DISEASES OF THE NEOBORN

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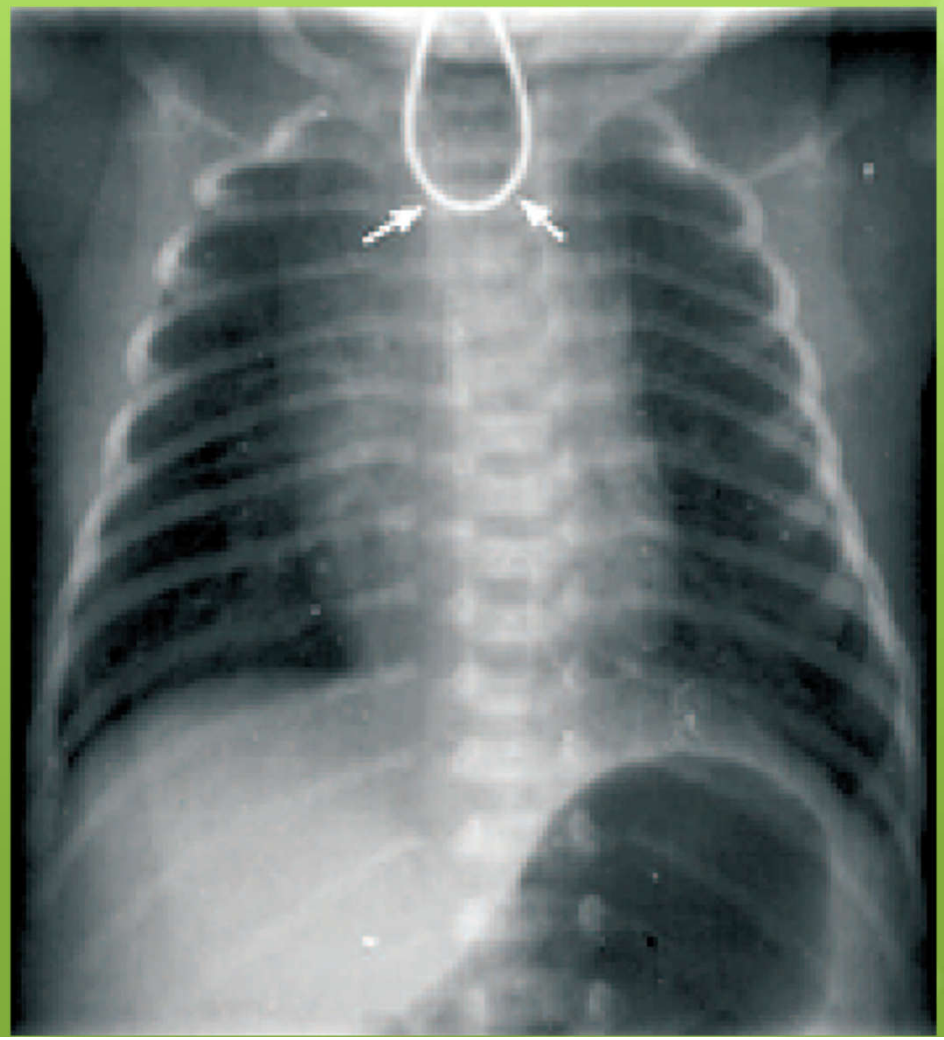
Malformations Of The Neonates

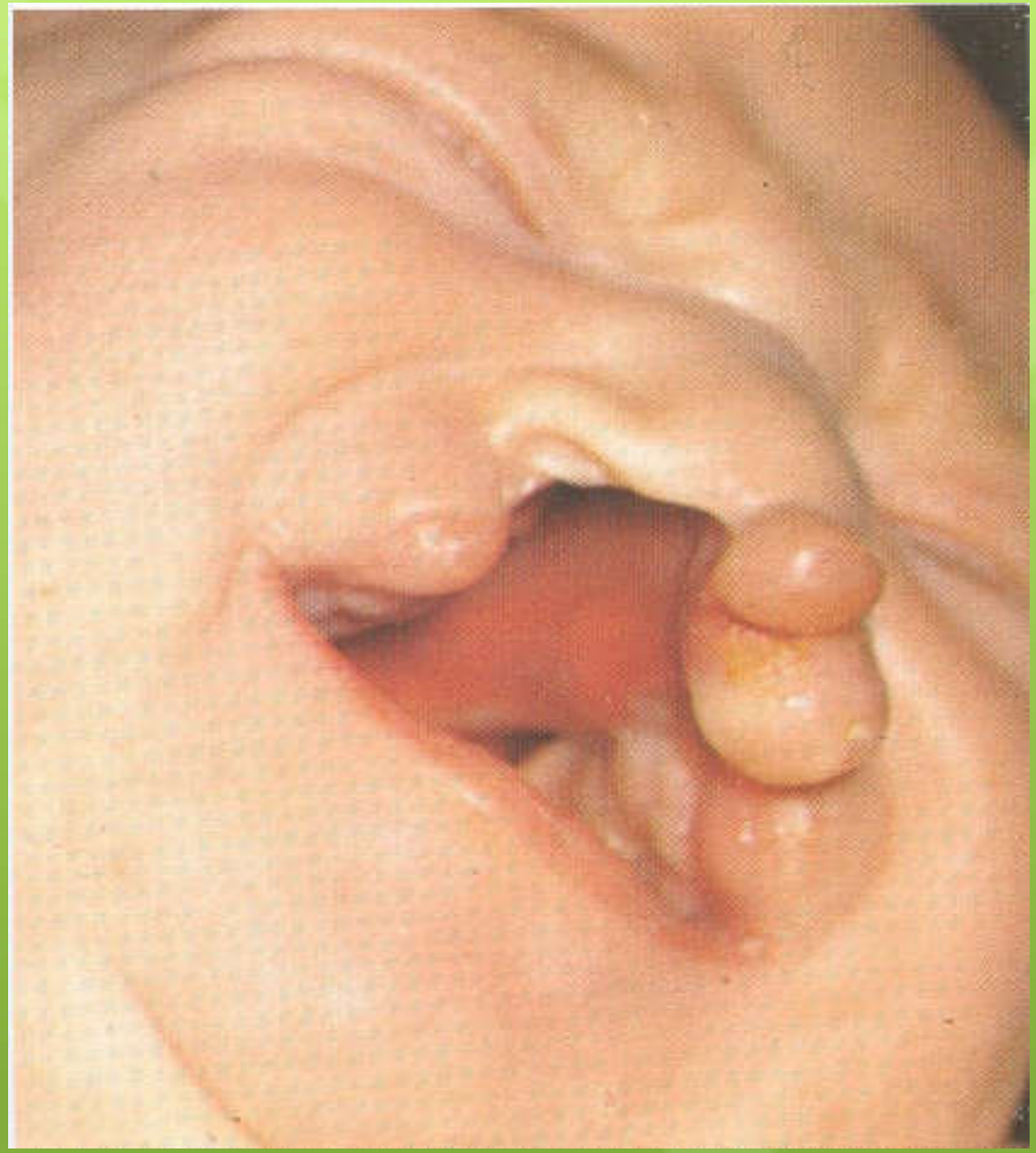
Major malformations

- Causes may be to genetic or teratogenic effect
- These are the malformations that may have an adverse effect on function & social acceptability.

- Occur in 2-3% of all neonates.
- Examples of these are
  - Cleft lip and palate
  - Choanal atresia
  - Tracheoesophageal fistula
  - Meningomyelocele
  - Complex cardiac defects

Tracheoesophageal fistula baby presented with respiratory distress, cyanosis, frothy secretion, in x-ray chest the nasogastric type kinked in upper chest and can not pass to the abdomen this neonatal emergency condition and surgical correction needed





Meningomyelocele is a defect in the spinal cord and meninges may be associated with hydrocephalus
this disease can be prevented by mother supplementation of folic acid 5mg daily 3 months preconception and during pregnancy

Minor malformations

- These are the malformations that have a little or no clinical significance.
- Occur in about 10% of all neonates.
- Examples of these are single palmer crease, polydactyl, syndctly and extra nipple. If there is more than one the neonate must be examined carefully to search for a syndrome.

Respiratory system diseases

Respiratory distress in newborns

- RD defined as the presence of any degree of the 4th degree of RD:
- Tachypnea (>60 breaths per minute), Nasal flaring.
- Subcostal, intercostal retractions, Suprasternal retractions,
- Expiratory grunting,
- Central cyanosis in room air,

Respiratory distress in newborns

- RD is still the most common clinical disorder seen in neonates and carries a risk of mortality and morbidity.
- RD occurs in approximately 7% of all neonates.
- RD persisting for more than 4h after birth were routinely admitted to a neonatal unit and therefore separated from their mothers.

1-Respiratory Distress

Causes of respiratory distress in neonates

Respiratory system causes of respiratory distress:

- **Respiratory distress syndrome (hyaline membrane disease).**
- **Transient Tachypnoea of the newborn.**
- **Meconium aspiration syndrome.**
- **Pneumonia.**
- **Massive pulmonary hemorrhage.**
- **Congenital diaphragmatic hernia**

Non respiratory causes of respiratory distress:

- Congenital heart disease
- Heart failure
- Severe anaemia & polycythaemia
- Birth asphyxia
- Metabolic diseases

Respiratory Distress Syndrome (RDS)

(Hyaline membrane disease)

RDS

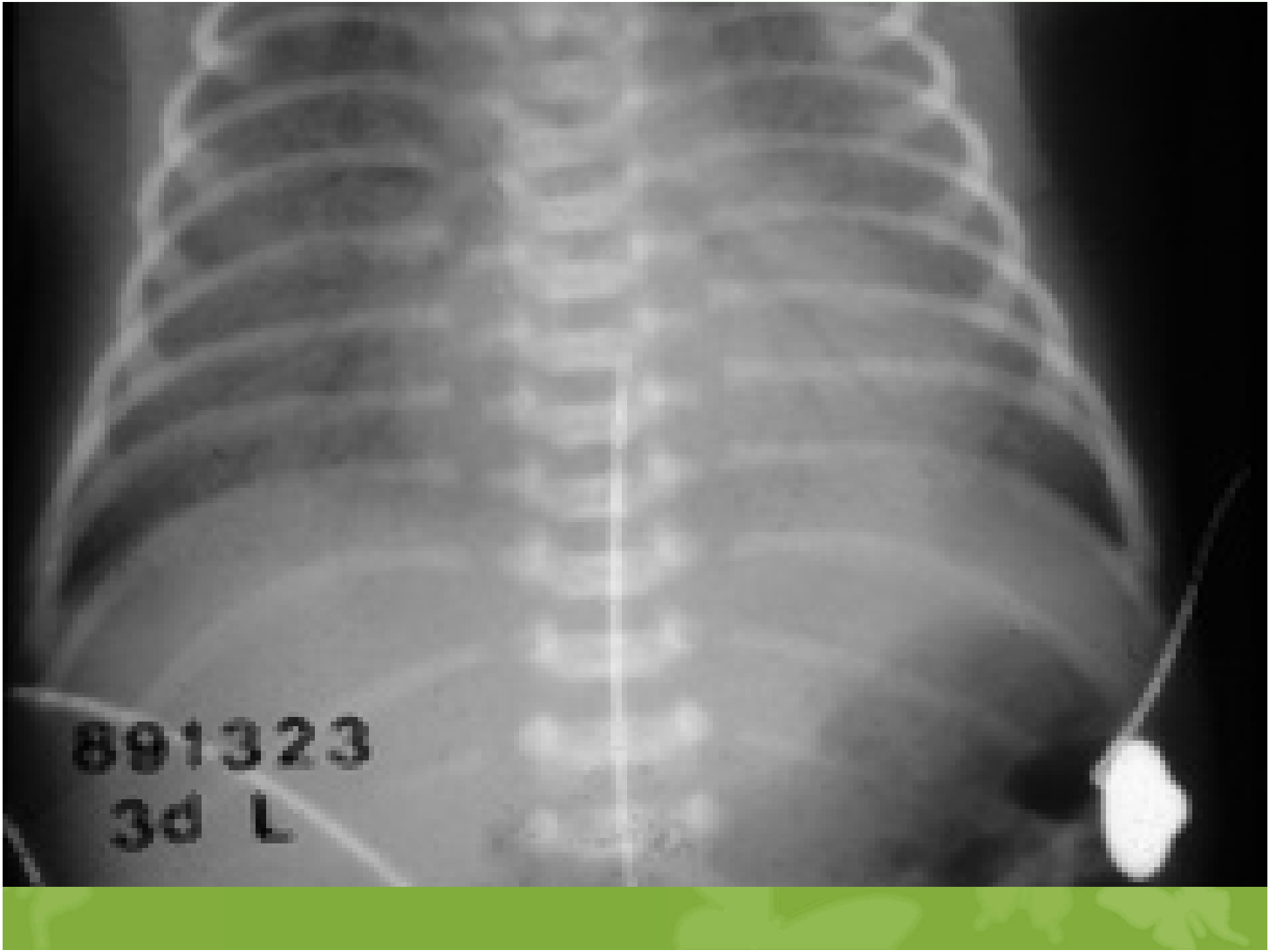
- Most common respiratory illness in NICU
- Occur in premature neonate <34 weeks
- RDS occur 1-2% late preterm infants (34-37 weeks)
- Surfactant deficiency
- Risk factors
  - Prematurity
  - Asphyxia and stress
  - Male
  - Acidosis
  - DM mother

signs

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

Chest X-ray

- Ground glass appearance
- Reticulogranular shadow
- With air bronchograms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Physiologic abnormalities

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

Surfactant

- Type 2 pneumocytes lamillar body 24weeks…34wks
- secretion of Phosphatidylcholine a surfactant specific protein
- Recycling and regeneration (including externally given surfactant)

Surfactant

- Decrease surface tension at air liquid level
- Equalize tension in alveoli of different size
- Increase in lung compliance.
- Absence of surfactant cause RDS and Pulmonary hypertension

Treatment of RDS

Treatment of RDS

- Good transport of neonate to neonatal unit
- Surfactant through endotracheal tube 100mg/kg/dose
- Respiratory support and oxygen supply:
  - Nasal cannula
  - Continuous-positive-airway-pressure (CPAP)
  - Mechanical ventilation

Continuous-positive-airway-pressure (CPAP)

- CPAP is a pressure and oxygen applied in spontaneous breathing baby.
- CPAP now consider the gold standard therapy in RDS.
- It prevent alveolar collapse by maintain the positive end expiratory pressure (PEEP), splint airway, preserve surfactant,
- cheap and easy applicable just apply pressure 4-6 mm Hg and oxygen 21%-40%
- the main disadvantage is not used in apnea, or if the baby had severe respiratory failure , then mechanical ventilation needed.

Mechanical ventilation

- Mechanical ventilation is apply two pressure (Peak inspiratory pressure (PIP) and positive end expiatory Pressure (PEEP), oxygen, rate indicated when
- Absent or weak of spontaneous breathing,
- Failure of CPAP to maintain adequate ventilation
- During surfactant therapy
- The main disadvantage lung injury due to excess pressure (paratrauma) and lung volume (volutrauma)

Treatment of RDS

- Antibiotics (penicillin & aminoglycosides). This is given because it is very difficult to differentiate between RDS and early sepsis.
- General supportive care as hypothermia, hypoglycemia
- Nutrition by total parental nutrition and early enteral feeding
- Maintain Haemoglobin within normal level
- Early treatment of hypotension (fluids and inotropes)

Complications of RDS

- Pneumothorax
- Patent ductus arteriosus
- Intracranial hemorrhage
- Infections
- Narcotizing enterocolitis
- Chronic lung disease

Prevention of RDS

- Prevention of preterm deliveries (by good maternal nutrition, treatment of infections, control blood pressure…etc.)
- Antenatal steroids to mother with impending preterm delivery
- Corticosteroid regimens shown to be effective include betamethasone 12 mg intramuscularly, two doses 24 h apart or dexamethasone 6 mg intramuscularly four doses 12 h apart
- Surfactant for preterm babies < 30 weeks ?????

Thank You

2-Transient Tachypnea Of The Newborn

Transient tachypnea of the newborn (TTN), a clinical syndrome associated with respiratory distress, was first described by Avery et al., in (1966).

Etiology and clinical picture

- The suggested etiology was delayed lymphatic absorption of the pulmonary alveolar fluid, which causing respiratory distress, retraction and occasional cyanosis
- It is commonly found to occur in term infants and in neonates delivered by cesarean section.
- TTN is usually a benign and self-limiting disease and the prognosis is generally excellent.
- Usually the respitory distress markedly improve on the 3rd day

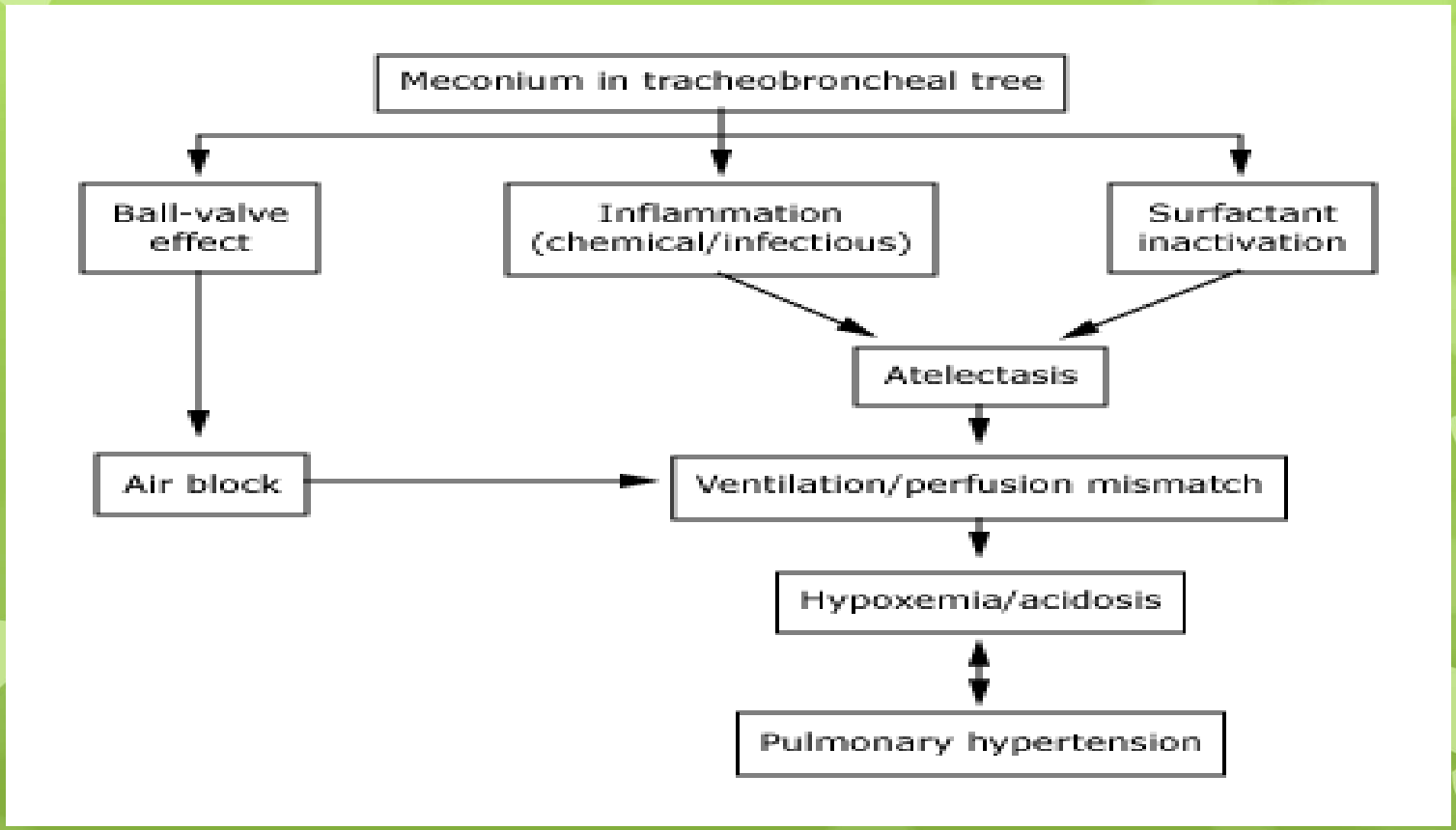
Mangements

- Admission to incubator
- Routine investigations + chest X ray
- Oxygen supplementation if needed
- Antibiotic ampicillin (100mg/kg/day)and gentamycin (5mg/kg/day)

3-Meconium Aspiration Syndrome (MAS)

Passage of meconium from the fetus lower sphincter into the amniotic fluid (called Meconium stained amniotic fluid), if the baby inhalation occurred into the trachea Meconium Aspiration Syndrome (MAS)

Pathophysiology



Definition

- *Meconium aspiration syndrome (MAS)* is a respiratory disorder in an infant born through *Meconium stained amniotic fluid* whose symptoms cannot be otherwise explained.

Incidence

- *Meconium stained amniotic fluid* observed in 13% of all live births.
- MAS occurs in 5% of newborns delivered through *Meconium stained amniotic fluid*
- More frequently in infants who are postmature, or term infant with hypoxia
- Decline from 5% to 1.5% (1990–2000), attributed to a 33% reduction in the incidence of births >41 weeks gestation.

Clinical picture

- Evidence of postmaturity>40 weeks GA: peeling skin, long fingernails, and decreased vernix.
- The vernix, umbilical cord, and nails may be meconium-stained, depending upon how long the infant has been exposed in utero.
- In general, nails will become stained after 6 hours.

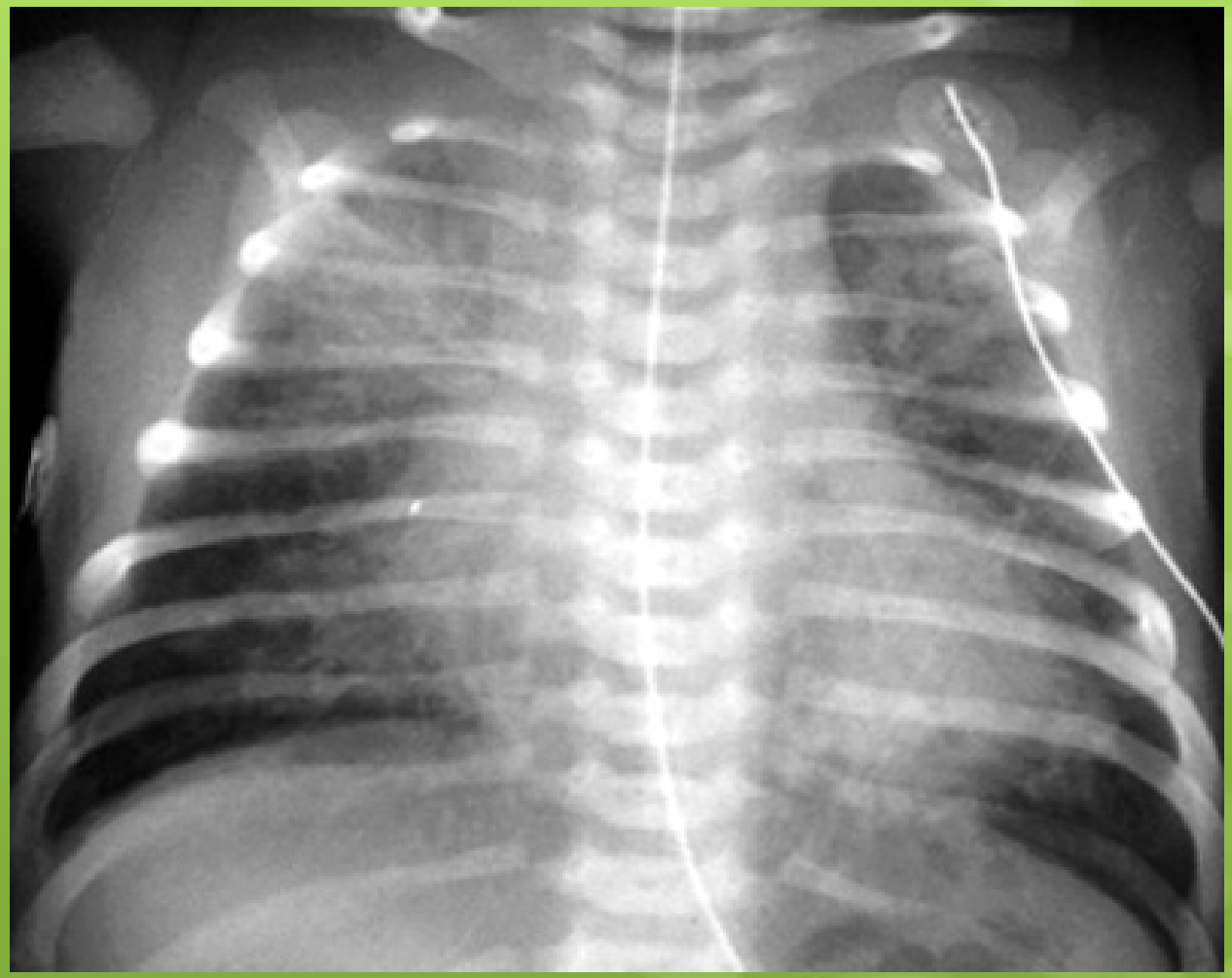
CLINICAL FEATURES

Physical examination

- Affected patients typically have respiratory distress with marked tachypnea and cyanosis.
- Reduced pulmonary compliance and use of accessory muscles of respiration are evidenced by intercostal and subcostal retractions and abdominal (paradoxical) breathing, often with grunting and nasal flaring.

Coarse focal consolidation with emphysema.

Hyperinflation and patchy asymmetric airspace disease that is typical of MAS.



Management

- Skilled resuscitation team should be present at all deliveries:
- Pediatric intervention depends on whether the infant is vigorous.
- Vigorous infant is if has:
    1. *Strong resp. efforts and cry*
    2. *Good muscle tone*
    3. *Heart rate >100b/m*
- When this is a case-no need for tracheal suctioning, only routine management.

Management

- When the infant is not vigorous:
  1. *Clear airways as quickly as possible.*
  2. *Free flow $0_{2.}$*
  3. *Radiant warmer but drying and stimulation should be delayed.*
  4. *Suction of the mouth and hypopharynx under direct visualization, followed by intubation and then suction directly to the ET tube as it slowly withdrawn.*

Mangements

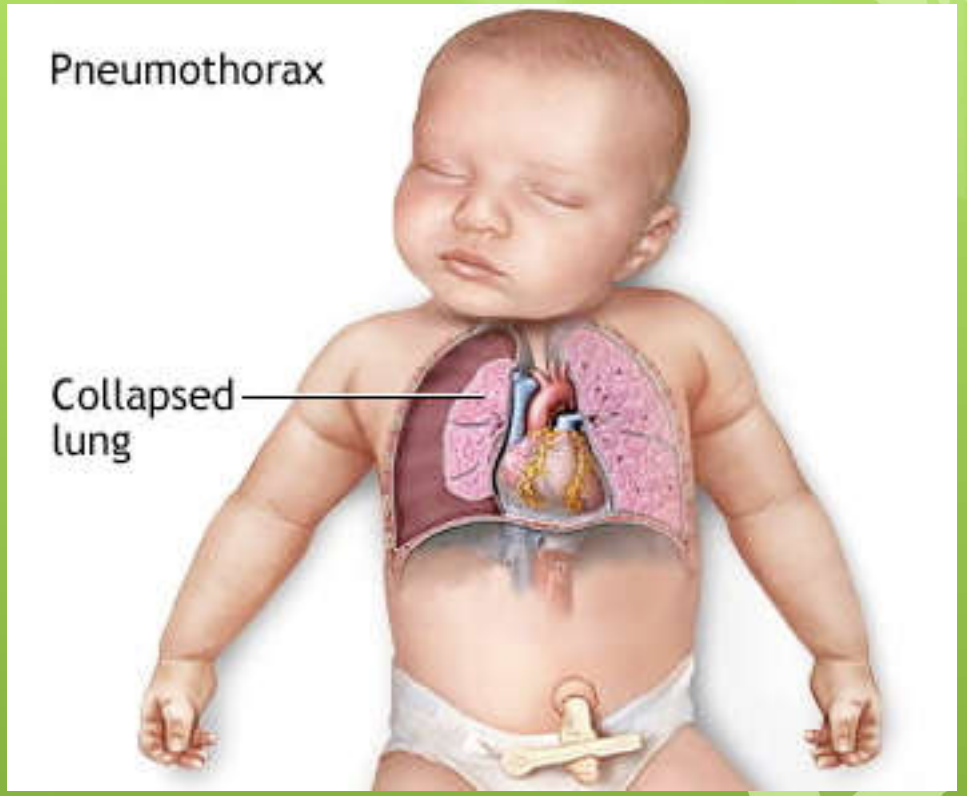
- Admission to incubator
- Routine investigations + chest X ray
- Oxygen supplementation if needed
- Antibiotic ampicillin (100mg/kg/day)and gentamycin (5mg/kg/day)
- CPAP
- Mechanical ventilation

4-Pneumothorax

- This is the presence of air in the pleural space.

Predisposing Factors:

- Prematurity
- Difficult delivery
- Vigorous resuscitation
- Mechanical ventilation
- RDS
- MAS
- Mechanical ventilation



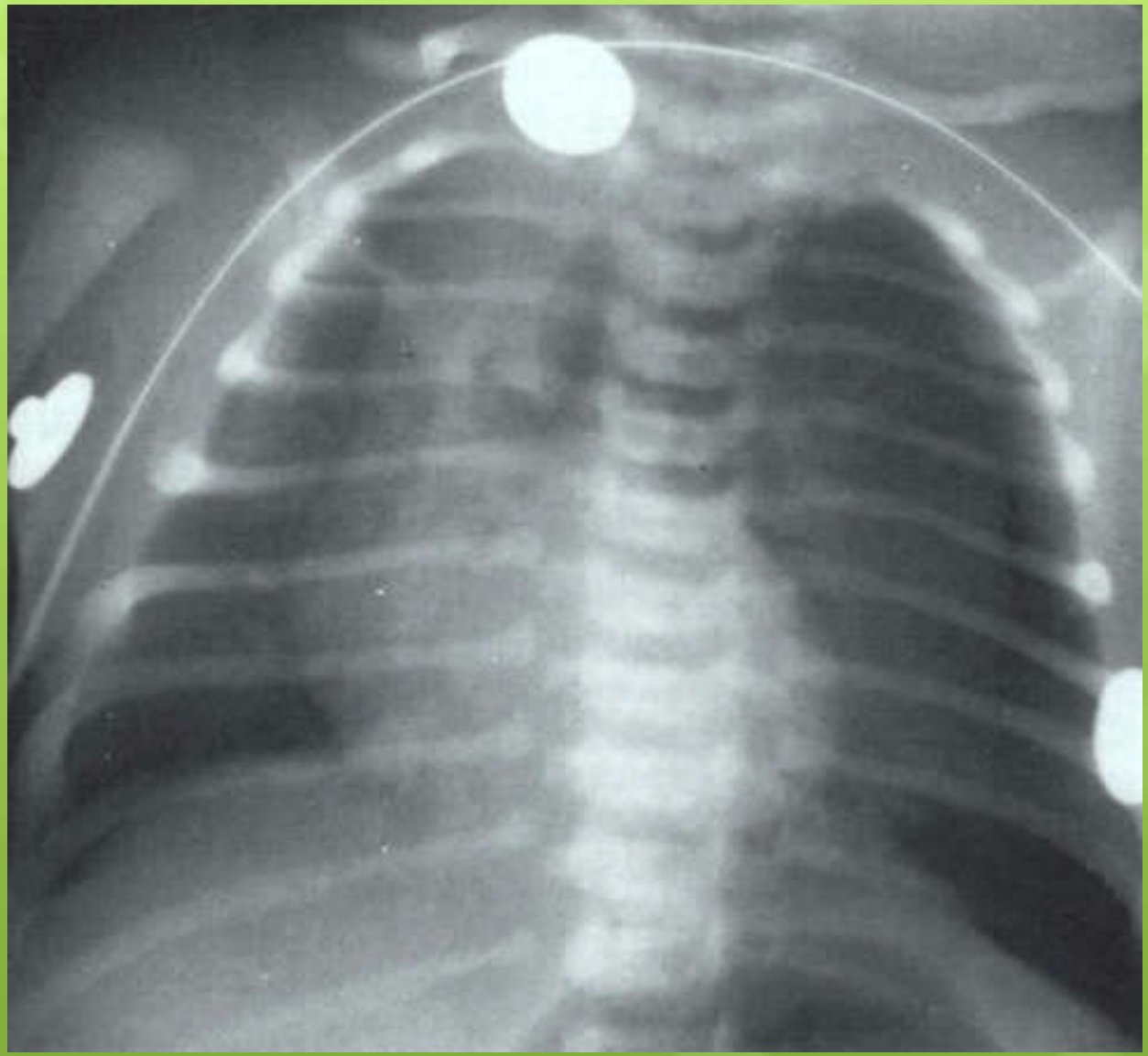
Clinical picture

- *Sudden, unexplained deterioration in the newborn's condition*
- *Shift in the apical cardiac impulse to the side opposite the pneumothorax, often with muffled heart sounds.*
- *Decreased breath sounds*
- *Apnea*
- *Bradycardia*
- *Cyanosis*
- *Increased oxygen requirements*
- *Higher PCO_2 and decreased pH (Respitory acidosis)*

Diagnosis

- **X-ray examination** *is the major method for definitive diagnosis of pneumothorax.*

- **Chest ultrasound** to evaluated the amount of fluid in pleural cavity



Treatments

Thoracentesis

- Hollow needle or cannula is inserted into the pleural space to release air, allowing the lung to reinflate under water seal
- Because pneumothorax is potentially life-threatening for a newborn, immediate removal of accumulated air by thoracentesis may be warranted
- This procedure carries a risk of damaging the lung pleura with needle tracks.
- Only can be performed by specifically trained personnel

5-Aspiration pneumonia

This is a common problem in preterm or full term with neurological problems due to muscle weakness and lack of co-ordination as in case of perinatal hypoxia (HIE).

Clinical features and treatment

- The neonate is presented with a sudden onset of respiratory distress and a history of regurgitation.
- All sign of Respitory distress may present
- X-ray chest may show patches of consolations

Treatment

- The neonate should be treated with physiotherapy and antibiotics, oxygen, mechanical ventilations
- Tracheo-esophageal fistula must be suspected if there are excessive secretions in oropharynx. In this case a catheter cannot pass down to stomach.

6-Apnea In The Neonates

Definition

- Cessation of breathing for at least 20 seconds or any time accompanied by bradycardia or cyanosis. After 30 sec., pallor and hypotonia are seen, and infant may be unresponsive to tactile stimulation.
- Frequent apnea more than three episodes in one hour

Common causes neonatal apnea

- Prematurity
- Sepsis
- Anemia
- PDA and CHD
- Gastro esophageal reflux
- Electrolyte imbalance as hypoglycemia
- Birth asphyxia, cerebral damage

Treatments of apnea

- Treatment of the cause e.g., antibiotics for sepsis, glucose for hypoglycaemia
- Skin stimulation
- Bag-mask ventilation
- Mechanical ventilation
- Drugs in cases apnea of prematurity
  - Theophylline loading dose 6mg/kg/dose, then maintance dose 6mg/kg/day divided into 3 equal dose
  - Caffeine citrate loading 20mg/kg/dose IV or oral then 5mg/kg/day as single daily dose

Cyanosis In Neonates

Definition

- This is a bluish discoloration of extremities (peripheral) & lips and tongue (central)
- It is clinically detected when the level of reduced Haemoglobin is more than 5 gm/Dl.
- Therefore cyanosis can be easily detected in neonates with polycythaemia and difficult to be detected in neonates with anaemia.
- Peripheral cyanosis is more common (especially in hypothermic neonates). However it is less significant.

Causes

1- Respiratory causes of cyanosis

a. Respiratory distress syndrome

b. Pneumonia

b. apnea

c. Meconium aspiration syndrome

d. Aspiration pneumonia

e. Pulmonary hypertension

Causes

2. Central nervous system causes of cyanosis

a. Apnea

b. Birth trauma.

c. Asphyxia

d. Some drugs as central anesthesia medications

3. Congenital cyanotic heart diseases

a. Teratology of fallot's

b. Transposition of great artery

c. Persistent pulmonary hypertension

4. Methaemoglobinaemia This is the increase of level of met-haemoglobin.

Clinical features

- In Respiratory tract causes
  - The baby looks ill.
  - There are signs of respiratory distress (Tachypnoea, recessions and grunting).
  - Analysis of arterial blood gas will show a decrease in partial pressure of oxygen that increase after giving oxygen.
  - Chest X-ray will show a normal heart shadow and abnormal lung fields

In Central nervous system causes

There may be other neurological abnormalities

- Convulsions
- Lethargy.
- There is abnormal breathing pattern (irregular with periods of apnea).

In Congenital cyanotic heart diseases

- Baby may looks well or critically ill
- There may or may not a heart murmur.
- Art blood gas analysis shows a decrease in partial pressure of oxygen that shows little or no response after giving oxygen.
- Chest X-ray may shows Cardiomegaly with no lung disease.
- Echo is needed

In Methaemoglobinaemia

- Baby looks well.
- Arterial blood gas analysis shows normal partial pressure of oxygen that increases after giving oxygen.
- Chest x-ray is normal.
- Treatment is with IV ascorbic acid & methylene blue

HYPEROXIA TEST

- ADMINISTER 100% O2 FOR 10 MINUTES
- ASSES O2 OF UPPER and LIMB LOWER LIMB
- Apply plus oximeter
- If marketed improved in oxygen consider respiratory causes
- If no improvement or mild improvement in oxygen consider cardiac causes

Persistent Pulmonary Hypertension Of The Newborn

Definition

- In normal newborn, breathing and legation of umbilical cord that occur immediately after birth decrease pulmonary blood pressure and increase systemic blood pressure.

- Persistent pulmonary hypertension of the newborn occurs when blood pressure in pulmonary artery is higher than systemic blood pressure. This is the also Called persistent fetal circulation.

Causes

- Idiopathic
- Any Severe lung disease
- Sepsis
- Asphyxia
- CHD

Clinical picture

- There is a central cyanosis and loud second heart sound.
- Sometimes it is clinically difficult to differentiate it from congenital heart disease in the clinical ground.
- Arterial blood gas analysis shows a decrease in partial pressure of oxygen that mild increased after giving oxygen.
- X-ray normal in idiopathic causes
- Echocardiography shows right to left shunt with anatomically normal heart.

Management

General management principles include the following:

- Continuous monitoring of oxygenation, blood pressure, and perfusion
- Maintaining a normal body temperature
- Correction of electrolytes/glucose abnormalities and metabolic acidosis
- Sedations
- Nutritional support
- Minimal stimulation/handling of the newborn
- Minimal use of invasive procedures (e.g, suctioning)

Treatments
Specific management principles include the following:

- Inotropic support (eg, dopamine to incrase systemic blood pressure
- Pulmonary vasodilators (eg, inhaled nitric oxide)
- Vasodilators as sildenafil 1-2mg/kg/day in four divided dose, Mg sulphate 25-50mg/kg/day,
- Surfactant administration: in case of parenchymal lung disease
- Endotracheal intubation and mechanical ventilation with heavy sedation
- Extracorporeal Membrane Oxygenation: ECMO severe cases

Thank You