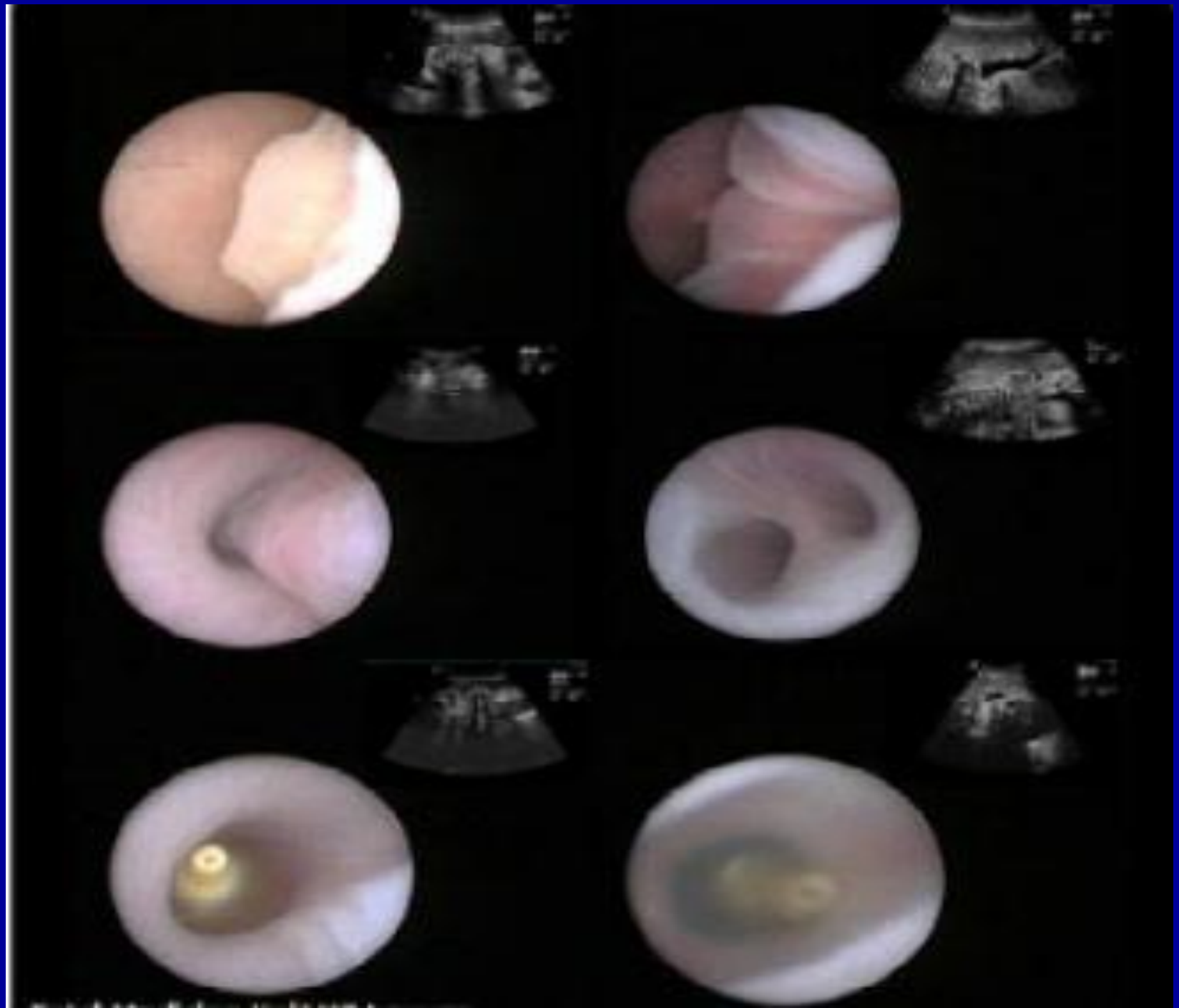
Diaphragmatic hernia

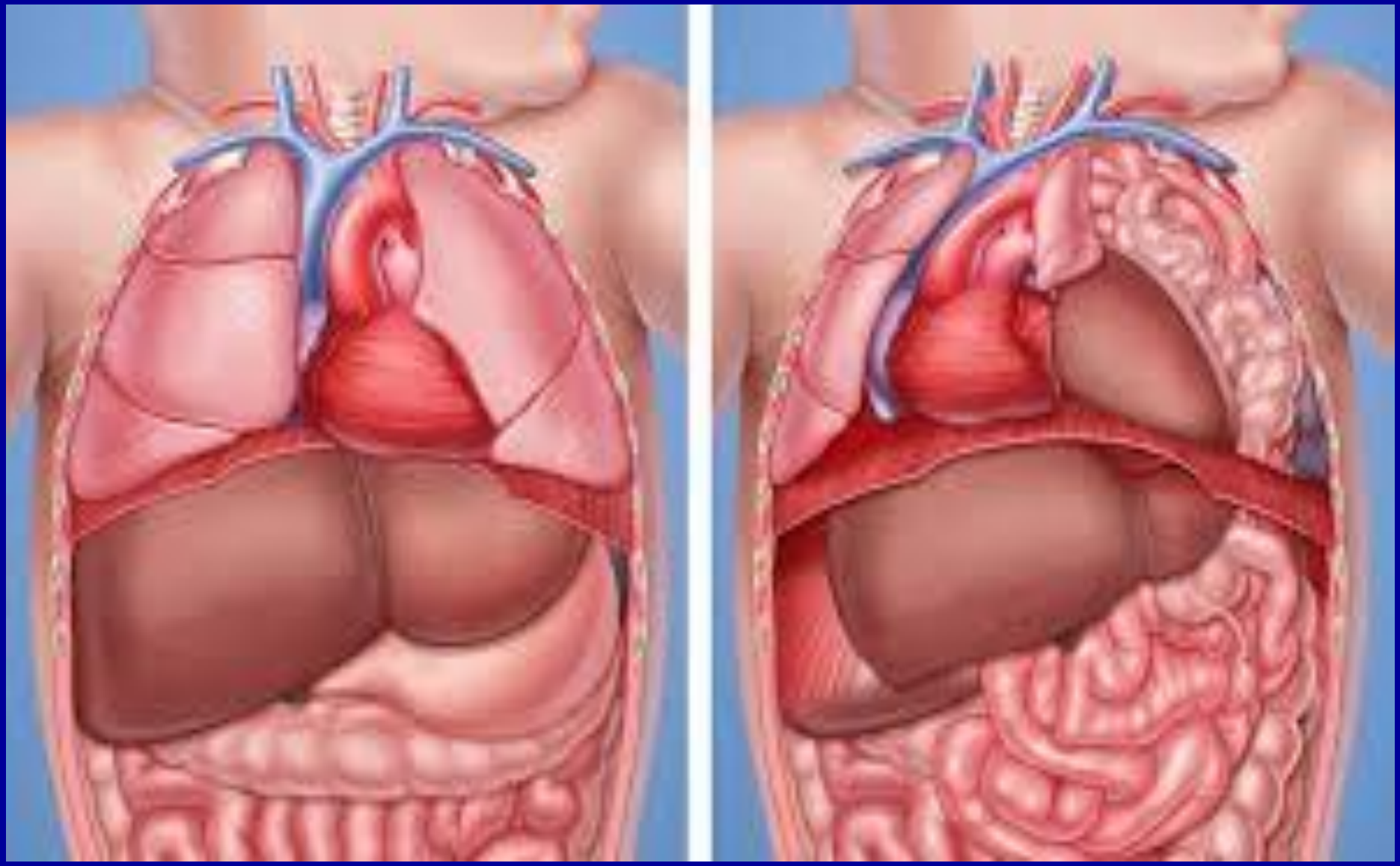


Congenital Diaphragmatic Hernia—
Antenatal Fetal MRI




Balloon Tracheal Occlusion
Left lung expands by fluid buildup
Diaphragmatic hernia
Liver and small intestine pushed back down into abdomen





Phrenic Nerve Paralysis

Late BPD

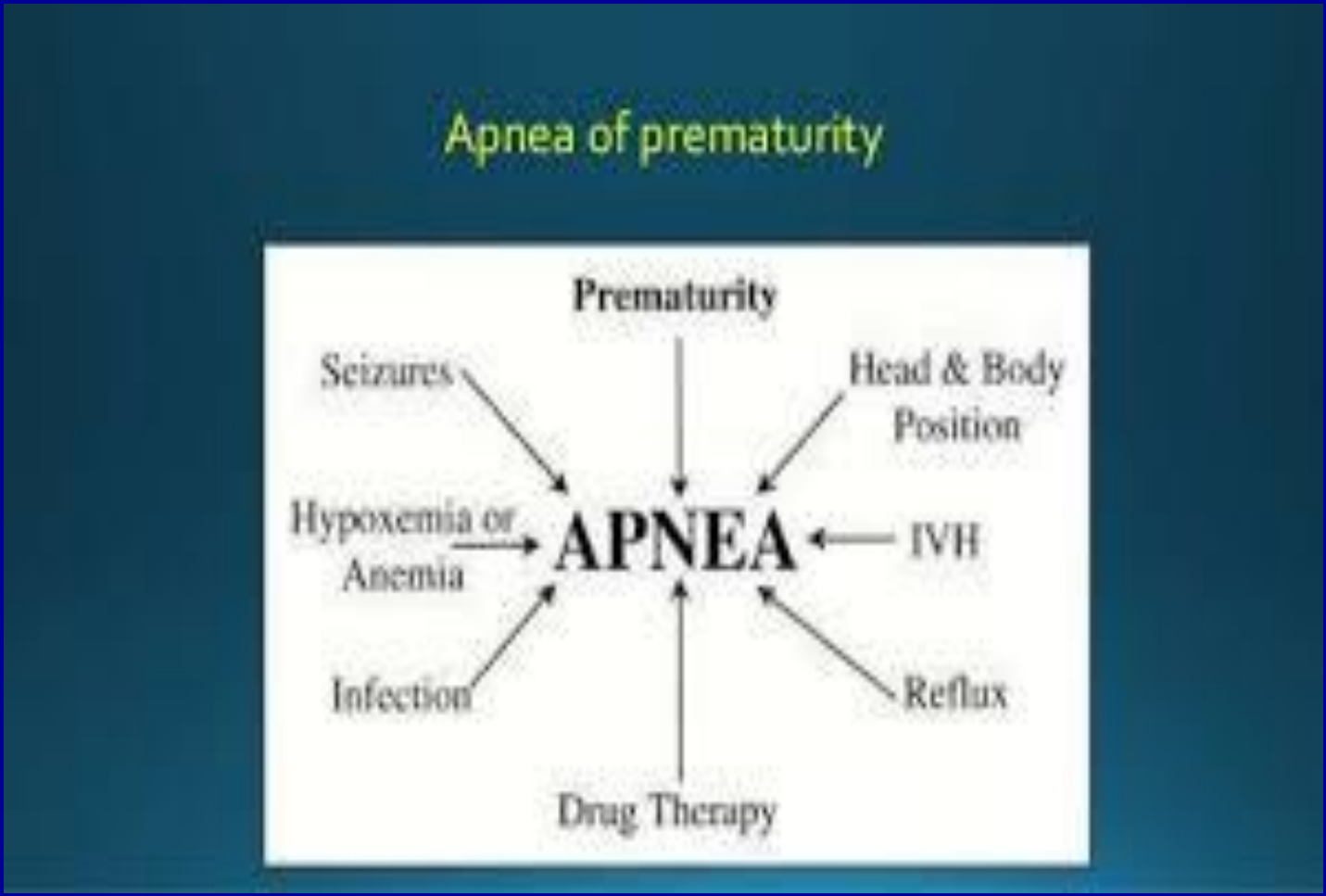
APNEA

Definition: cessation of breathing for longer than a 15 second period or for a shorter time if there is bradycardia or cyanosis

Apnea of Prematurity

- the cessation of pulmonary airflow for specific time interval, usually longer than10-20s
- central apnea complete cessation air flow and respiratory effort with no chest movement
- obstructive apnoa no airflow but chest movement presents
- Common in premature infants, because they usually responds paradoxically to hypoxia by developing apnea rather than increasing in respiration as do mature infants

APNEA


Apnea of prematurity
Prematurity
Seizures
Head & Body Position
Hypoxemia or Anemia
APNEA
IVH
Infection
Reflux
Drug Therapy

Babies at Risk for Apnea

- **Preterm**
- **Respiratory Distress**
- **Metabolic Disorders**
- **Infections**
- **Cold-stressed babies who are being warmed**
- **CNS disorders**
- **Low Blood volume or low Hematocrit**
- **Perinatal Compromise**
- **Maternal drugs in labor**

Table 1. Comparison of Apnea and Periodic Breathing

Criteria	Central Apnea	Obstructive Apnea	Mixed-type Apnea	Periodic Breathing
Duration of breathing cessation	At least 20 sec[a]	At least 20 sec[a]	At least 20 sec[a]	5-10 sec
Respiratory effort	Absent	Present	Absent/present	Absent
Movement of air	Absent	Reduced/absent	Reduced/absent	Reduced/absent
Bradycardia/desaturation	May occur	May occur	May occur	No

[a] *May be less than 20 seconds if there is associated bradycardia or cyanosis.*

Source: Reference 4.

APNEA

Treatment

- **Determine cause:**
- **x-ray**
- **blood sugar**
- **body and environmental temperature**
- **hematocrit**
- **sepsis work up**
- **electrolytes**
- **cardiac work up**
- **r/o seizure**

Treatment

- **CPAP**
- **Theophylline/Caffeine therapy**, caffeine at a loading dose of 10 mg⁄kg followed by 5 mg⁄kg⁄day maintenance may be an adequate starting point
- theophylline use, the recommended loading dose is 5–6 mg/kg, followed by maintenance doses of 2–6 mg/kg/day divided into two or three daily doses
  Mechanical ventilation
- **Apnea monitor**
- **Kangaroo mother care**

Viewer Discertion Advised

This video contains medical/surgical content that may not be suitable for general public.This video is made keeping in mind the wellbeing of our patients and ultimately to relieve their sufferings,which is our goal.In doing so we all learn.

THANK YOU

- Odds of death in hospital for VLBW infants were reduced by 30 % after surfactant was introduced.

- 80% of decline in the U.S. neonatal mortality rate between 1989 & 1990 could be attributed solely to the use of surfactant.

NEJM May 1994