Respiratory problems in newborn

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Doctors Notes will be highlighted in yellow

Important

Extra from book

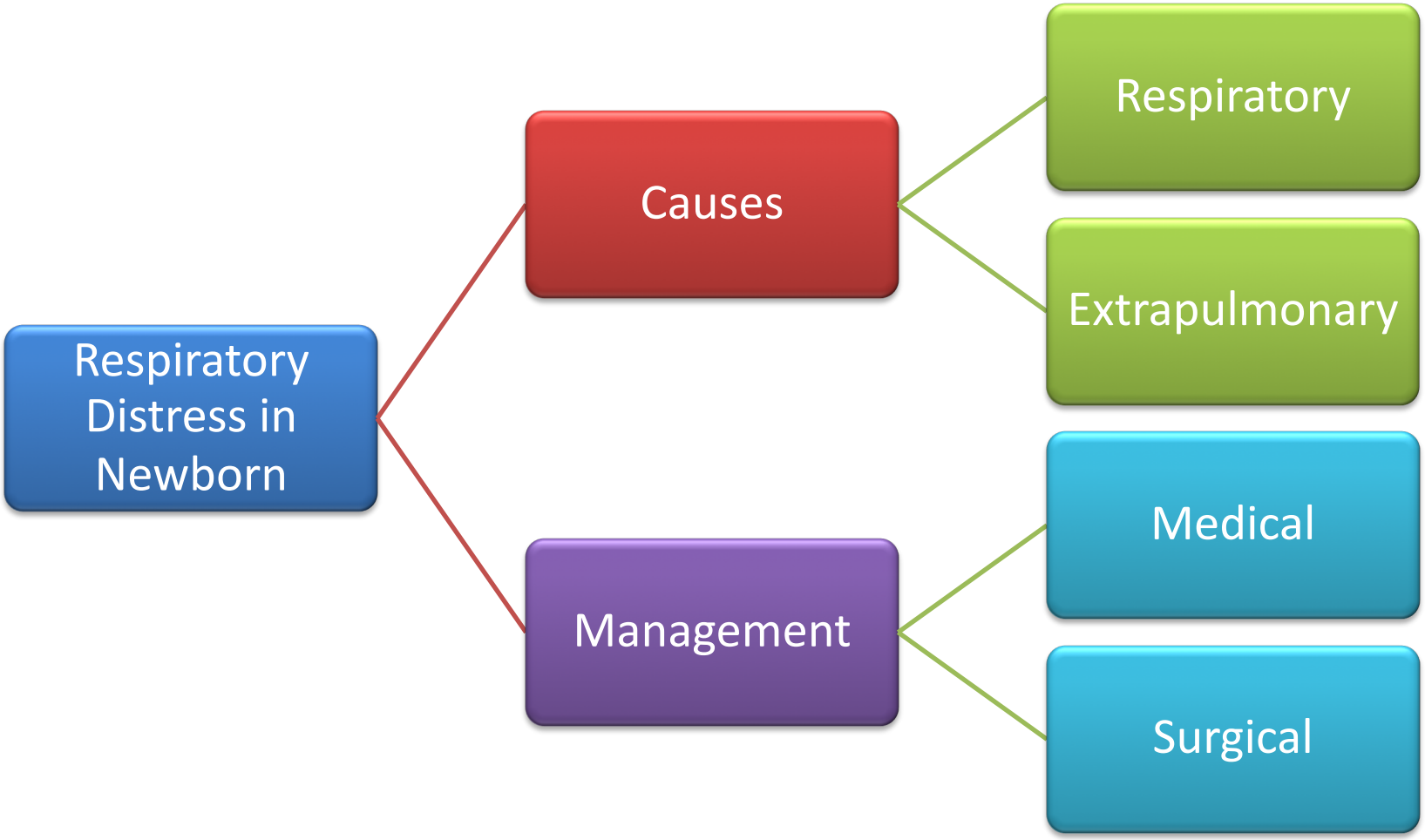
عدد سلايدز الدكتور أكثر لكن جمعت الصور لتقليل العدد، بالتوفيق.

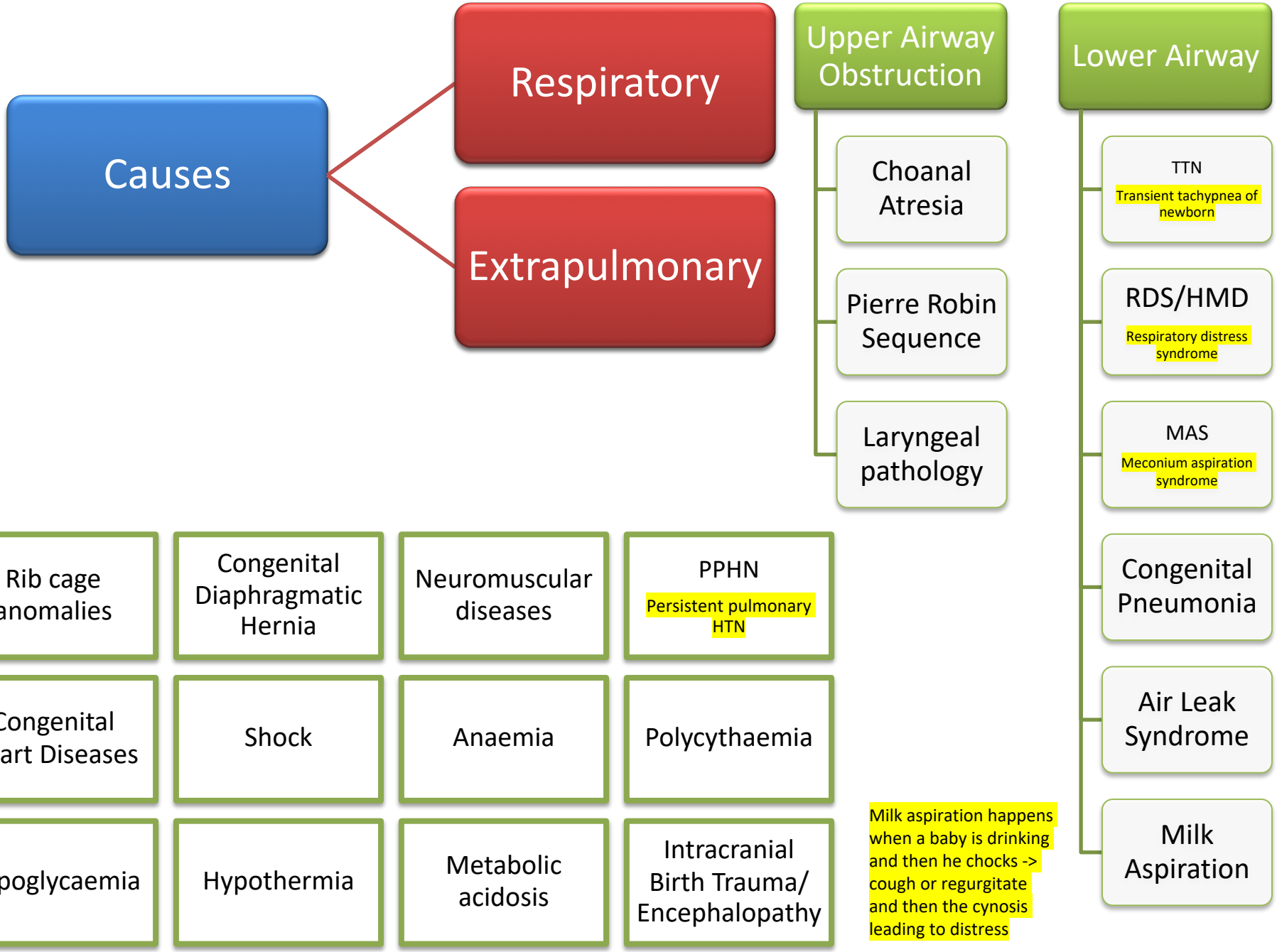
Respiratory Distress

- This is the commonest presentation.
- The commonest cause is **transient tachypnea of the newborn TTN (term babies), Respiratory distress syndrome (preterm babies).**
- Newborn 7 days, neonate 28 days! Infant up to a year, toddler 3 years
- What's the difference between (respiratory distress syndrome) and (respiratory distress)?

The word syndrome makes a difference, Respiratory distress is a discerption of any disease that cause respiratory distress, When adding syndrome it means you're talking about a specific condition which is also called hyaline membrane disease which is a deficiency of a molecule called surfactant.

Causes and Classification




Causes
Respiratory
Extrapulmonary
Upper Airway Obstruction
Choanal Atresia
Pierre Robin Sequence
Laryngeal pathology
Lower Airway
TTN
Transient tachypnea of newborn
RDS/HMD
Respiratory distress syndrome
MAS
Meconium aspiration syndrome
Congenital Pneumonia
Air Leak Syndrome
Milk Aspiration
Rib cage anomalies
Congenital Diaphragmatic Hernia
Neuromuscular diseases
PPHN
Persistent pulmonary HTN
Congenital Heart Diseases
Shock
Anaemia
Polycythaemia
Hypoglycaemia
Hypothermia
Metabolic acidosis
Intracranial Birth Trauma/ Encephalopathy
Milk aspiration happens when a baby is drinking and then he chocks -> cough or regurgitate and then the cynosis leading to distress

Management

Medical

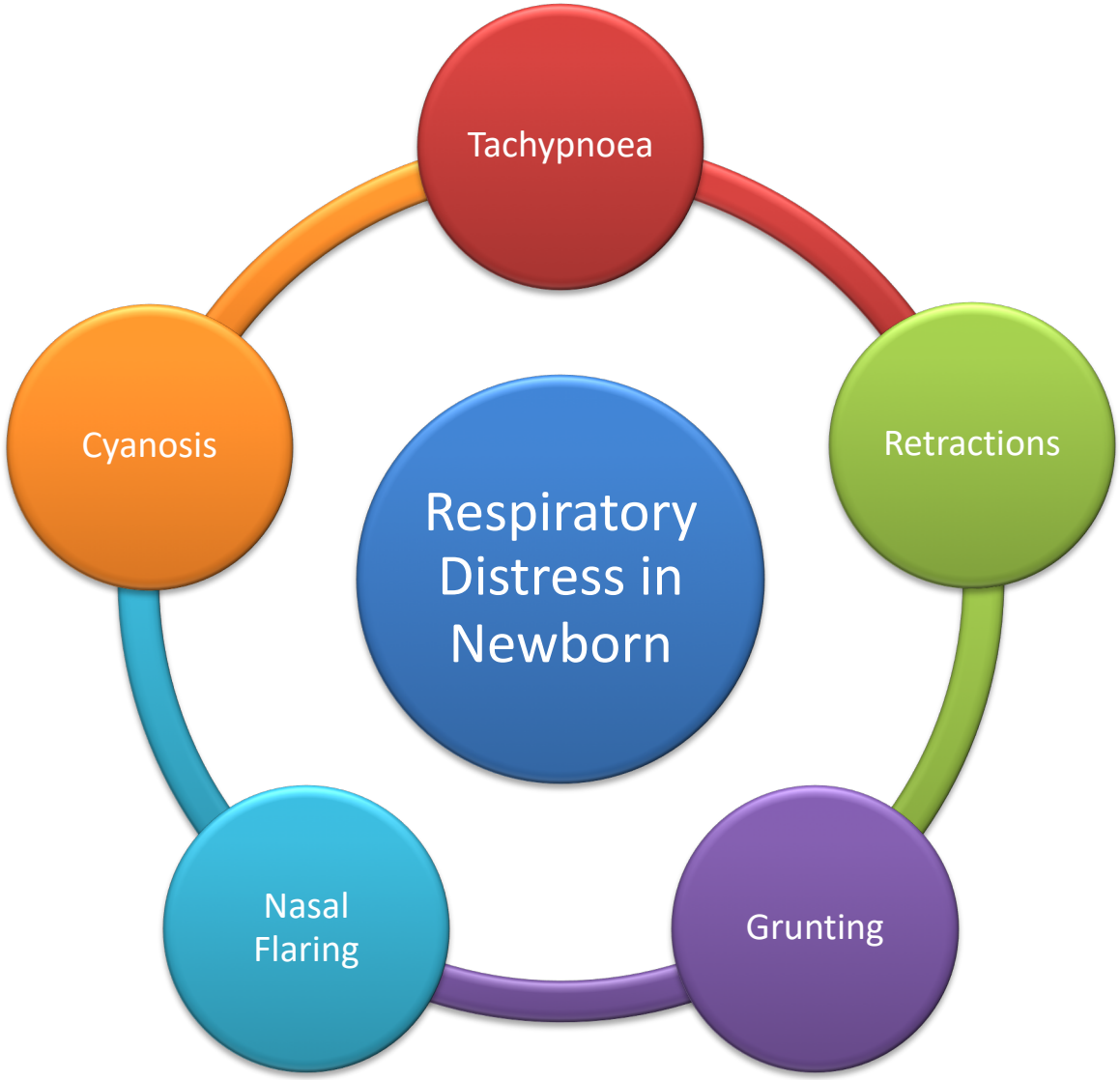
- TTN
- MAS
- RDS/HMD
- Pneumonia
- Milk Aspiration
- CHD
- Shock
- Anaemia
- Polycythaemia
- Hypoglycaemia
- Hypothermia
- Metabolic Acidosis

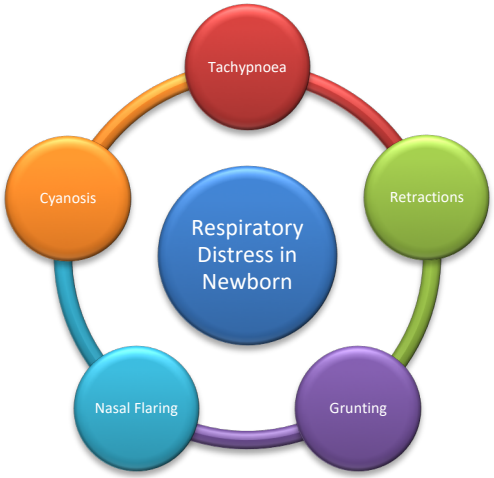
Surgical

- Choanal atresia
- Pierre Robin Sequence
- Air Leak Syndrome (pneumothorax)
- Rib cage anomalies
- Congenital Diaphragmatic Hernia
- Intracranial Birth Trauma/ Encephalopathy

Respiratory Distress Signs

once you enter the circle all the symptoms accumulate



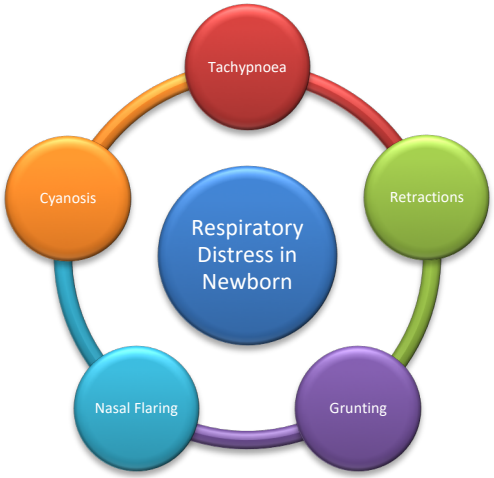


Tachypnoea

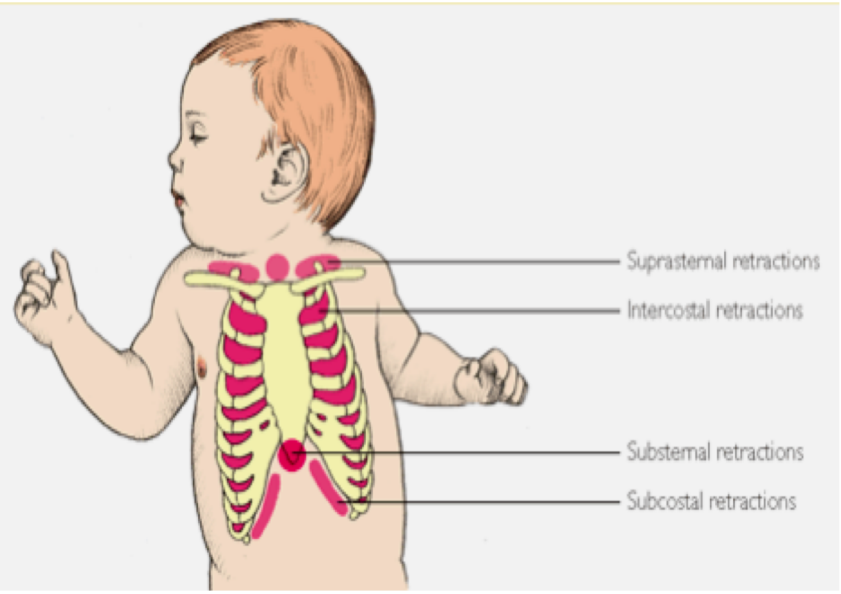
Respiratory Rate:

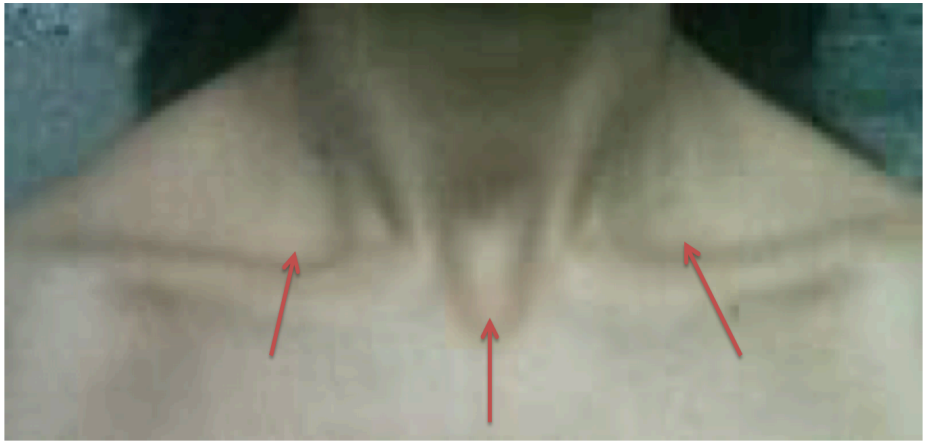
< 1 week up to 2 months:	**60 or more**
2 to 12 months:	50 or more
12 months to 5 years:	40 or more

- In preterm baby they can have up to 70-80.



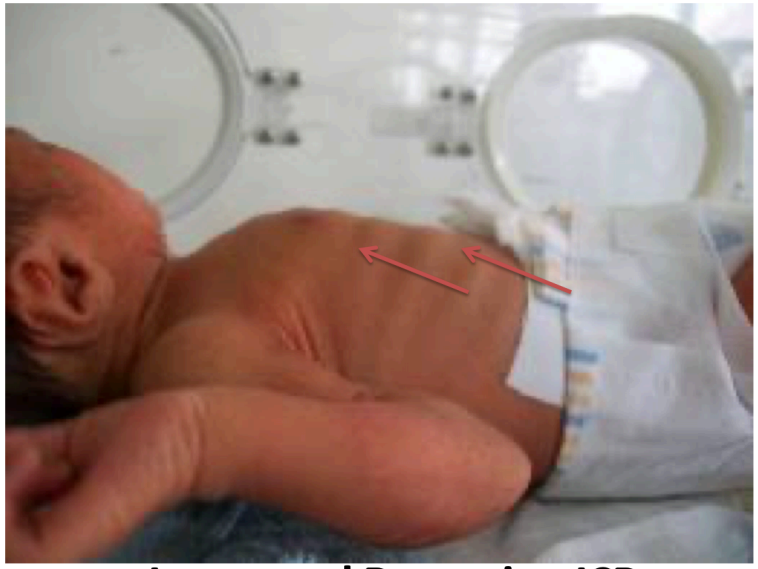
- Due to negative intrapleural pressure generated between the contraction of diaphragm, respiratory muscles and the mechanical properties of lung and chest wall
  - Suprasternal Retraction SSR
  - Intercostal Retraction ICR
  - Subcostal Retraction SCR





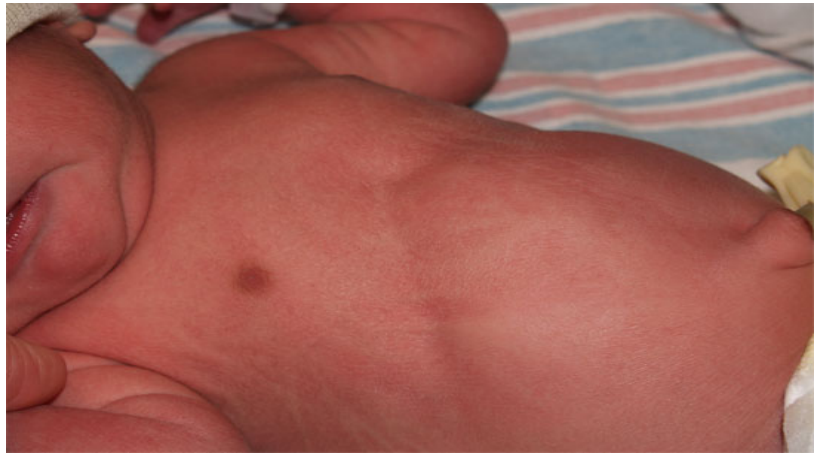
Suprasternal Retraction SSR

Above the sternum

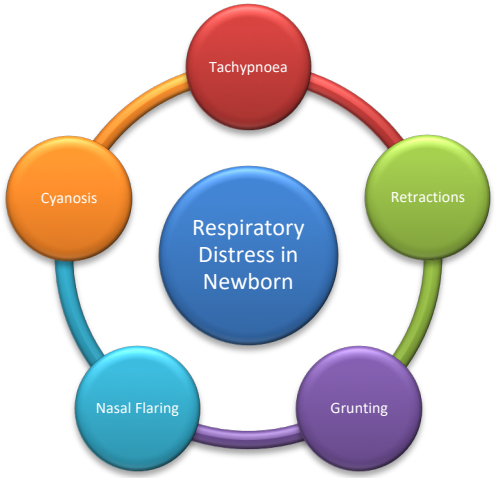


Intercostal Retraction ICR

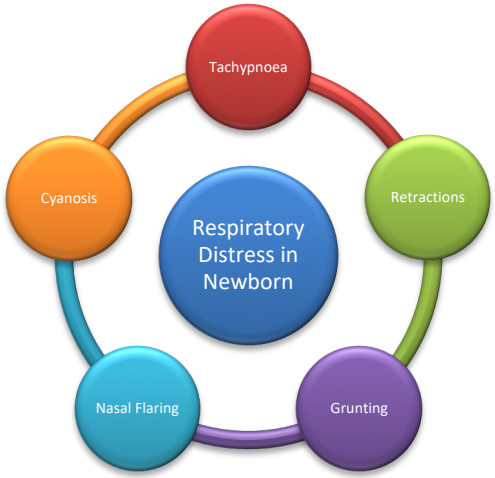
Between the ribs



Subcostal Retraction SCR

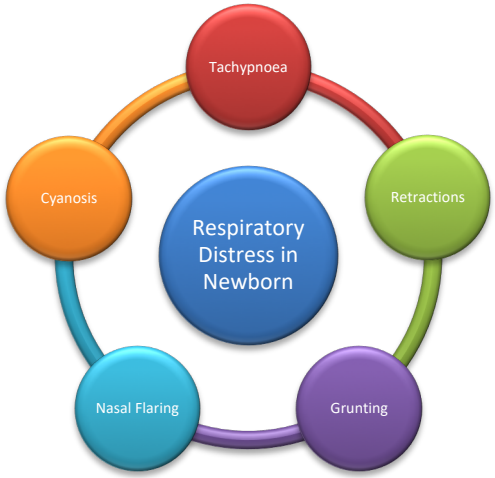


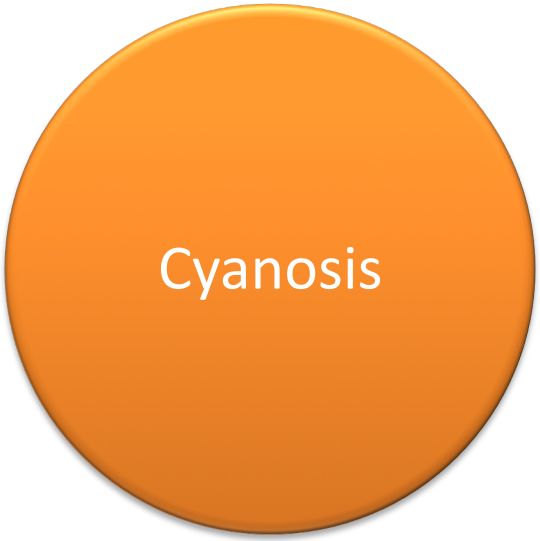
- Expiration through <u>partially</u> closed vocal cords to increase airway pressure and lung volume resulting in improved ventilation-perfusion (V/P) ratio
- Low pitched expiratory sound.
- Protective phenomenon to prevent collapse of alveoli: PEEP more common in preterm and in babys TTN



Nasal Flaring

- Narrow nasal space contributes to total lung resistance
- Nasal flaring decreases the work of breathing
  - Flaring means that the baby reached max distress
  - What are the primary respiratory muscle of newborn? Diaphragm
  - Accessory muscles: intercostal subcostal substernal and nose



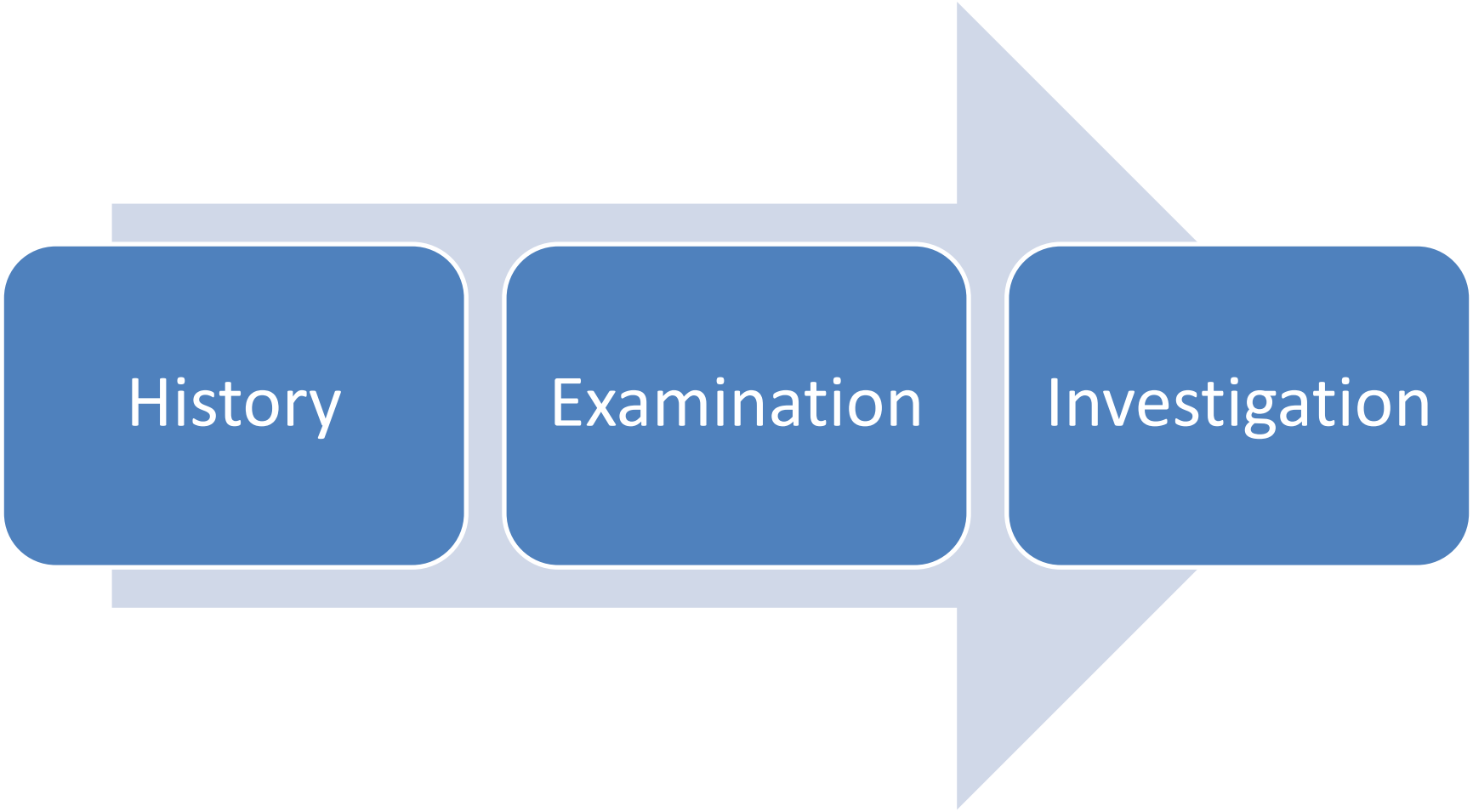


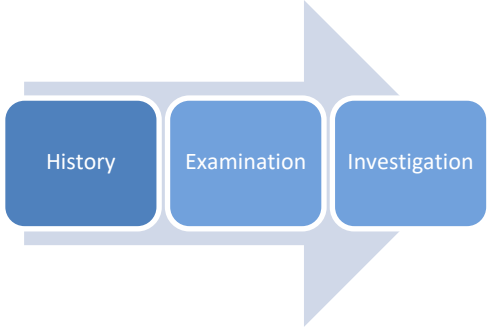
- Clinical detection of cyanosis depends on total amount of desaturated HB in blood
  - Anaemic infants may have low PaO_2 that is missed clinically
  - Polycythaemic infants with normal PaO_2 can appear cyanotic

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

Central cyanosis, +ICR, +SCR, +NF

Evaluation and Investigation





- TTN could happen in quick delivery (**Precipitate delivery**) so the baby will have retained fluid in the lung.
- Trauma during birth that could cause respiratory
- Is liquor clear or not? MAS.
- Antenatal US: is the baby IUGr? Congenital anomalies?

Gestation age /Delivery mood

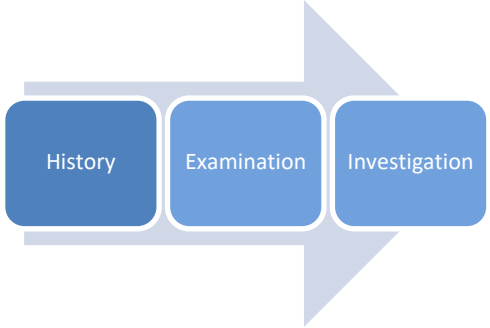
Term LSCS ?TTN	Preterm (no dexa) ?RDS	Postdate (IOL,MSAF) ?MAS

Liquor **AKA amniotic fluid**

Oligohydramnio ?Pulmonary Hypoplasia	Polyhydramnios ?Cong Diaphr Hernia ?Oesoph atresia/TEF	MSAF TMSL/MMSL/LMSL ?MAS ?PPHN

Antenatal US Finding

Amniotic Fluid Index	Renal Agenesis ?Pulmonary Hypoplasia ?RDS



Leaking Liquor

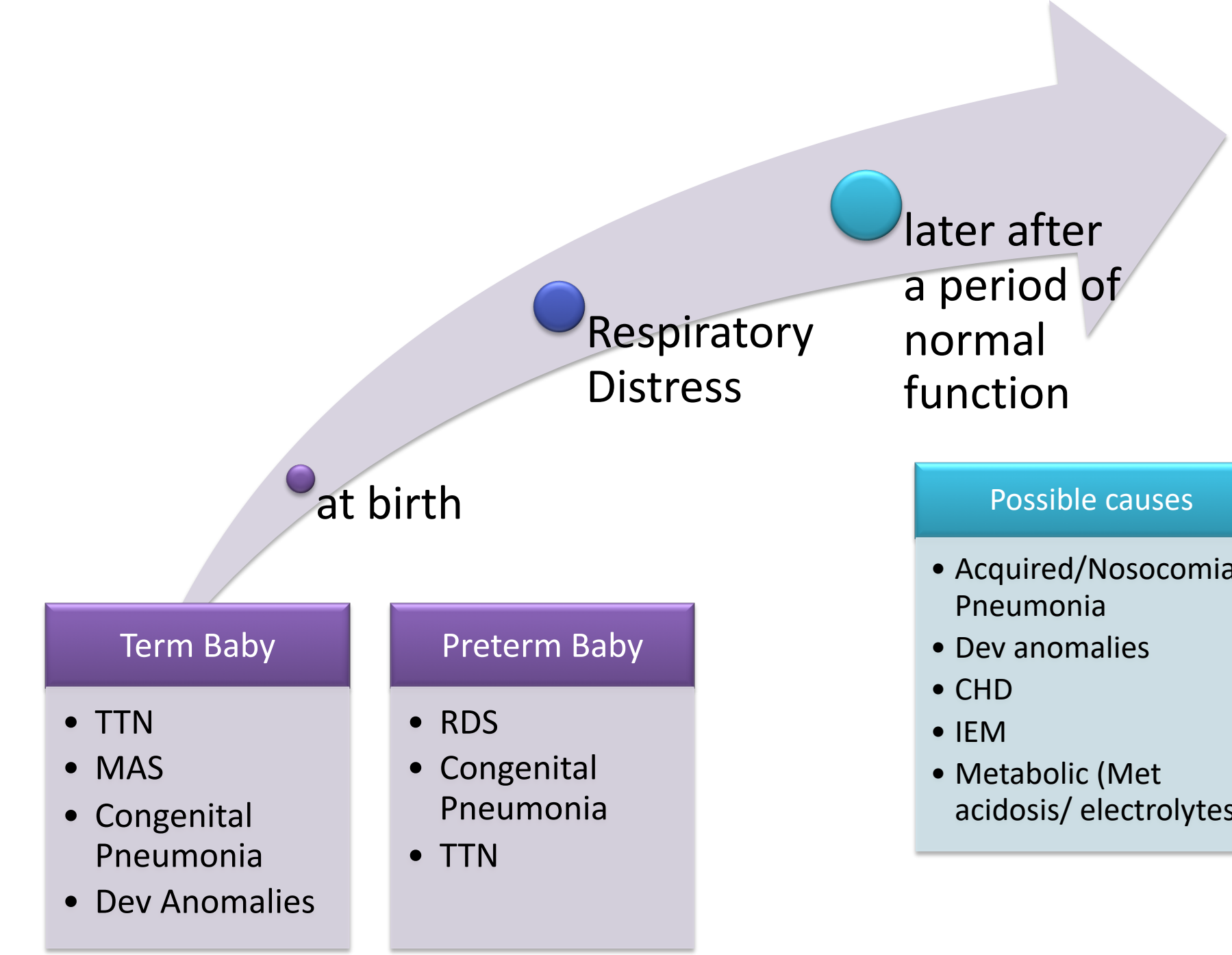
- >18hrs
  ?Presumed Sepsis
- PPROM/PROM
- Maternal UTI
  ?Presumed Sepsis

Condition at birth

- Distress
  ?Met acidosis
- Not vigorous
  ?Asphyxial Lung Ds
- Require resus at birth
  ?Air Leak Syndrome (pneumothorax)

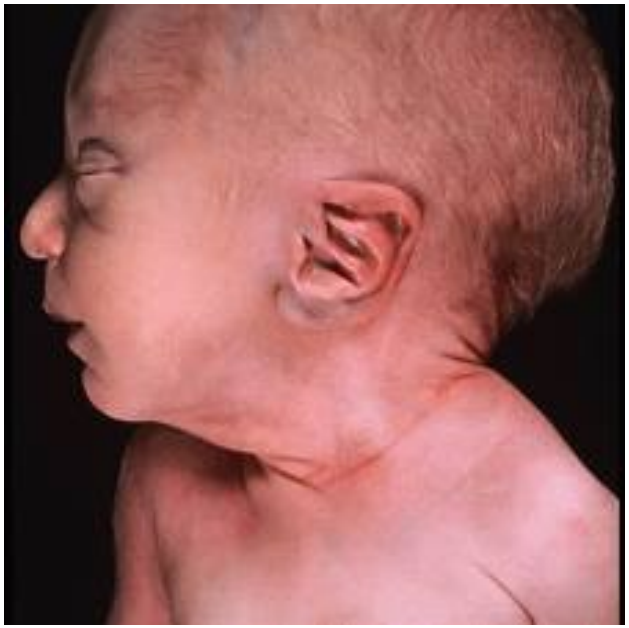
Risk Factors

- IDM
  ?Hypoglycaemia
- GBS+ Mother
  ?Sepsis/Congenital Pneumonia


later after a period of normal function
Respiratory Distress
at birth
Term Baby
TTN
MAS
Congenital Pneumonia
Dev Anomalies
Preterm Baby
RDS
Congenital Pneumonia
TTN
Possible causes
Acquired/Nosocomial Pneumonia
Dev anomalies
CHD
IEM
Metabolic (Met acidosis/ electrolytes)

History | Examination | Investigation

Heart rate in neonate is taken by auscultation not by pulse!
For RR look at the abdominal movement.



Potter face: abnormal facies with a beak nose, receding chin (micrognathia), broad nasal bridge, epicanthal folds, and large low set ears

Vitals

- T – hypo/hyperthermic
- RR – tachy/apnoea
- HR – tach/bradycardia
- SPO_2 – desaturate?

General Condition

- Pallor
- Plethoric
- SGA/LGA
- Macrosomic/hydroptic

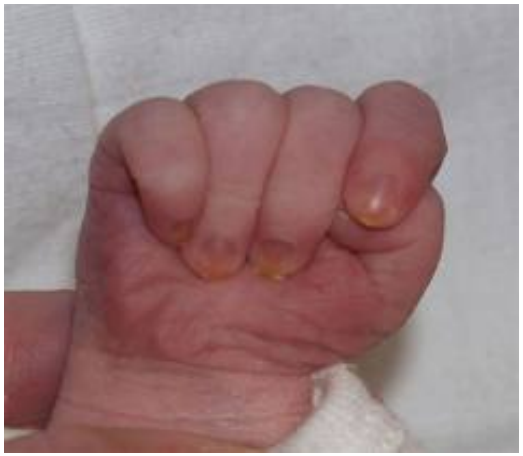
Oral Cavity

- Cleft palate
- Excessive oral secretion

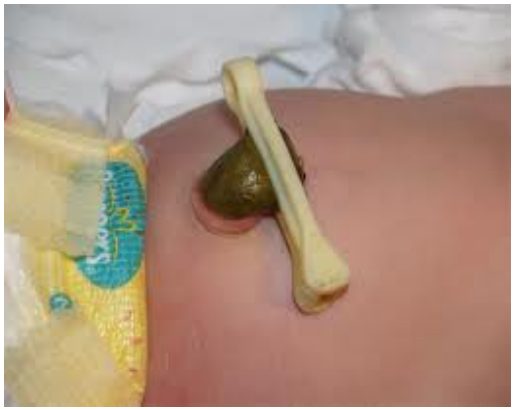
Congenital anomalies

- Pierre Robin
- Potter face

History | Examination | Investigation



Meconium stained Nail



Meconium stained Cord

CVS/Lung

- Dextrocardi,murmurs
- In-drawing sternum
- Air entry

Abdomen

- Scaphoid abdomen
- ddx: Diaphragmatic hernia if you miss it the baby will die, start Ambo bagging definitive is intubation and then NGT to deflate the stomach.

Umbilical cord/ Nails

- Meconium stained

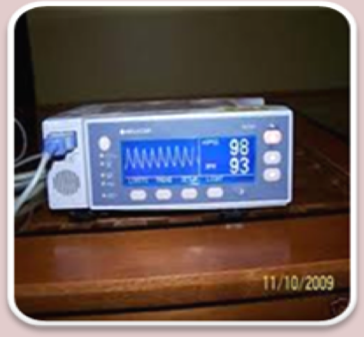
Tone/ Reflexes

- Hypotonia
- Poor sucking reflex
- Incomplete Moro

History | Examination | Investigation

Look for:

- O_2 Saturation
- Metabolic/ respiratory acidosis/ alkalosis
- Blood counts (Hb/TWC/Plt/Ht)
- Glucose level
- Sepsis causative agent
- Collapse/Air Leak/CDH/ Cardiomegaly



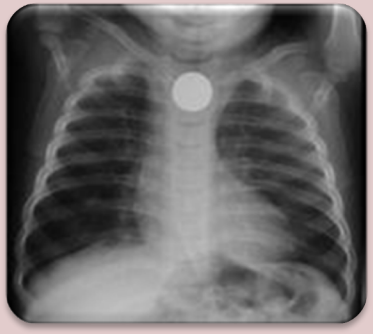
SPO_2 monitoring

VBG/ ABG

FBC

DXT

Blood C+S/LP



CXR Portable

General Management

Respiratory Support most imp

- O_2 Delivery
- PEEP/ Mechanical ventilation (CPAP/SiPAP)
- Intubation and suction

Supportive Care

- HR monitoring
- Continuous SPO_2 monitoring
- Temp/DXT monitoring
- I/O charting
- Feeding (PO/TPN)
- Cot/Incubator nursing

Definitive/Specific Therapy

According to diagnosis

Differential Diagnosis of Respiratory Distress in the Newborn

Most common causes: if you were asked what are common causes?

- Transient tachypnea of the newborn term
- Respiratory distress syndrome (hyaline membrane disease) Preterm
- Meconium aspiration syndrome POST TERM/Term

Less common but significant causes:

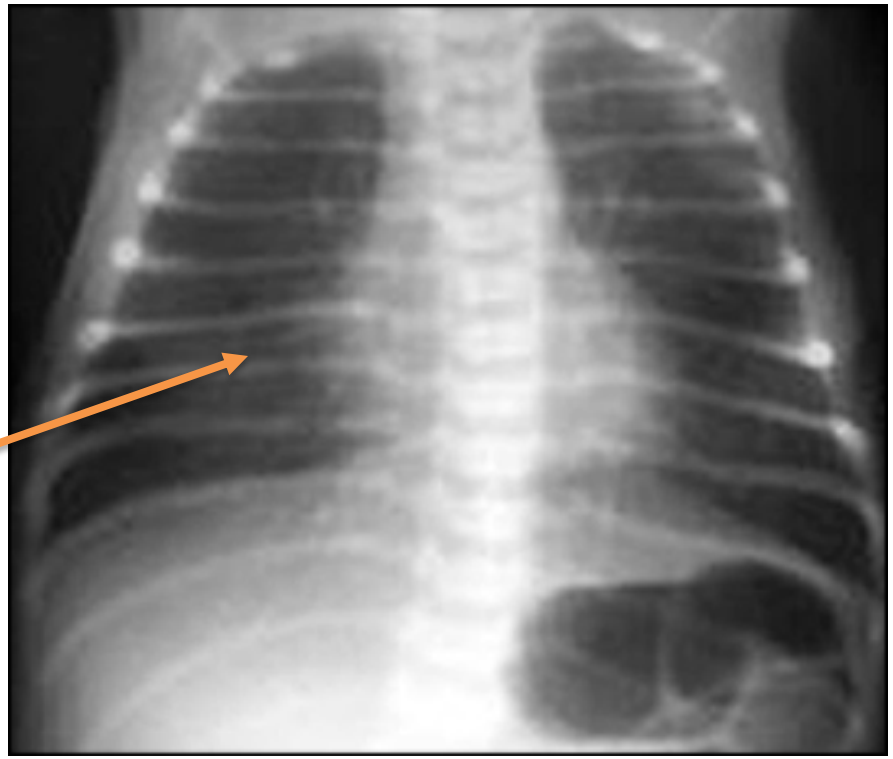
- Delayed transition
- Infection (e.g., pneumonia, sepsis)
- Nonpulmonary causes (e.g., anemia, congenital heart disease, congenital malformation, medications, neurologic or metabolic abnormalities, polycythemia, upper airway obstruction)
- Persistent pulmonary hypertension of the newborn
- Pneumothorax

Some students wish not to get a newborn in the exam but believe me you can list all the differentials and no one can tell you no because they have no special signs and symptoms in this age group.

Transient Tachypnea of the Newborn

- More than 40 % of cases. Common
- A benign condition.
- Residual pulmonary fluid remains in fetal lung tissue after delivery. How to get rid of this fluid during delivery? 1. Squeezing the vagina 2. lymphatic drainage so why is it common in CS? Due to the lack of squeezing effect and in multipara why? Faster delivery less squeezing.
- Prostaglandins released after delivery dilate lymphatic vessels.
- Fluid persists despite these mechanisms.
- Risk factors include maternal asthma, male sex, macrosomia, maternal diabetes, and cesarean delivery.
- Symptoms can last from a few hours to two days. And the baby is totally normal.

CXR - TTN

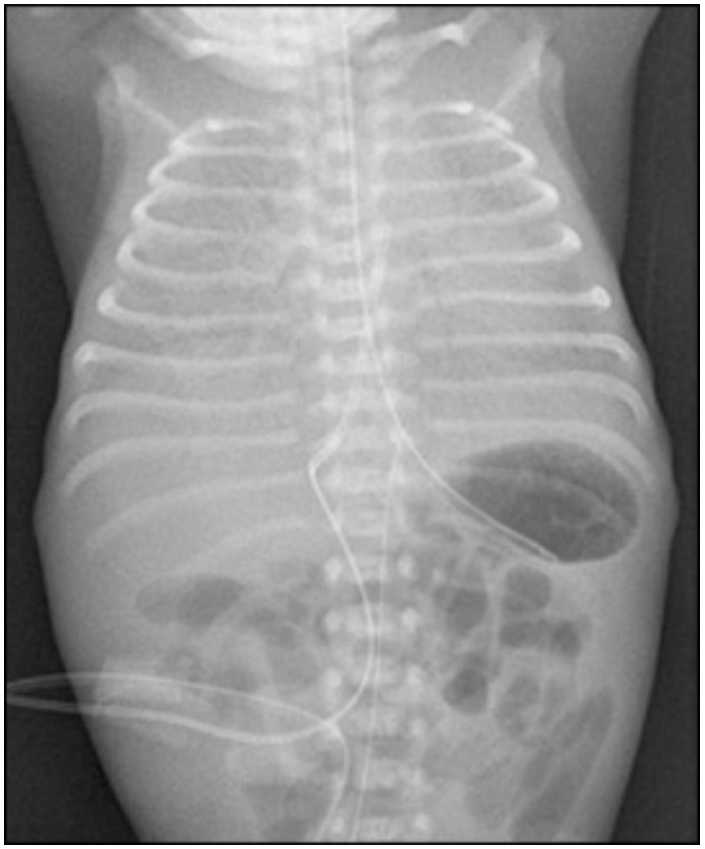


Fluid in the transverse fissure of the right lung
This is typical in TTN

Respiratory Distress Syndrome

- Also called hyaline membrane disease,
- Is the most common cause of respiratory distress in **premature infants.**
- Occurs in less than 5 percent of those born after 34 weeks' gestation.
- More common in boys,
- Incidence is approximately six times higher in infants whose mothers have **diabetes**.
- They found that DM interferes with surfactant synthesis.
- Glucocorticoids given antenatally to mothers stimulate fetal surfactant production and are given if preterm delivery is anticipated it significantly reduces RDS bronchopulmonary dysplasia and intraventricular hemorrhage.

CXR - RDS



Bilateral Homogenous ground glass appearance with decreased lung volume.
IT MUST BE BILATERAL

Extra from the book:

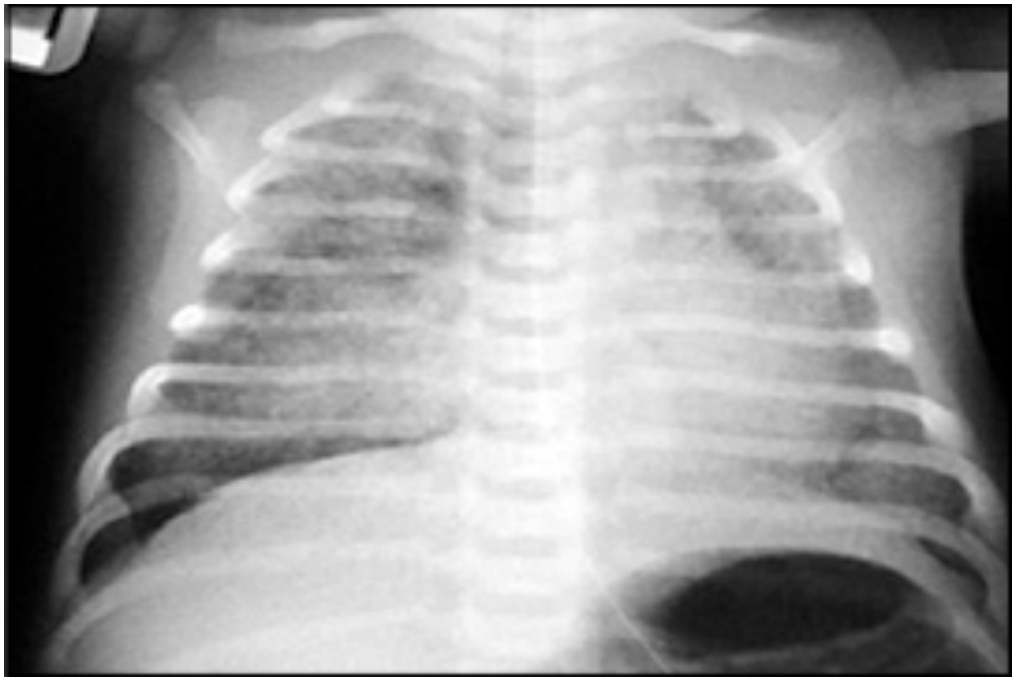
Best initial diagnostic test—chest radiograph
Findings: ground-glass appearance, atelectasis, air bronchograms
Most accurate diagnostic test—L/S ratio (part of complete lung profile; lecithin-tosphingomyelin ratio)

Treatment with raised ambient oxygen is required and surfactant therapy may be given by instilling surfactant directly into the lungs via a tracheal tube or catheter. Additional respiratory support may be provided non-invasively with continuous positive airway pressure (CPAP) or high-flow nasal cannula therapy or invasively with mechanical ventilation via a tracheal tube. Mechanical ventilation (with intermittent positive pressure ventilation or high-frequency oscillation) is adjusted according to the infant's oxygenation (which is measured continuously), chest wall movements and blood gas analyses.
Non-invasive respiratory support is used in preference to mechanical ventilation whenever possible as it has fewer complications.
Surfactant therapy reduces morbidity and mortality of preterm infants with respiratory distress syndrome

Meconium Aspiration Syndrome

- Meconium-stained amniotic fluid occurs in approximately 15 percent of deliveries, causing meconium aspiration syndrome in the infant in 10 to 15 percent of those cases, **typically in term and post-term infants.**
- Meconium is composed of desquamated cells, secretions, lanugo, water, bile pigments, pancreatic enzymes, and amniotic fluid. Although **sterile**, meconium is locally irritative, obstructive, and a medium for bacterial culture.
- Fetal distress in utero. Seen in CTG.
- Significant respiratory distress immediately after delivery.
- Hypoxia.

CXR - MAS



Bilateral patchy fluffy appearance like cotton.

Infection

always think of sepsis and do blood culture and start ABx

- Bacterial infection .
- Common pathogens include group B streptococci (GBS) commonest in preterm , *Staphylococcus aureus, Streptococcus pneumoniae*, and gram-negative enteric rods.
- Pneumonia and sepsis have various manifestations, including the typical signs of distress as well as **temperature instability. (hypothermia)**
- Unlike transient tachypnea of newborn, respiratory distress syndrome, and meconium aspiration syndrome, bacterial infection takes time to develop, with respiratory consequences occurring **hours to days after birth**.
- Risk factors for pneumonia include prolonged rupture of membranes, prematurity, and maternal fever.
- Prevention of GBS infection.
- Chest radiography helps in the diagnosis, along with blood cultures .

Less Common Causes

- Pneumothorax.
- Persistent pulmonary hypertension of the newborn.
- pulmonary hypoplasia.
- congenital emphysema
- esophageal atresia,
- diaphragmatic hernia.
- choanal atresia
- vascular rings.
- Obstructive lesions include choanal atresia, macroglossia, Pierre Robin syndrome, lymphangioma, teratoma, mediastinal masses, cysts, subglottic stenosis, and laryngotracheomalacia.
- Cyanotic heart disease includes transposition of the great arteries and tetralogy of Fallot.
- Noncyanotic These lesions include large septal defects, patent ductus arteriosus.
- Hydrocephalus and intracranial hemorrhage.
- Maternal exposure to medications,
- Metabolic and hematologic derangements (e.g., hypoglycemia, hypocalcemia, polycythemia, anemia).
- Inborn errors of metabolism.

RDS

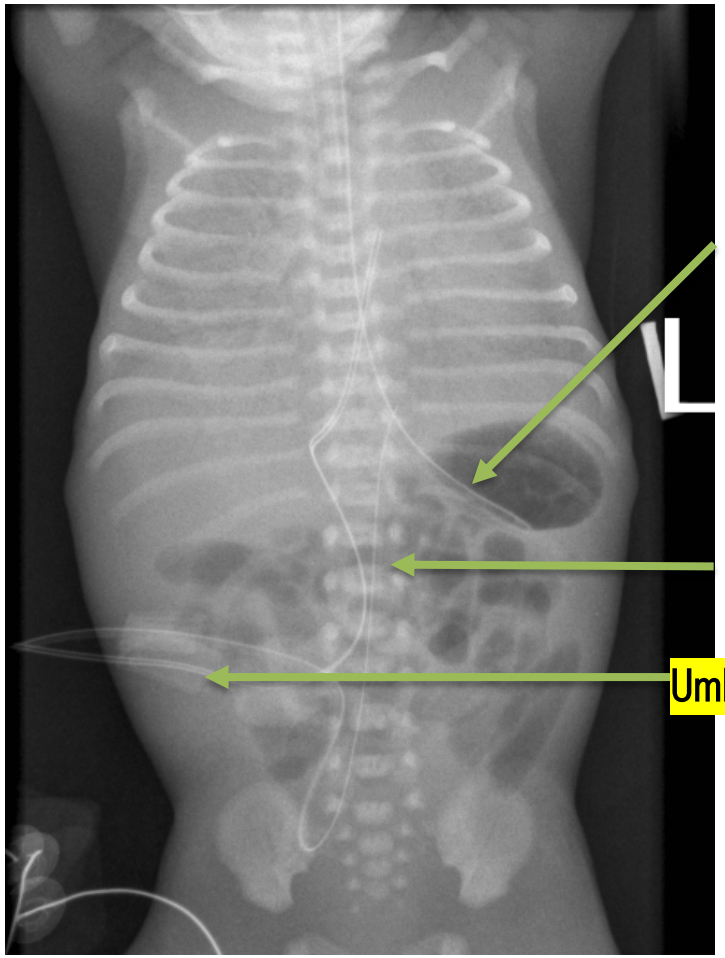
Bilateral homogenous ground glass appearance and small lung volume
there is pulmonary fluid and air which leads to pathologic air bronchogram

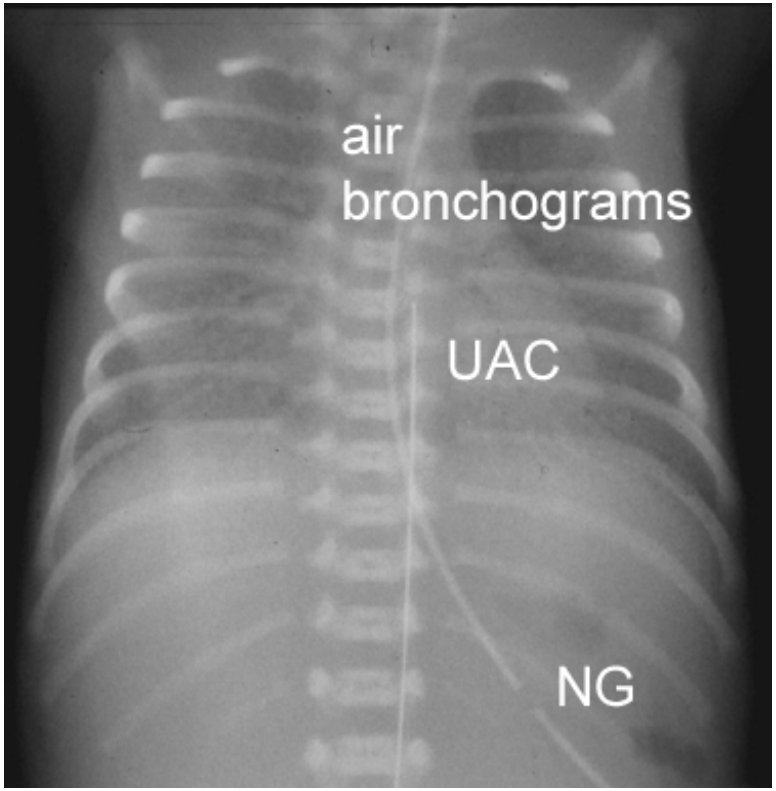
What's an air bronchogram? Fluid and air.

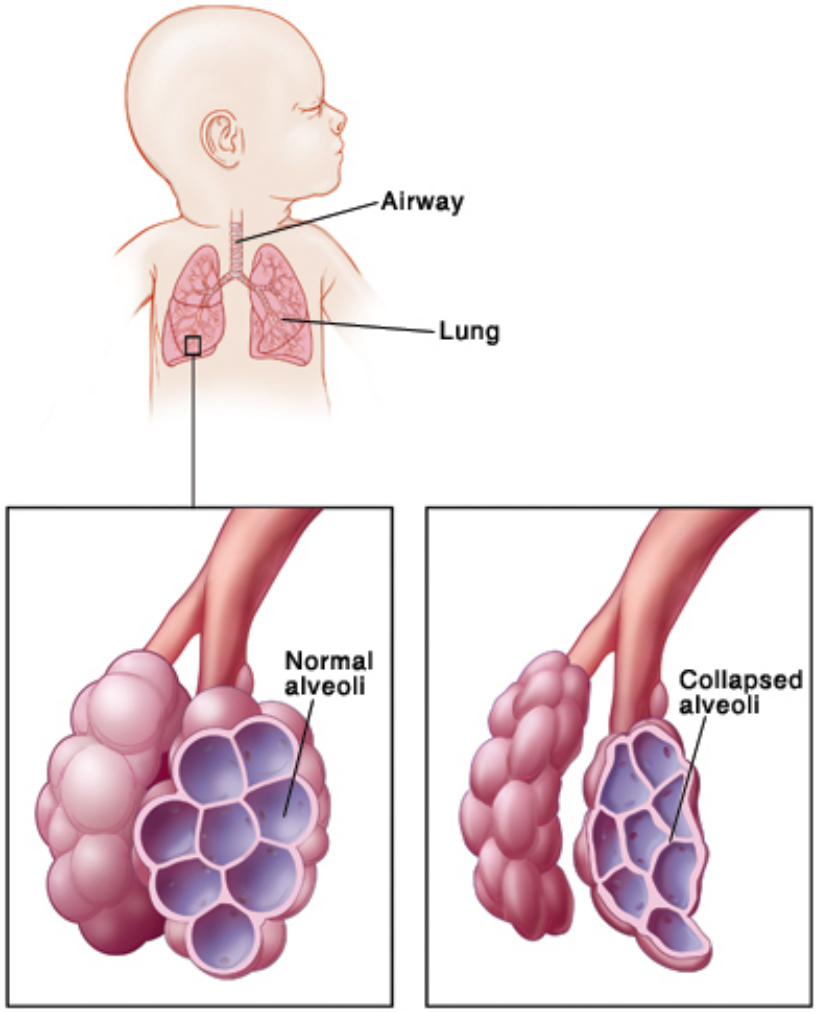
In this CXR theres no PATHOLOGICAL airbronchogram what you're seeing is the cardiac shadow.
When do we say pathologic Air bronchogram? When we see it **after the cardiac shadow**

Common mistake is when we ask you to show us the air bronchogram and you point at the heart and we ask you if its normal or not? You must say normal!!!!

How many veins and arteries in Umbilicus?
2 arteries and 1 vein
Fetus (vein oxygenated blood)
Baby (artery oxygenated)
In our practice we take blood every hour this is why we use umbilical artery catheterization

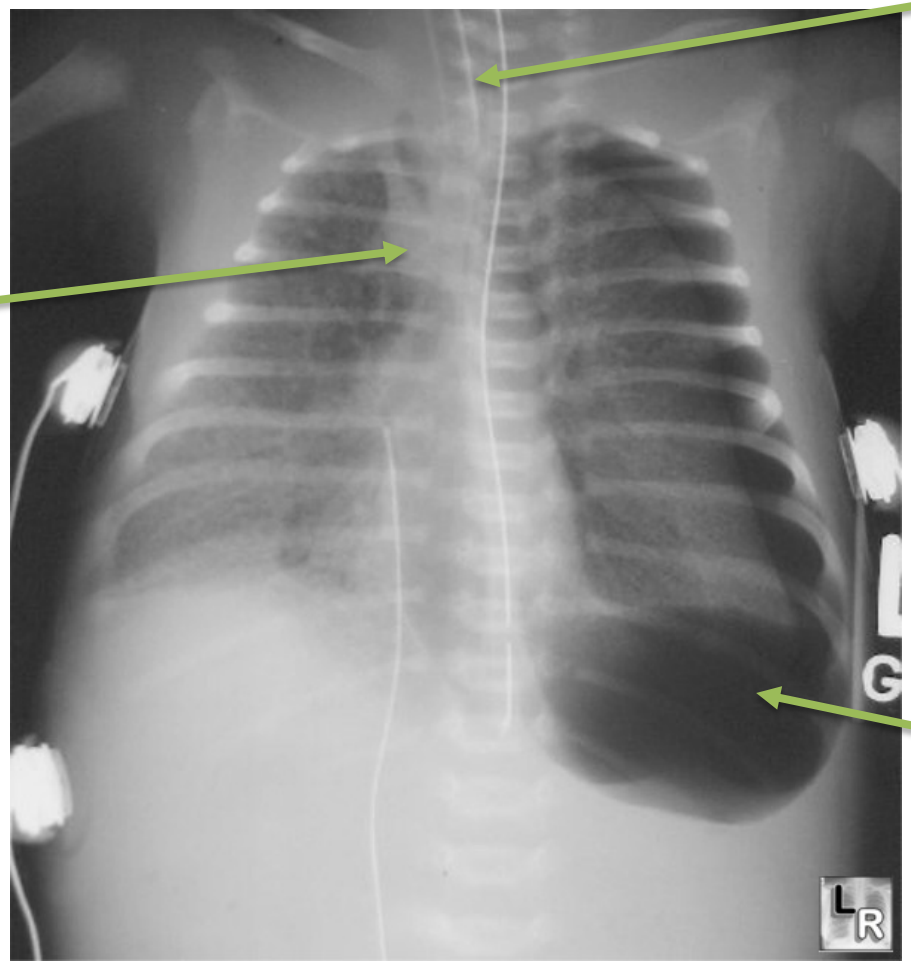



air
bronchograms
UAC
NG


Airway
Lung
Normal alveoli
Collapsed alveoli

Left pneumothorax

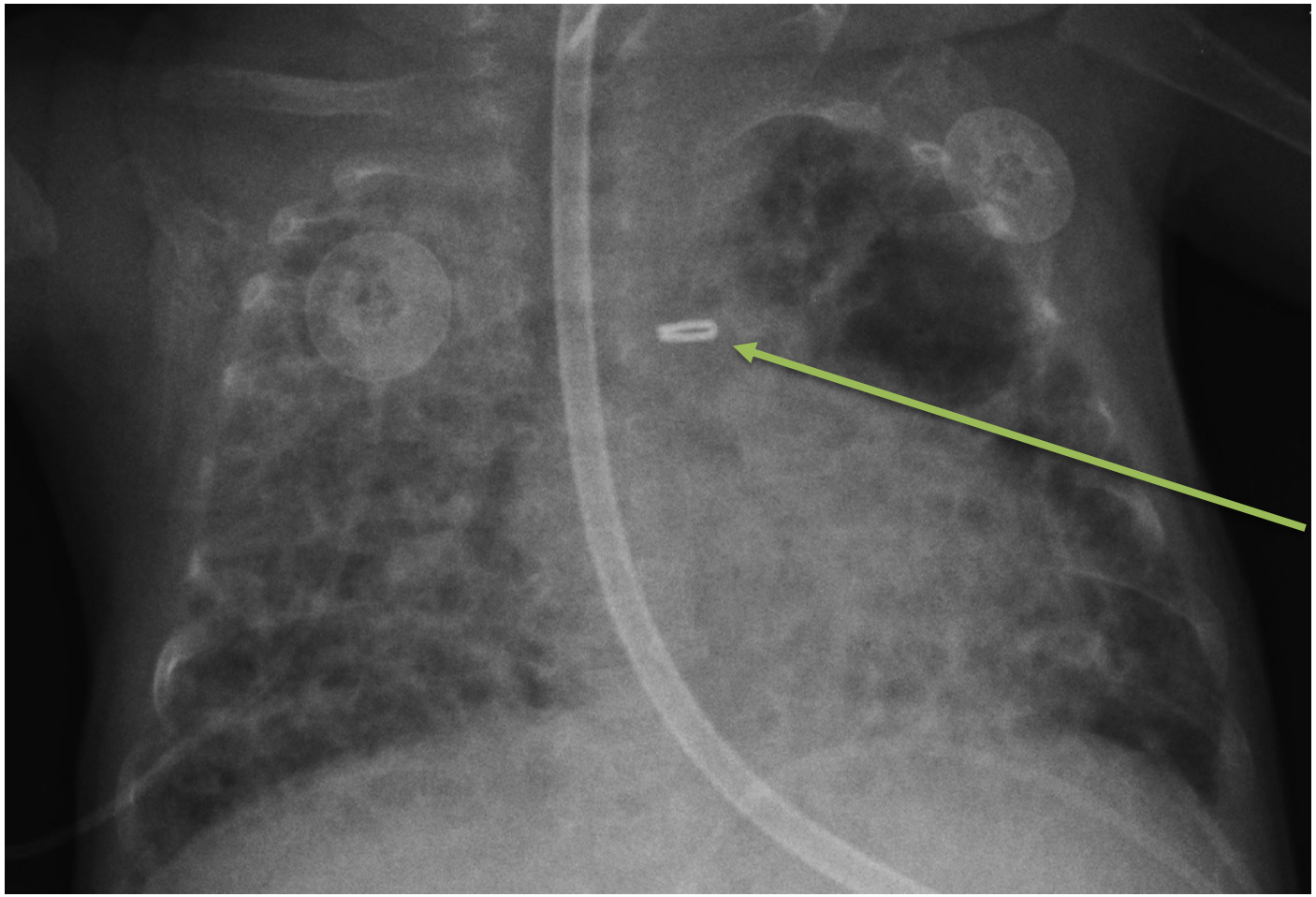
is it primary or 2ndry? This a preterm babys lung looking like RDS as a complication he developed 2ndry pneumothorax



How do you know he's a preterm? Umblical catheter

Preterm with RDS complicated by bronchopulmonary dysplasia

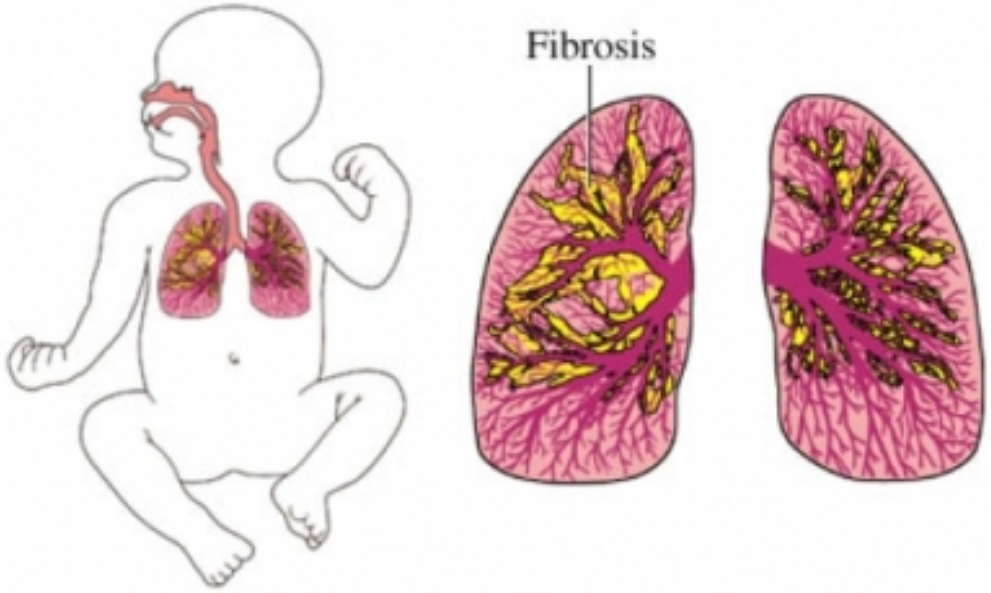
bilateral homogeneous honeycomb appearance on CXR



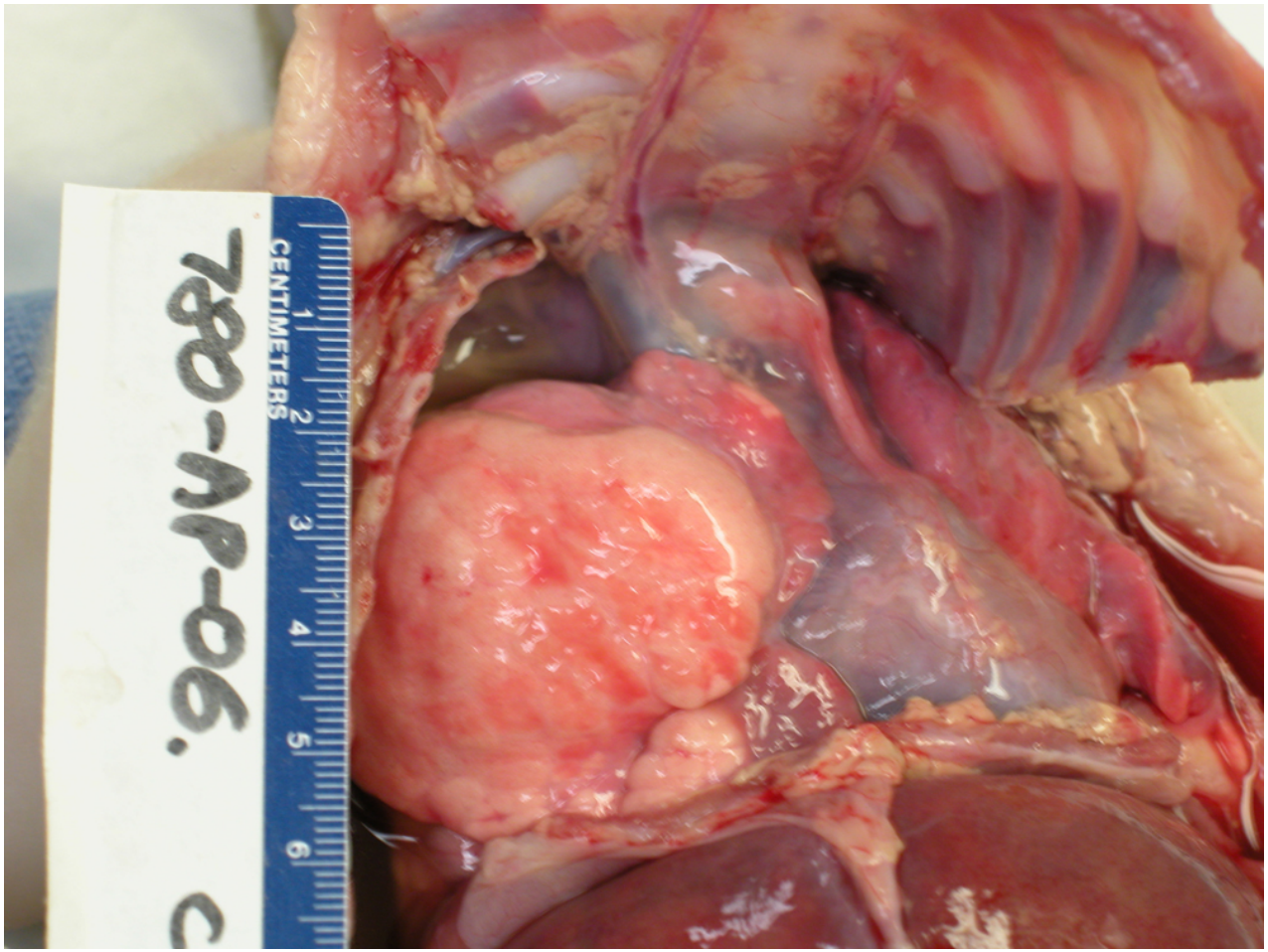
This is a bronchopulmonary dysplasia if you see the yellow this is fibrosis and 60% of dead tissue.

If you have necrotic tissue what will happen to it?
For example 60 years later you biopsied the lung it will be there until death!

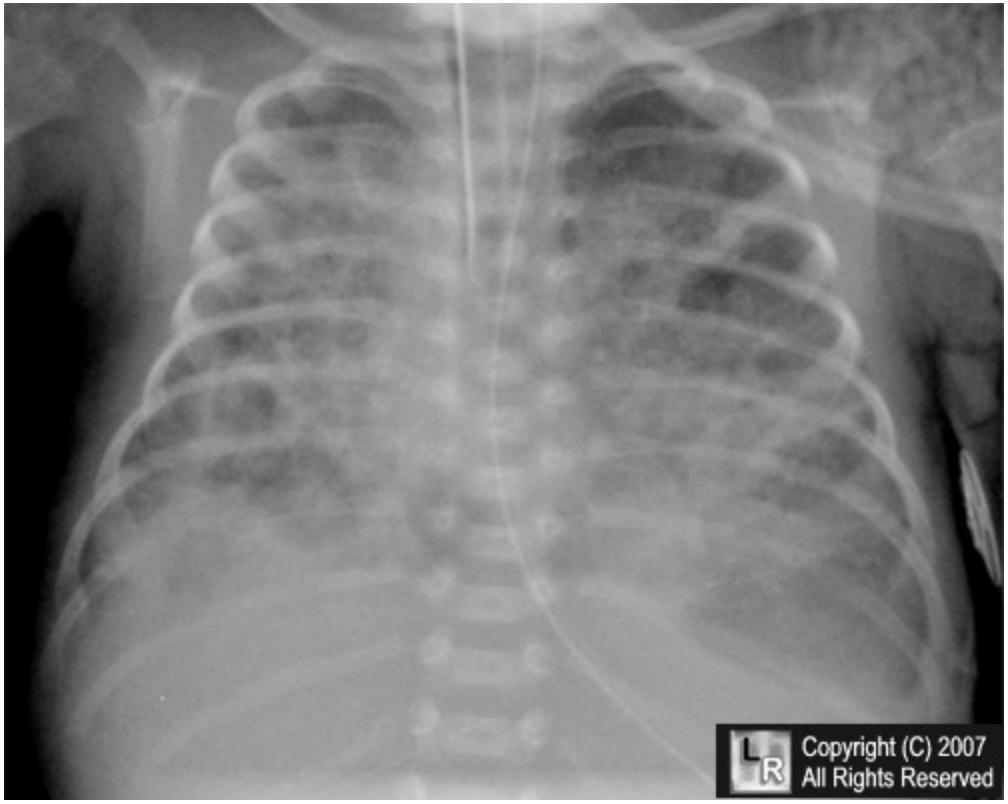
Babys with bronchopulmonary dysplasia during their early life they'll be complaining of respiratory distress once they reach the age of a year and half to 2 years they'll recover why?? Cells regenerate. Cells continue growing till age of 6 years.



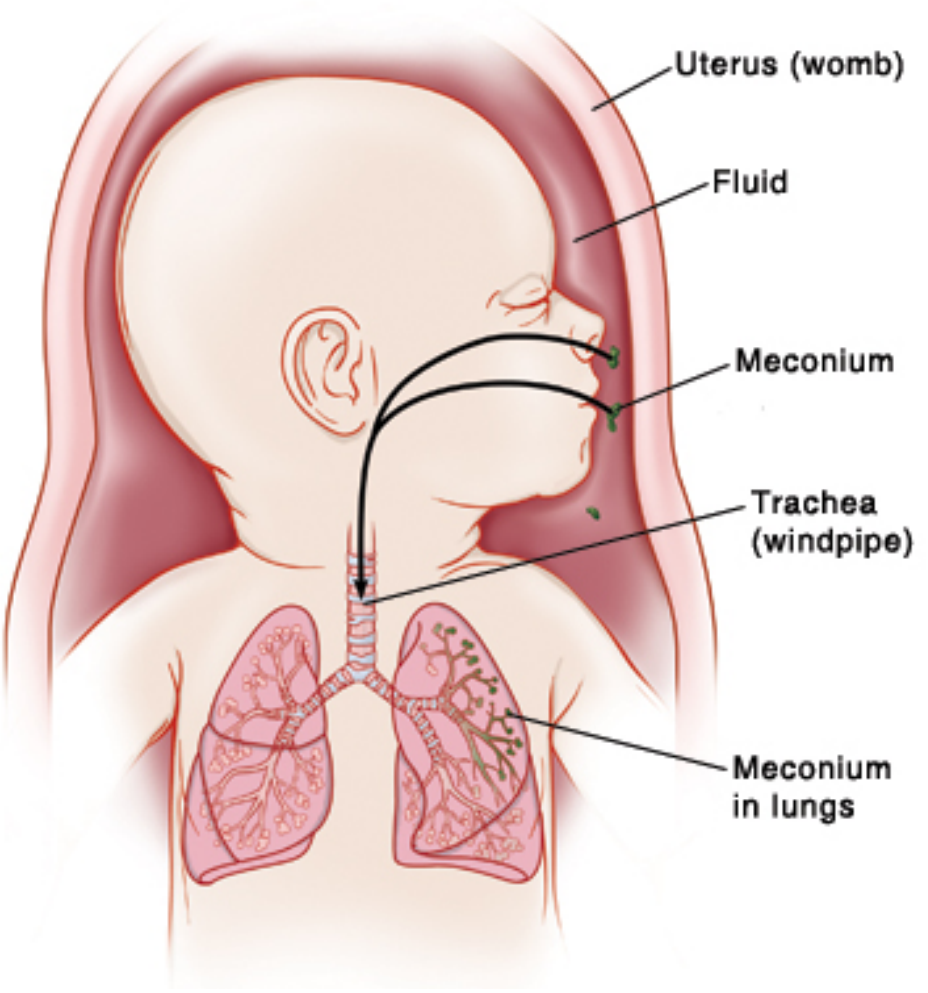
Autopsy of dead tissue

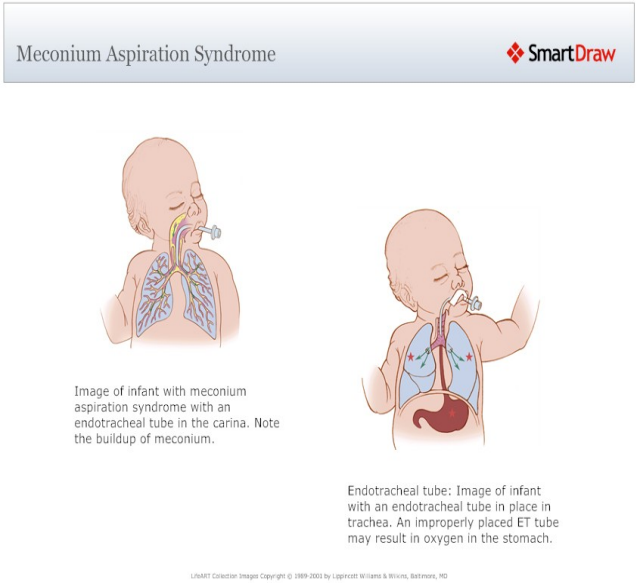


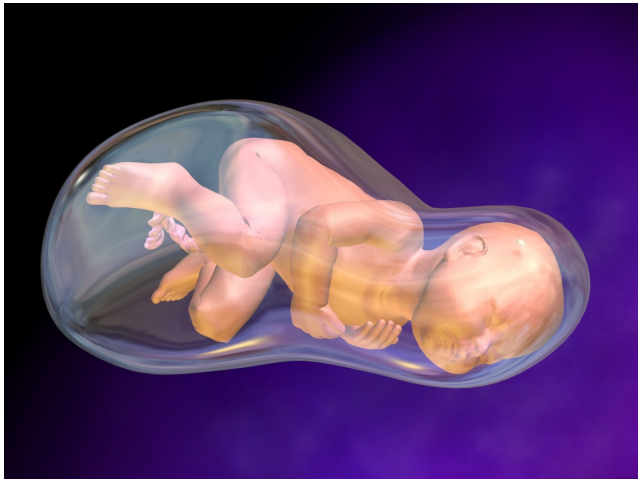
meconium aspiration syndrome (mas)



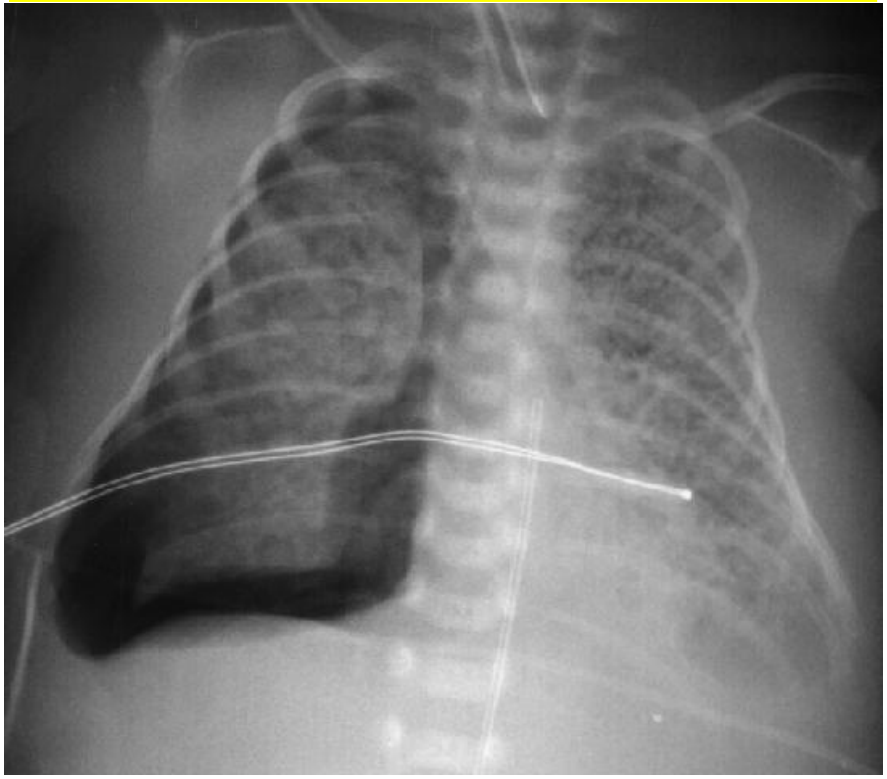
In utero the baby will take the amniotic fluid and swallow then goes to the lungs no problem will happen because its sterile , if the baby passes meconium the baby will be in distress due to obstruction and irritation.

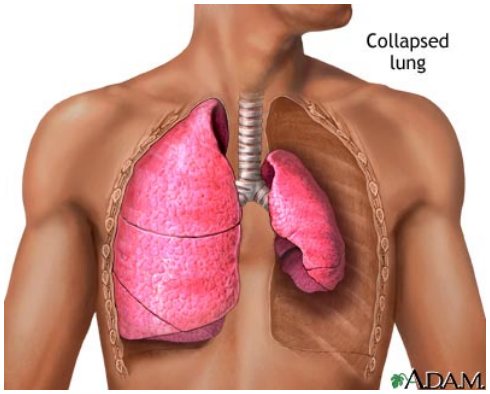


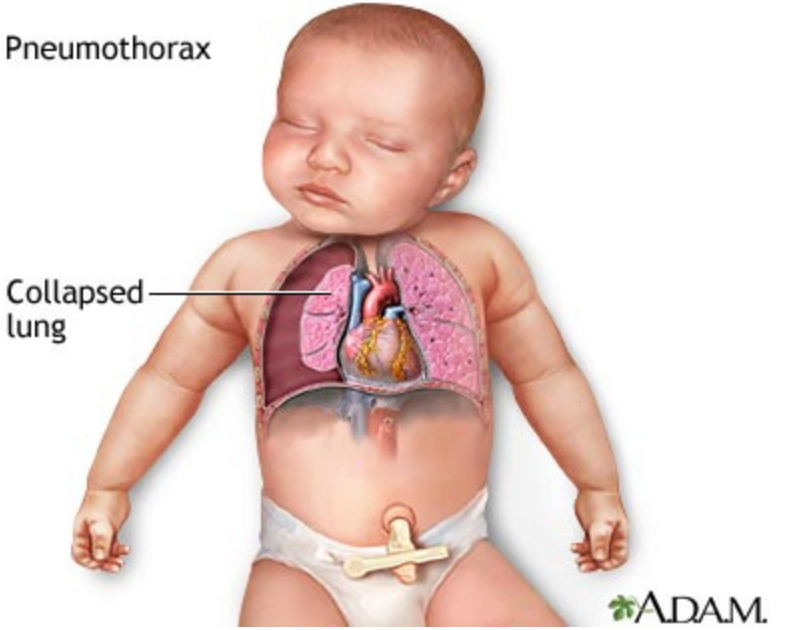




Right sided pneumothorax 2ndry to MAS

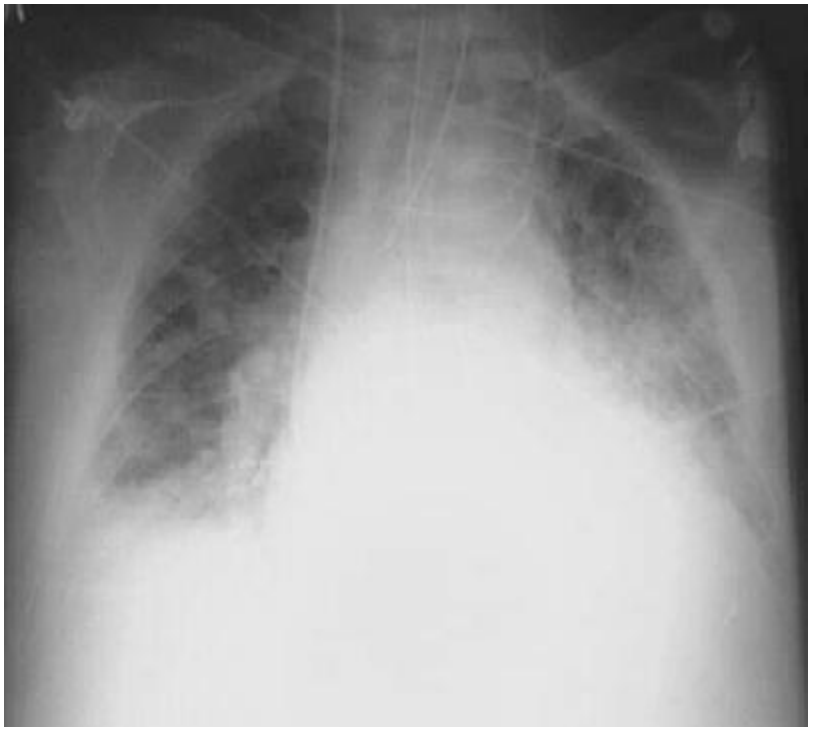






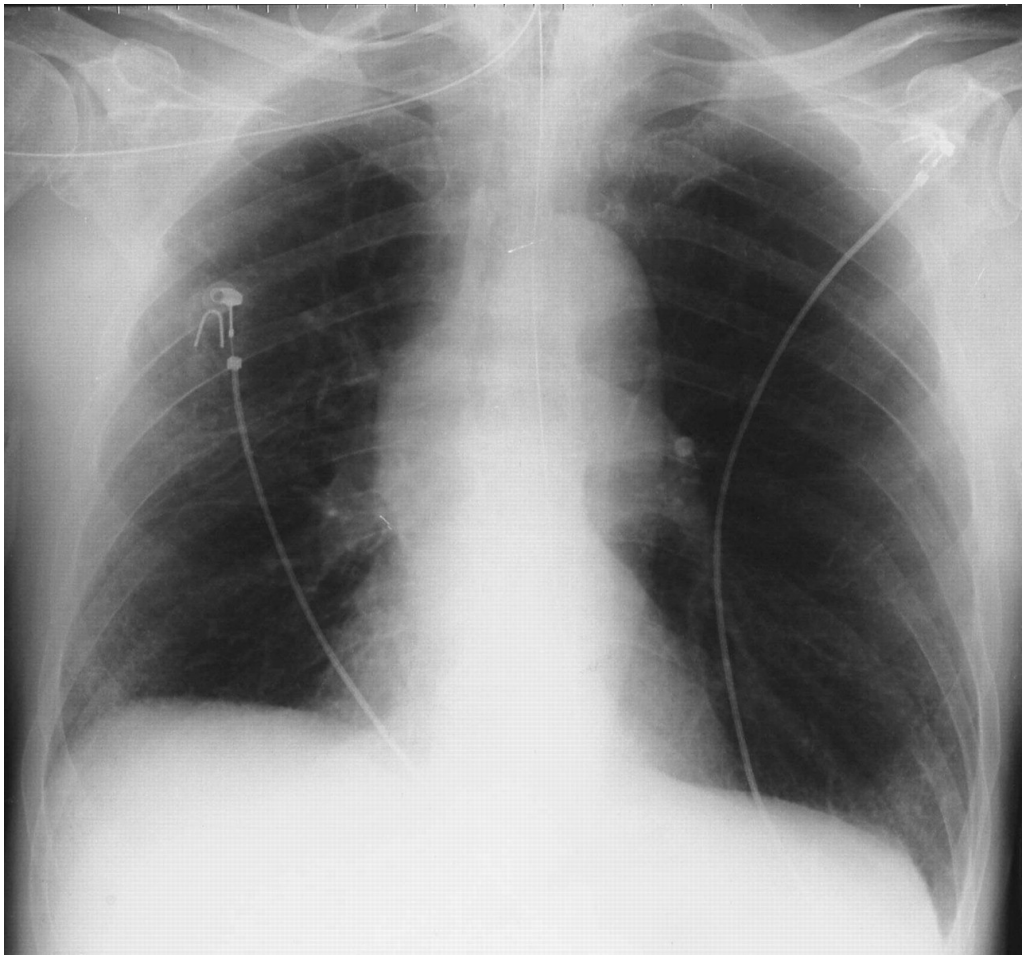
How to diffrentiate between collapse and pneumothorax?
Collapsed lung shift ipsilateral.
Pneumothorax shift contralateral

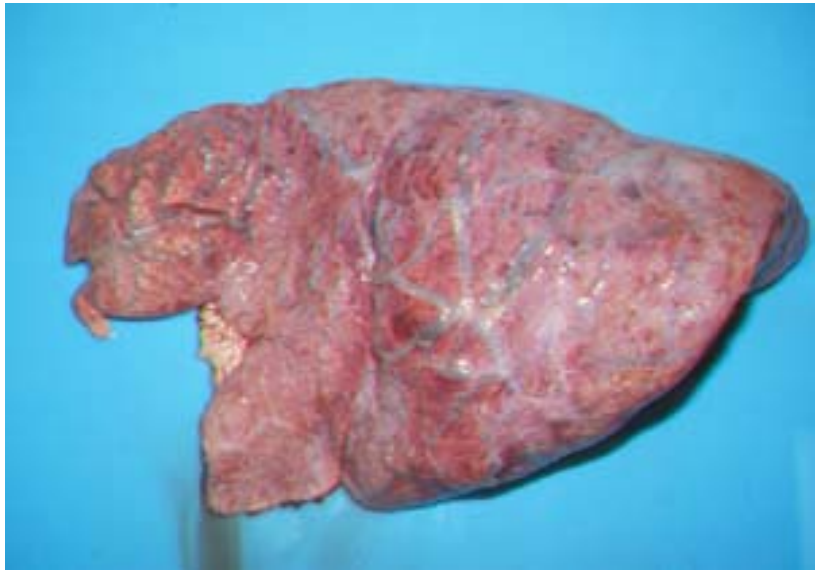
Pulmonary edema - obliterated angles

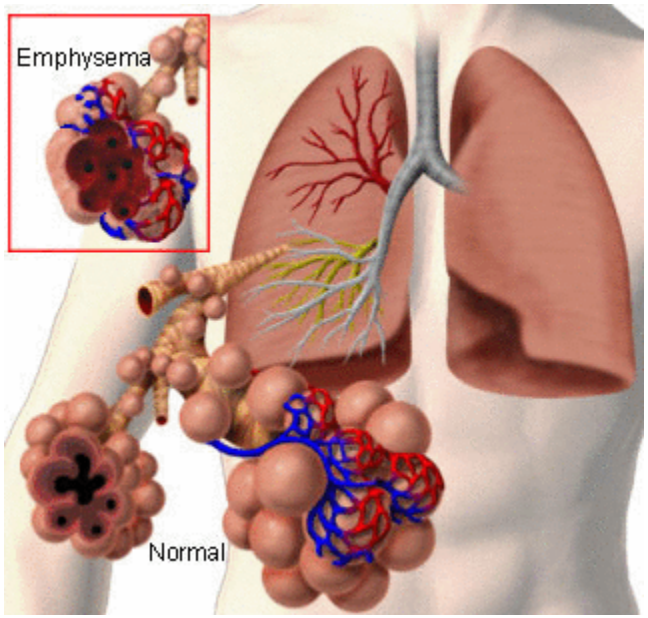


Bilateral hyperinflated lungs collapsing mediastinum

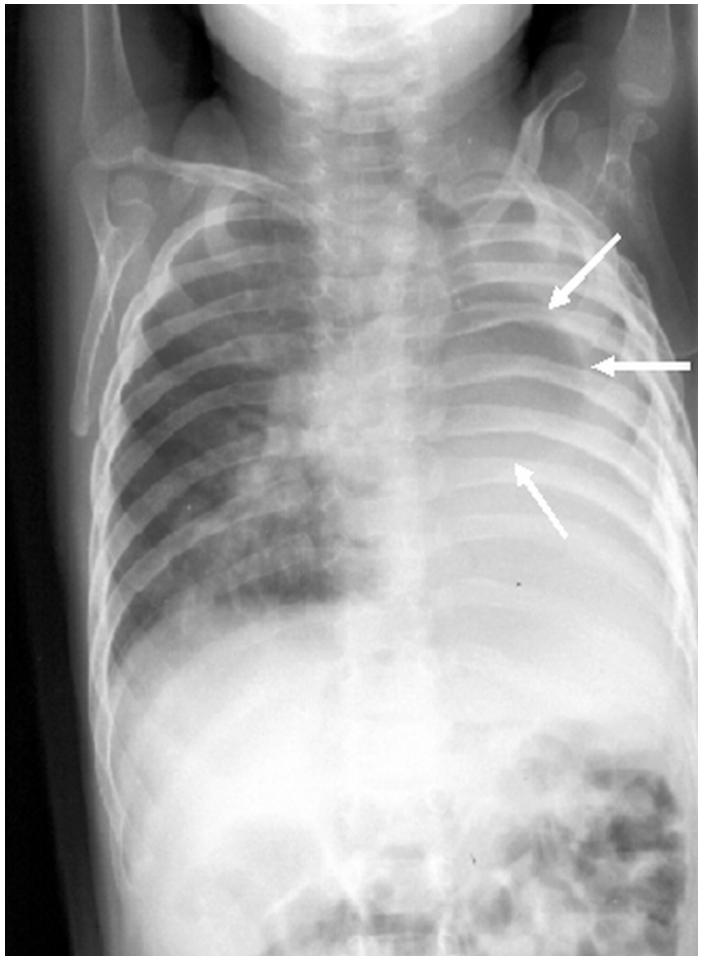
diagnosis: pulmonary emphysema with alpha 1 antitrypsin deficiency very rare in newborn

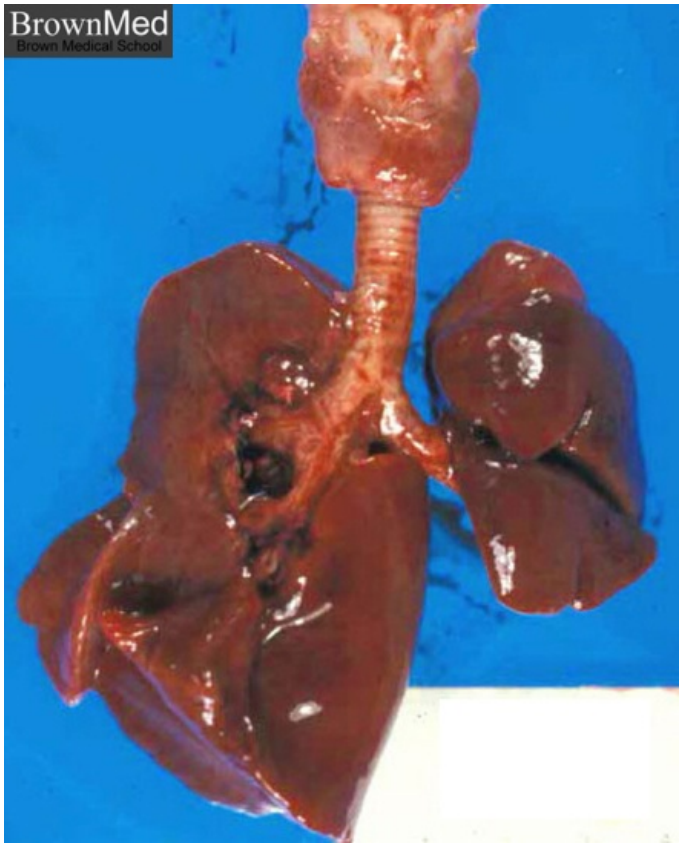





Emphysema
Normal

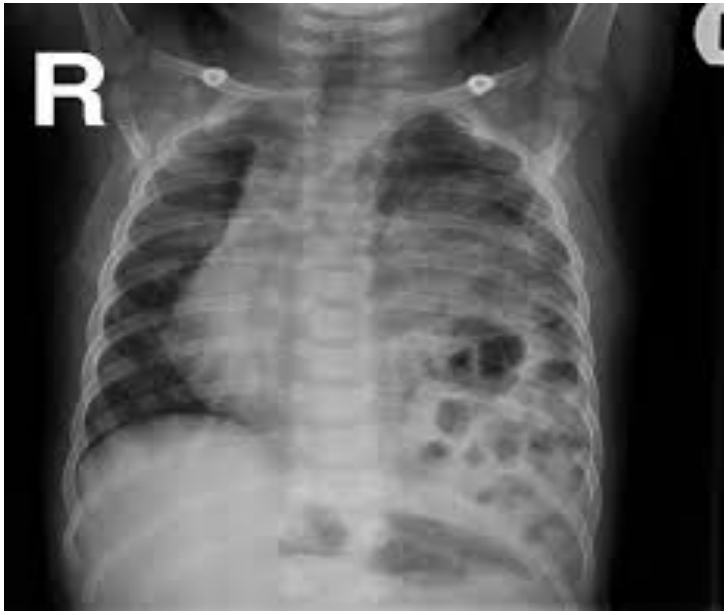
Collapsed lungs trachea shifted to the same side





CXR – CDH

Left sided congenital diaphragmatic hernia pushing the mediastinum to the other side causing pressure to the right lung.

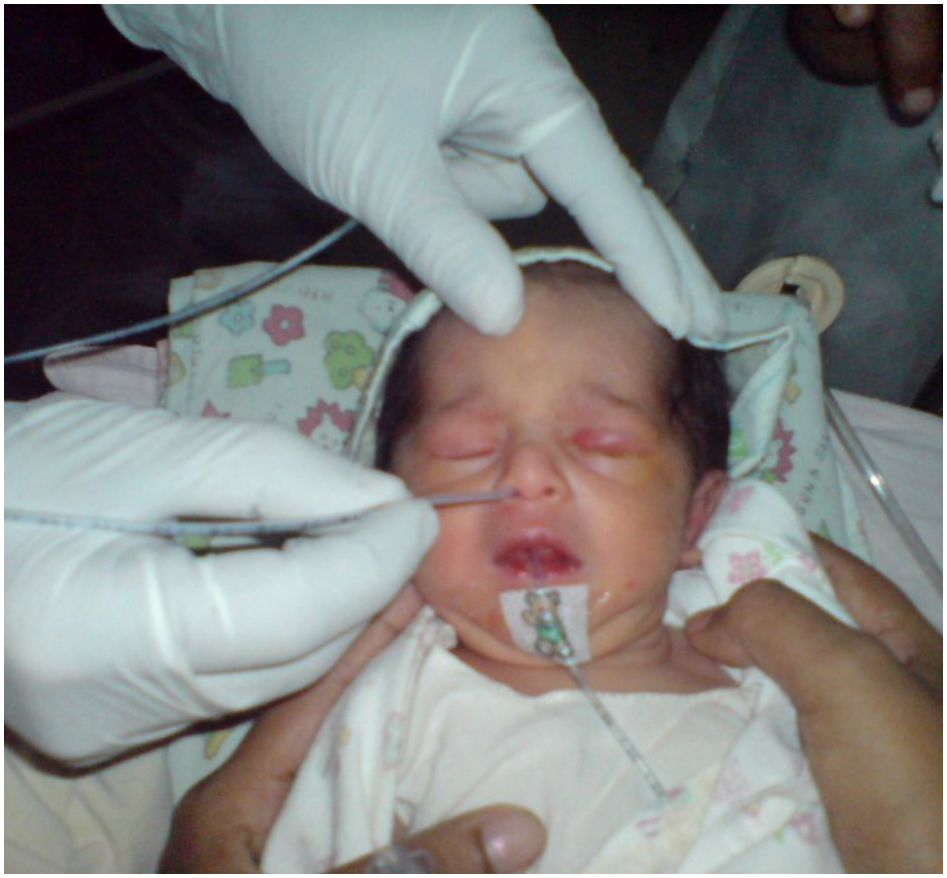


Technical question: is the R on the xray written before or after taking it?

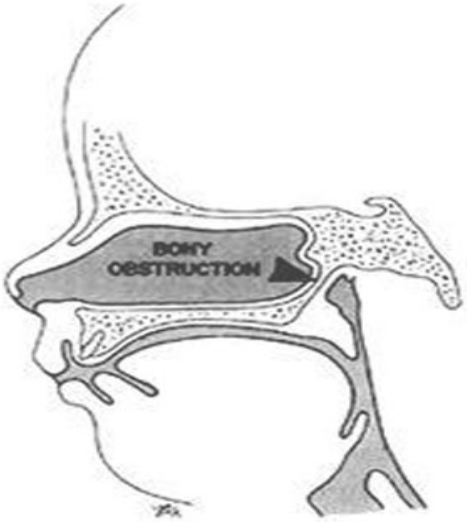
Before because you don't want to miss dextocardia and situs inversus totalis

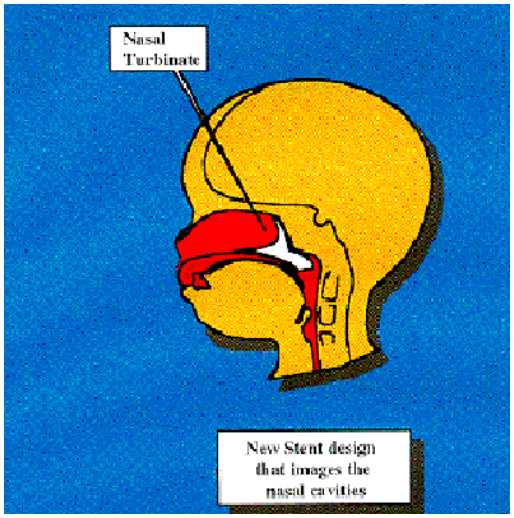
Extra from book:

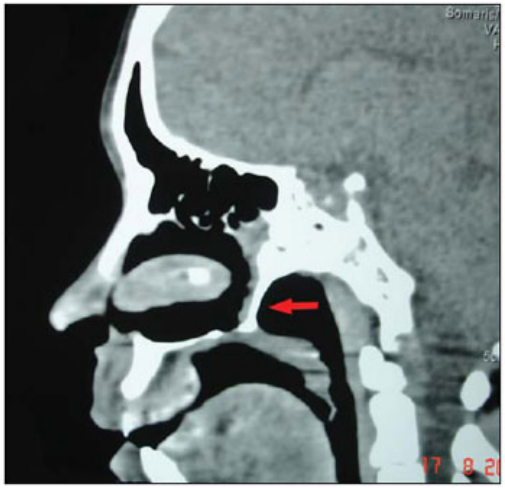
- Failure of the diaphragm to close ⟶ abdominal contents enter into chest, causing pulmonary hypoplasia.
- Born with respiratory distress and scaphoid abdomen
- Bowel sounds may be heard in chest
- Diagnosis—prenatal ultrasound; postnatal x-ray (best test) reveals bowel in chest
- Best initial treatment—immediate intubation in delivery room for known or suspected CDH, followed by surgical correction when stable (usually days)



- Scenario:
- The nurse tried inserting the NGT and after 4-5 cm it stopped, she called you telling you she measured 10cm to stomach but it stopped at 4cm what should I do? You'll ask her to keep it and go to see the patient and then try with the other nose don't push it.
- Why? Because you're suspecting choanal atresia.
- Usually bilateral choanal atresia is present at birth.
- Order xray to check for atresia
- Whats the diffrenece between adults and newborn? They're nasal breathers







Choanal atresia one of the surgical causes of distress

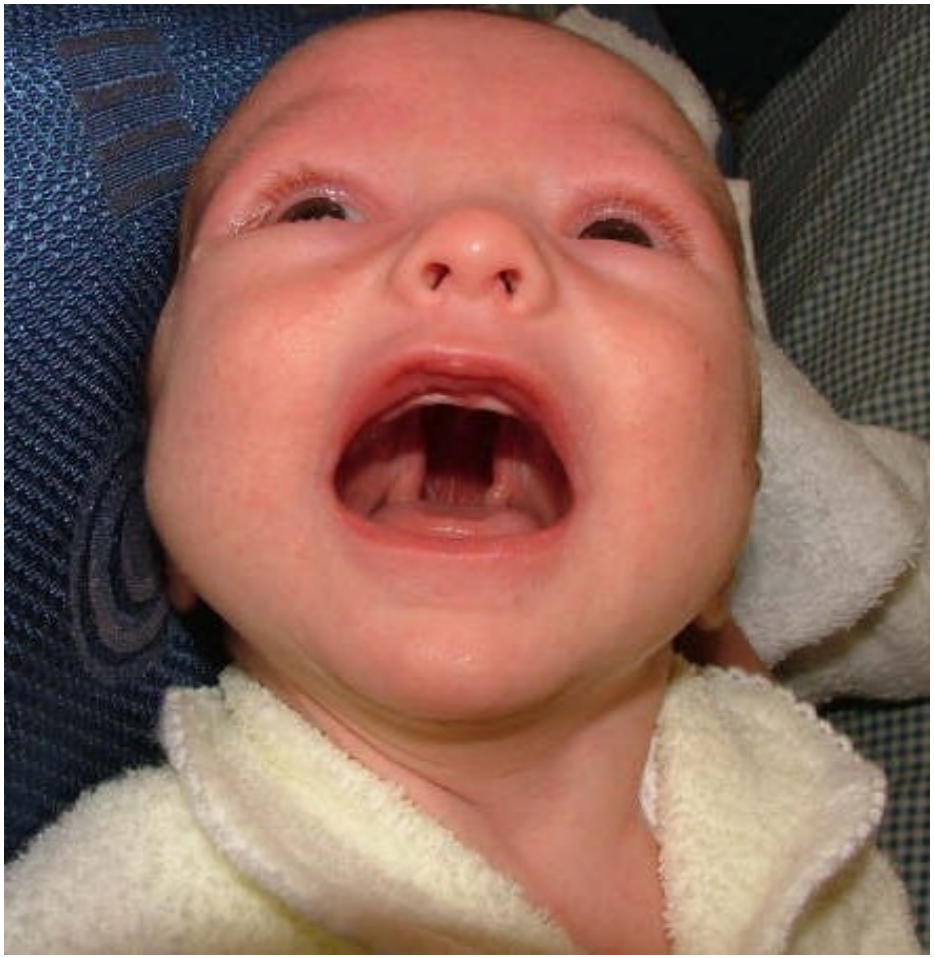
Extra from book:

This is a failure of the bucconasal membrane to cannulate during development. As babies are obligate nasal breathers, unless the baby is crying, it presents as breathing difficulties from birth. It may be unilateral or bilateral.

Diagnosis Inability to pass a nasogastric tube in the affected nostril(s)

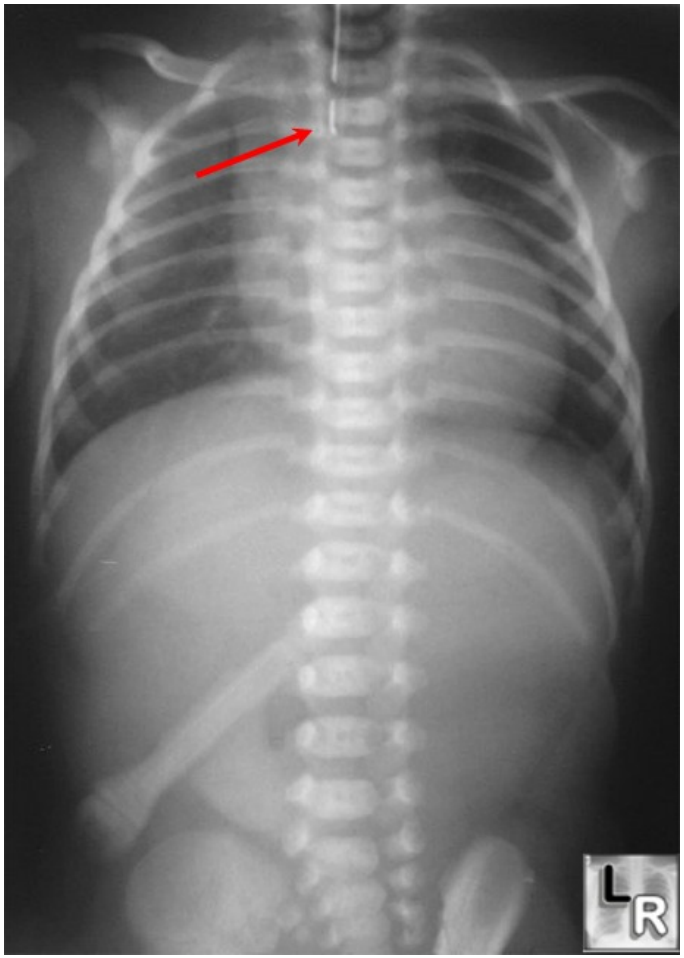
Management Provide an airway (pharyngeal or ETT) until surgery performed (urgently)

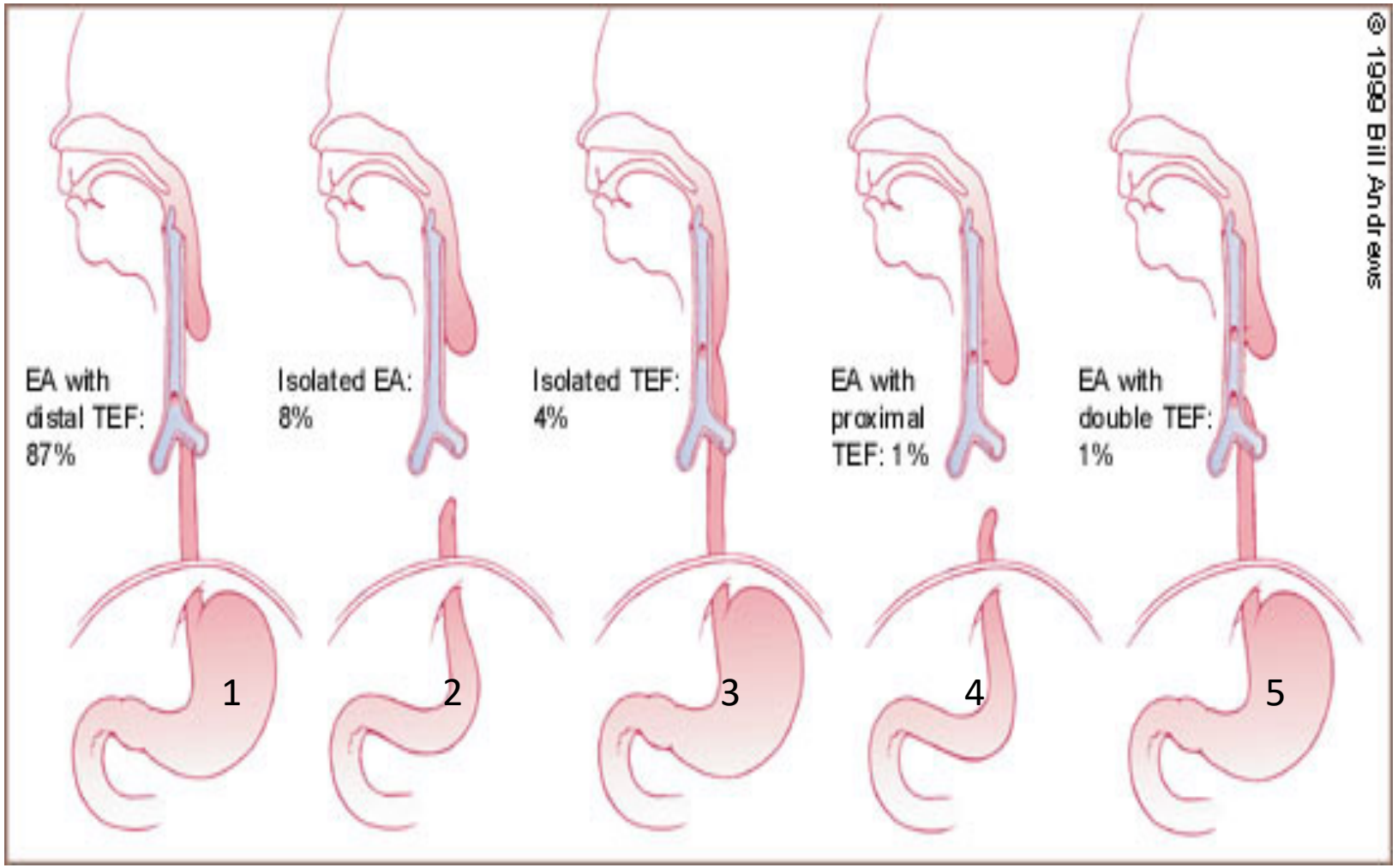
Cleft palate -> aspiration leading to distress



Esophageal atresia

scenario: difficulty inserting the tube at 6cm xray below showed esophageal atresia



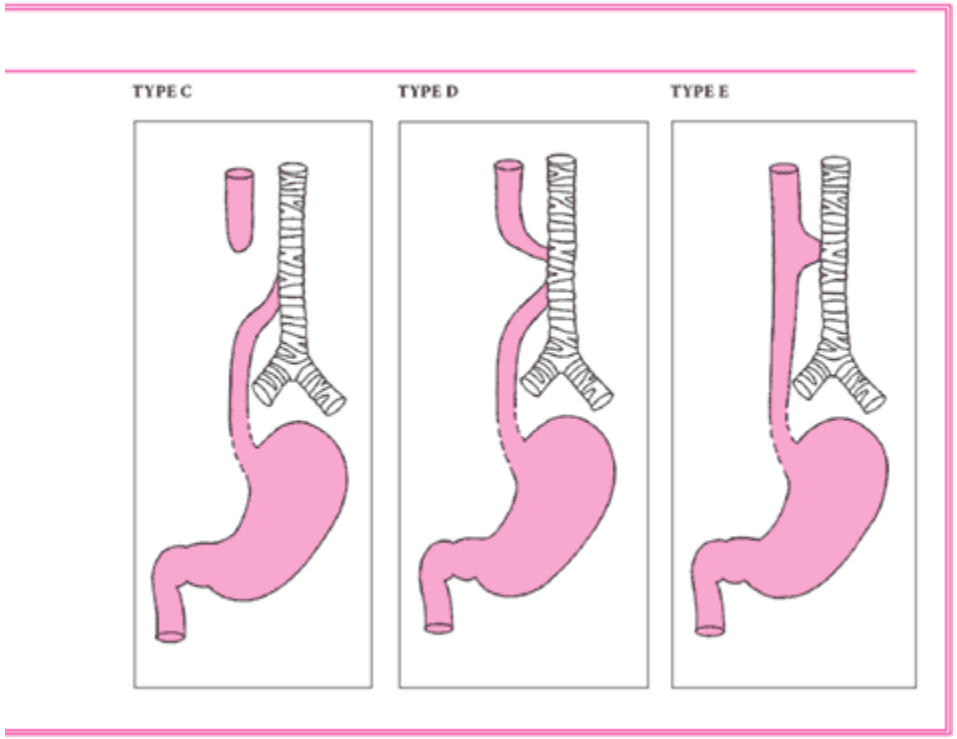


1: Esophageal atresia with DISTAL fistula (COMMONEST TYPE)
2: Isolated Esophageal atresia
3: Isolated fistula (H) shaped -> they present with recurrent infection due to inspiration surgically closed
4: Esophageal atresia with PROXMIAL fistula
5: Esophageal atresia with double fistula

C: commonest type Esophageal atresia with DISTAL fistula

D: atresia with double fistula

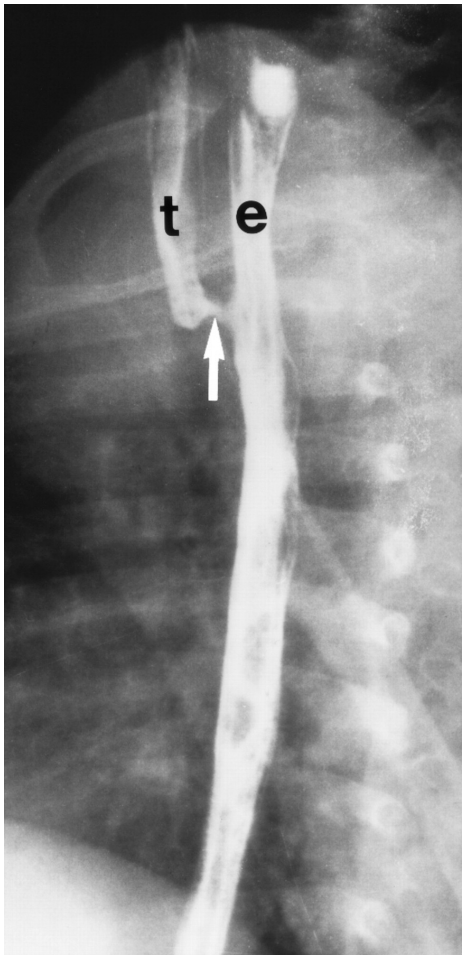
E: H shaped fistula

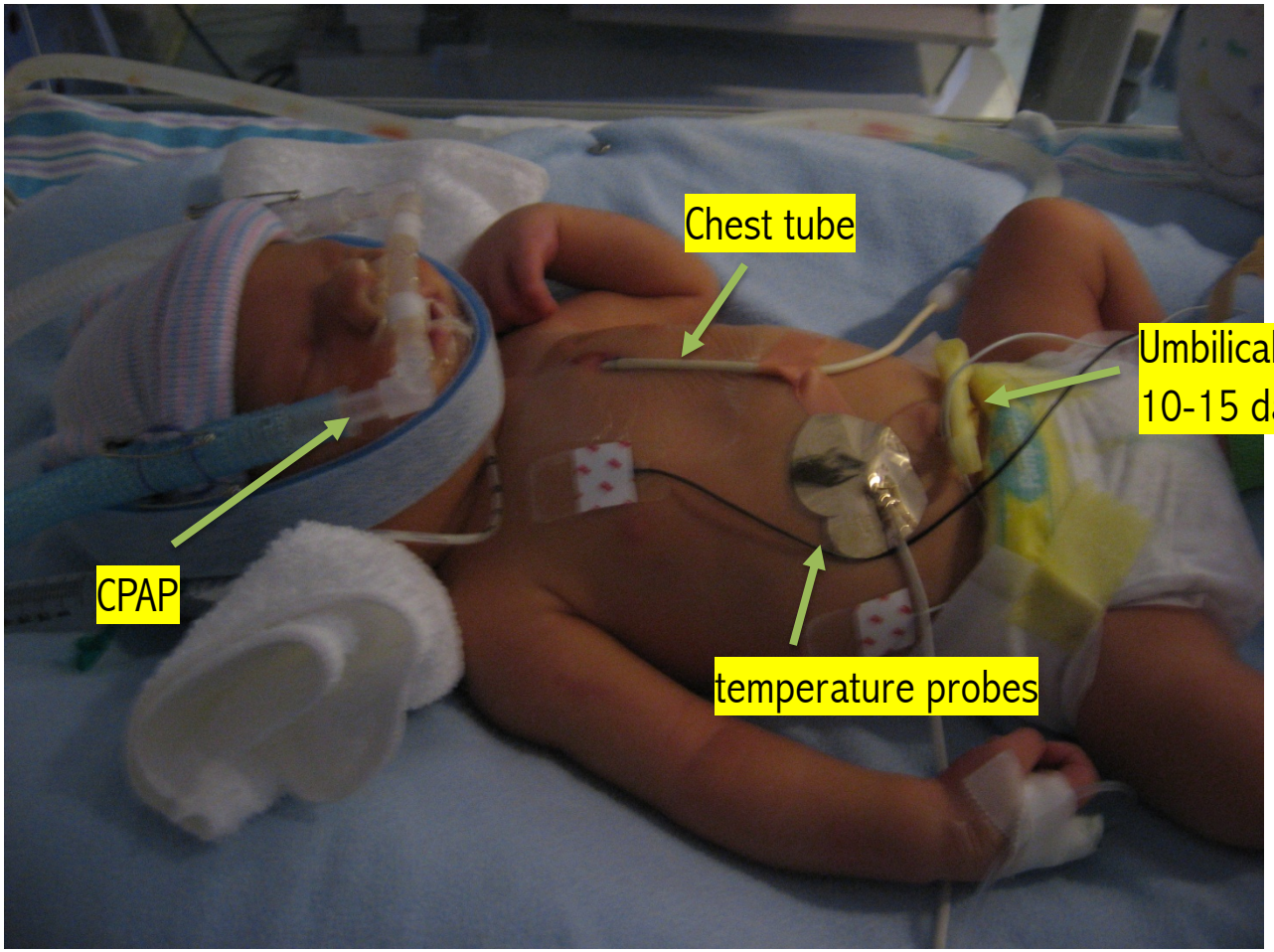


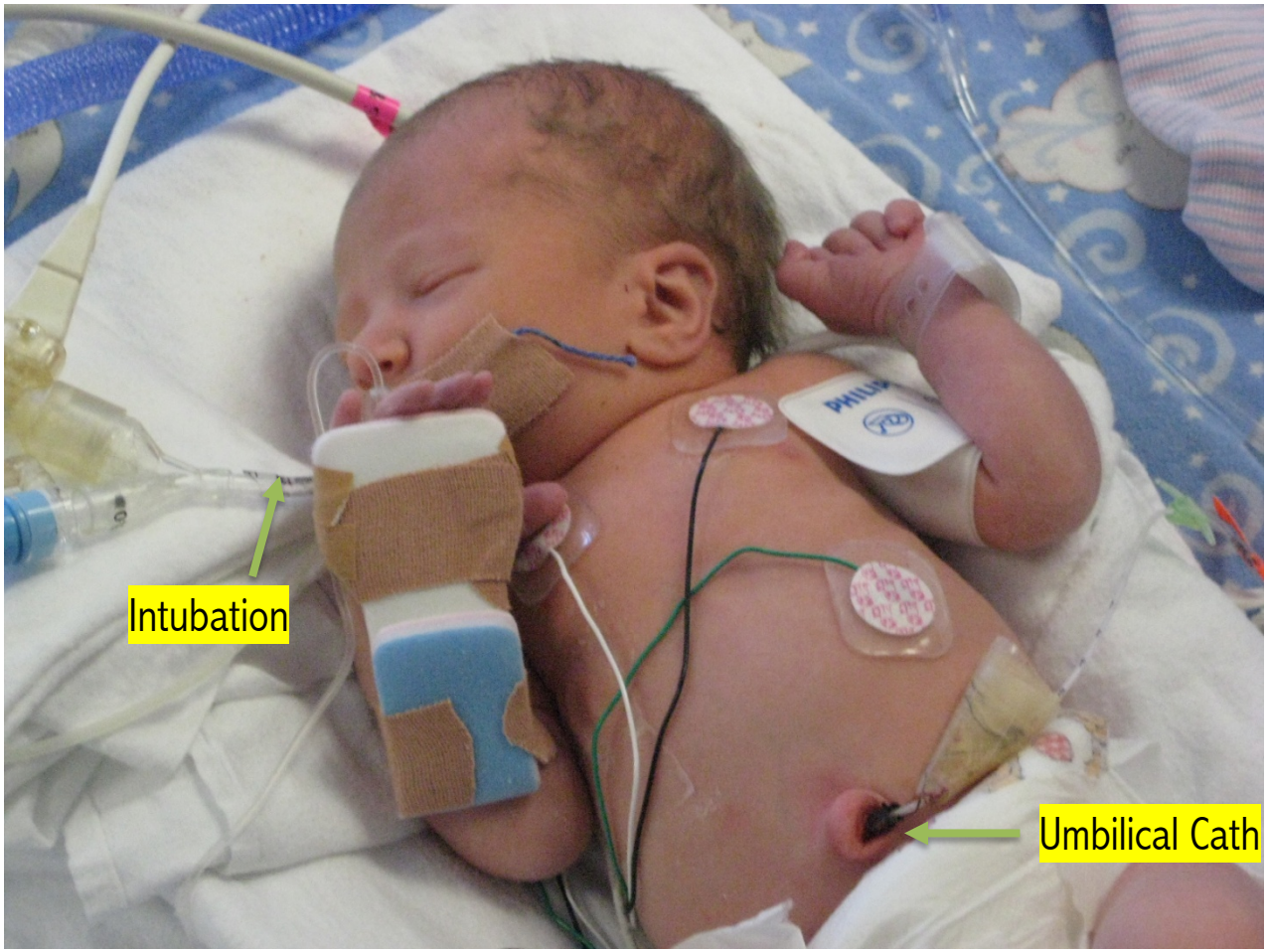
Extra from book:

Almost half of the babies have other congenital malformations, e.g. as part of the vertebral, anorectal, cardiac, tracheo-oesophageal, renal, and radial limb anomalies (VACTERL) association.

Barium meal showing H shaped fistula (isolated fistula)




Chest tube
Umbilical clip falls after 10-15 days
CPAP
temperature probes


Intubation
Umbilical Cath

Thank you