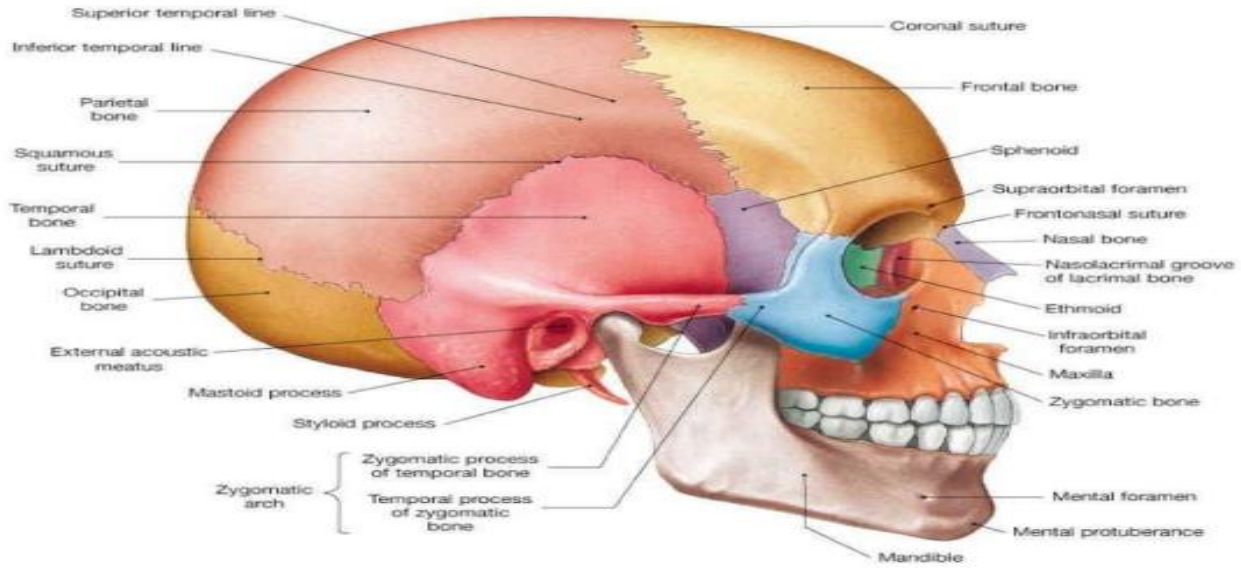
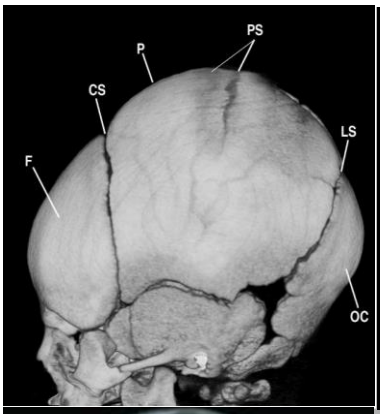
Lec. 1 | Newborn – Birth injury

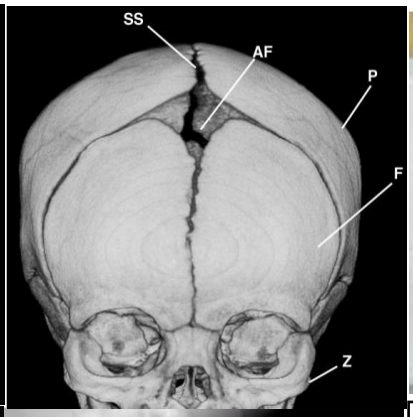
Birth injuries

On physical exam, a 12-hour-old newborn is noted to have non tender swelling of the head that does not cross the suture line. **What is the most likely diagnosis?**

Common Injuries During Deliveries		
Injury	**Specifics**	**Outcome**
Skull fractures	» In utero from pressure against bones or forceps. » **Linear** is Most common	» **Linear:** No symptoms and no treatment needed » **Depressed:** Elevate to prevent cortical injury
Brachial palsy	» **Erb-Duchenne:** C5-C6; cannot abduct shoulder; externally rotate and supinate forearm » **Klumpke:** C7-C8 ± T1; paralyzed hand ± Horner syndrome	Most with full recovery (months); depends on whether nerve was injured or lacerated. ***Rx:*** Proper positioning and partial immobilization; massage and range of motion exercises; if no recovery in 3-6 months, then neuroplasty
Clavicular fracture	Especially with shoulder dystocia in vertex position and arm extension in breech	Palpable callus within a week. ***Rx:*** with immobilization of arm and shoulder
Facial nerve palsy	Entire side of face with forehead; forceps delivery or in utero pressure over facial nerve	Improvement over weeks (as long as fibers were not torn); need eye care; neuroplasty if no improvement (torn fibers)
Caput succedaneum	Diffuse edematous swelling of soft tissue of scalp; **crosses suture lines**	Disappears in first few days; may lead to molding for weeks
Cephalo-hematoma	Subperiosteal hemorrhage; **Does not cross suture lines**	May have underlying linear fracture; resolve in 2 weeks to 3 months; may calcify; jaundice







facial palsy (Possible forceps delivery)

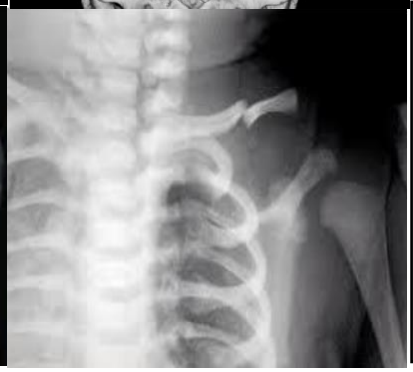
Which side facial palsy?

Management:

o Eye care.

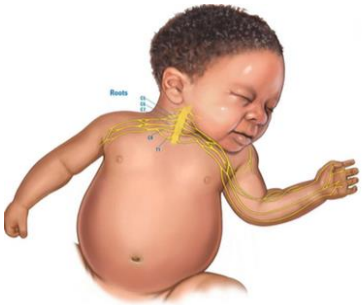
o Neuroplasty

Linear skull fracture

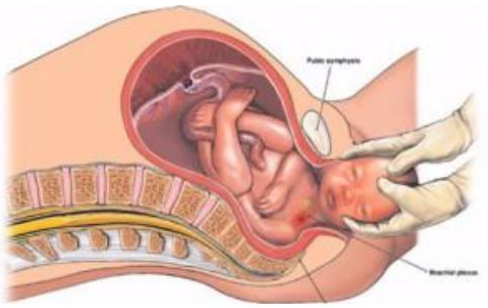


Fracture left clavicle

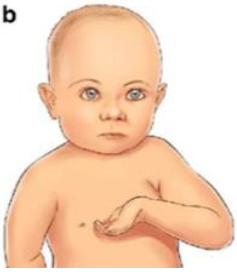
Arm & shoulder immobilization

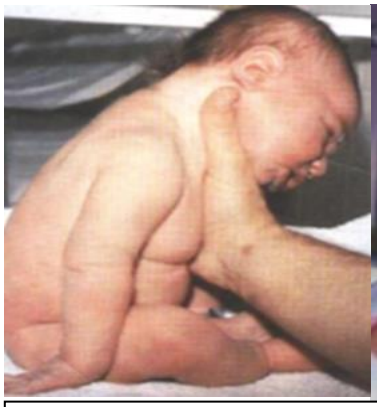


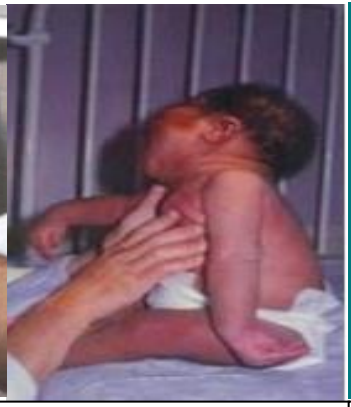
Brachial plexus injury

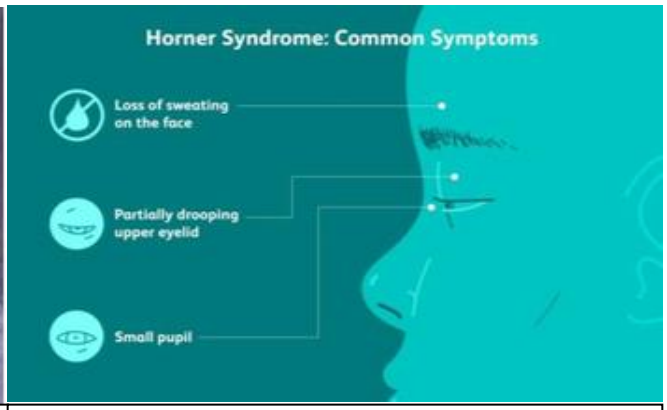


Difficult labor, shoulder dystocia

	Erb palsy	Klumpke palsy
Definition	Injury to the upper trunk of the brachial plexus **(C5–C6)**	Injury to the lower trunk of the brachial plexus **(C7-C8±T1)**
Etiology	Excessive lateral traction of the neck during delivery and shoulder dystocia	Excessive upward traction on the arm during delivery
Clinical features	» Weakness of muscles in the C5 and C6 → flexed wrist with an extended forearm and internally rotated and adducted arm **(waiter's tip posture)** » Asymmetric Moro reflex in infants (absent or impaired on the affected side)	» Weakness of intrinsic hand muscles → **total claw hand** » Absent grasp reflex in infants » Horner syndrome manifestations may be present
	a 	b  **(Hand paralysis + Horner syndrome)**



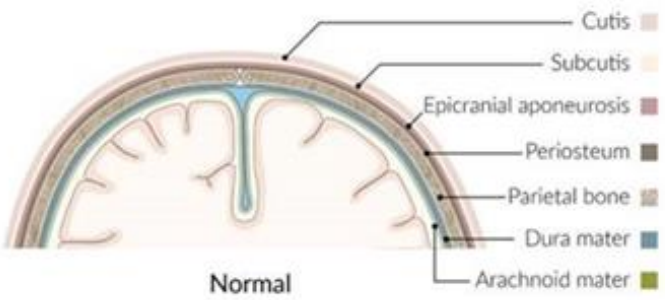




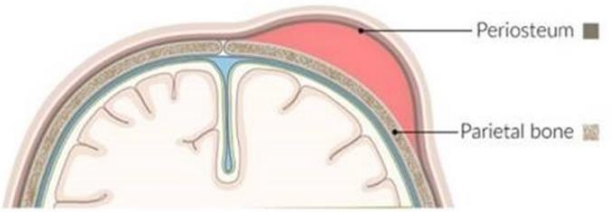
Erb palsy	Hand paralysis + Horner syndrome A Triad of: Ptosis, Myosis and Anhydrosis

Treatment of Brachial Plexus Injury

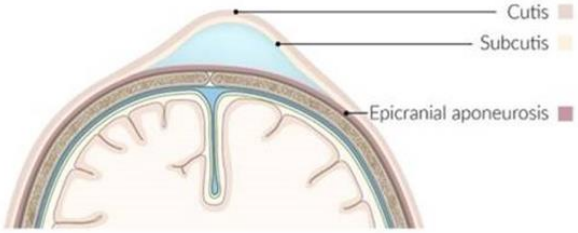
» Positioning and partial Immobilization
» Physiotherapy
» Surgery (neuroplasty if no recovery in 3-6 months)



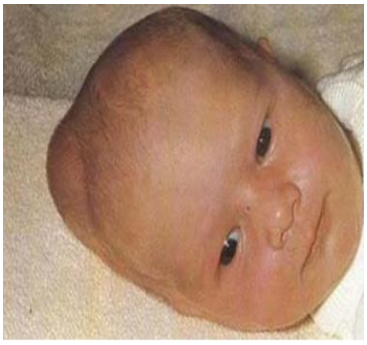
Normal



Cephalohematoma



Caput succedaneum



Cephalohematoma

Presented 12-24 hr after birth, resolves 2 wk-3 mo., possible underlying linear skull fracture

Caput succedanum

Presented at birth, resolve spontaneously within 2-3 days

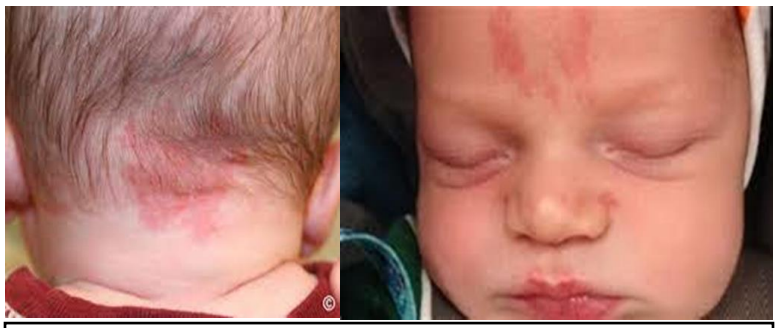
On physical exam, a 12-hour-old newborn is noted to have non tender swelling of the head that does not cross the suture line.

What is the most likely diagnosis?

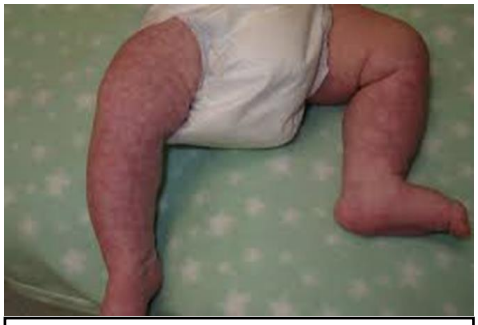
a) Intracranial hemorrhage.
b) Caput succedaneum.
c) Subcutaneous scalp hematoma.
d) Cephalohematoma.
e) Erb's palsy.

Physical examination

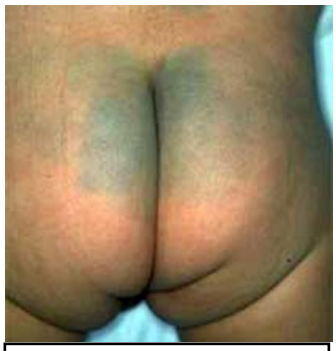
Finding / Diagnosis	Description / Comments
I. SKIN	
Cutis marmorata	Lacy, reticulated vascular pattern over most of body when baby is cooled; improves over first month; abnormal if persists
Salmon patch (nevus simplex)	Pale, pink vascular macules; found in nuchal area, glabella, eyelids; usually disappears
Mongolian spots	Blue to slate-gray macules; seen on presacral, back, posterior thighs; > in nonwhite infants; arrested melanocytes; usually fade over first few years; differential: child abuse
Erythema toxicum, neonatorum	Firm, yellow-white papule/pustules with erythematous base; peaks on second day of life; contain eosinophils; benign
Hemangioma	» **Superficial**: bright red, protuberant, sharply demarcated; most often appear in first 2 months; most on face, scalp, back, anterior chest; rapid expansion then stationary, then involution (most by 5-9 years of age) ***Rx:*** beta blockers, embolization » **Deeper:** Bluish hue, firm, cystic, less likely to regress ***Rx:*** (Steroids, pulsed laser) only if large and interfering with function
II. HEAD	
Preauricular tags/ pits	Look for hearing loss and genitourinary anomalies
Coloboma of iris	Cleft at " Six o'clock" position; most with other eye abnormalities; **CHARGE** association
Aniridia	Hypoplasia of iris; defect may go through to retina; association with Wilms tumor
III. EXTREMITIES	
Polydactyly	>5 numbers of fingers or toes. No treatment needed if good supply



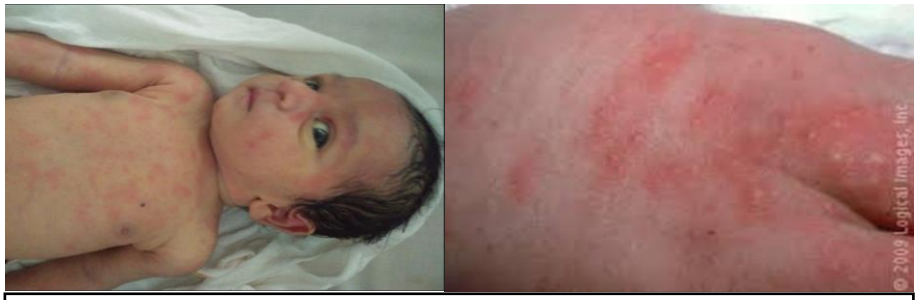
Salmon patch



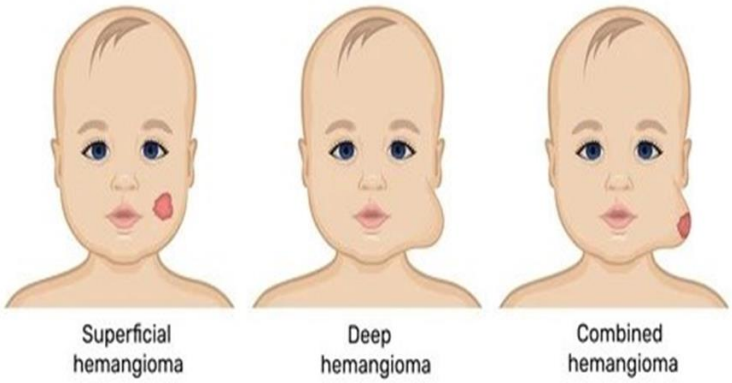
Cutis marmorata

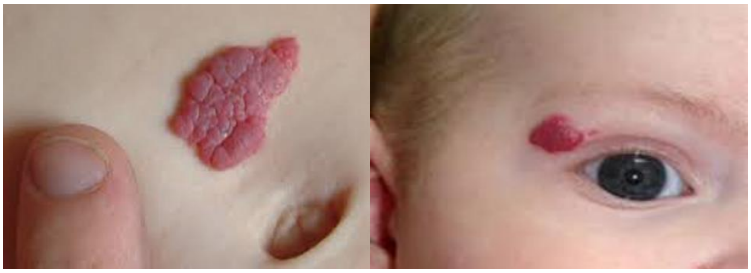


Mongolian spot



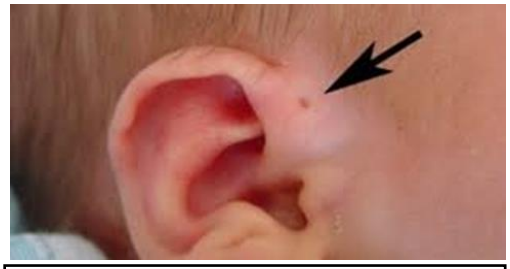
Erythema toxicum neonatorum



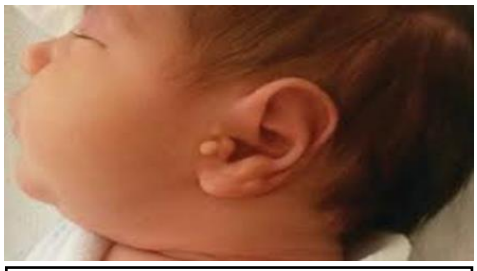


superficial hemangioma

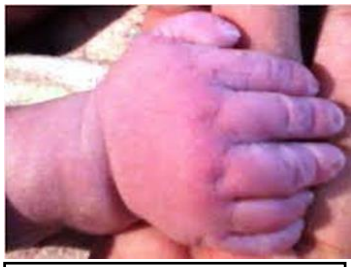
Deep (cavernous) hemangioma *mixed hemangioma*



Preauricular pit



Preauricular tag



Polydactyly

Fetal growth and maturity

1.Intrauterine Growth Restriction (IUGR)

Type	Reason	Main etiologies	Complications
Symmetric	Early, in utero insult that affects growth of most organs	Genetic syndromes, chromosomal abnormalities, congenital infections, teratogens, toxins	Etiology dependent; delivery of oxygen and nutrients to vital organ usually normal
Asymmetric (Head sparing)	Relatively late onset after fetal organ development; abnormal delivery of nutritional substances and oxygen the fetus	Uteroplacental insufficiency secondary to maternal disease (Malnutrition, cardiac, renal, anemia) and/or placental dysfunction (hypertension, autoimmune disease, abruption)	Neurologic (asphyxia) if significant decreased delivery of oxygen to brain

Asymmetrical IUGR: disproportionate growth restriction

- The most common manifestation of IUGR (~ 70%), has a late onset, and is usually due to maternal systemic disease (e.g., hypertension) that results in placental insufficiency.
- The dimensions of the head are normal while the body and limbs are thin and small.

Symmetrical IUGR: global growth restriction

- Less common (~ 30%) and is usually due to a genetic disorder (e.g., aneuploidy), congenital heart disease, or early intrauterine TORCH infection that affects the fetus early in gestation.
- The entire body is proportionally small.
- The circumference of the head is proportional to the rest of the fetal body.

Complications of IUGR

» Stillbirth
» Preterm labor Low birth weight (< 2500 g) with ↑ risk of sudden infant death syndrome
» Perinatal asphyxia
» Possibly motor and neurological disabilities

Asymmetrical IUGR	*Normal full term*

2. Gestational Age and Size at Birth

Preterm	Large for gestational age (LGA) - Fetal Macrosomia	Post-term
» Premature – liveborn infants delivered prior to 37 weeks as measured from the first day of the last menstrual period » Low birth weight (<2,500 grams), possibly due to prematurity, IUGR, or both	» Birth weight >4,500 grams at term » Predisposing factors: obesity, diabetes » Higher incidence of birth injuries and congenital anomalies	» Infants born after 42 weeks gestation from last menstrual period » When delivery is delayed ≥3 weeks past term, significant increase in mortality. » **Characteristics** 1. Increased birth weight 2. Absence of lanugo 3. Decreased/absent vernix 4. Desquamating, pale, loose skin 5. Abundant hair, long nails 6. If placental insufficiency, may be meconium staining

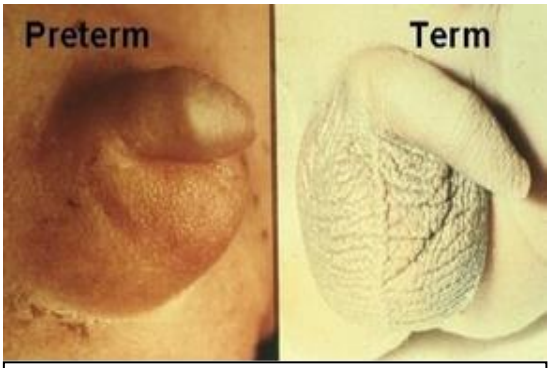
- The exact mechanisms underlying premature labor are not well understood, but some high risk factors have been identified
- **High-risk factors include:**
  History of preterm birth
  Cervical insufficiency
  Multiple gestations

3. Premature infant

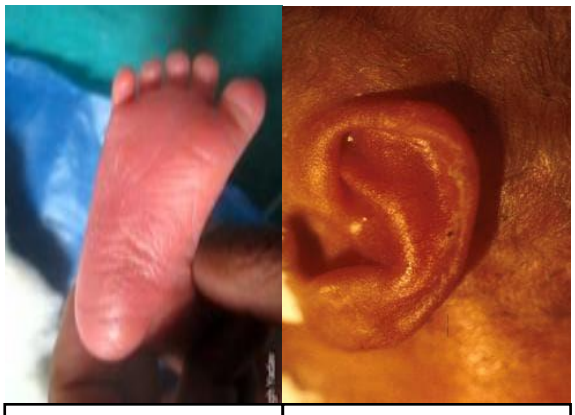
- Born before the 37th week gestation
- **Physical characteristics:**

  - » Skin is thin, smooth, shiny, with visible veins
  - » Minimal subcutaneous fat deposits
  - » Lanugo over body
  - » Minimal sole and palm creases
  - » Large head
  - » Ears have soft cartilage
  - » Genitals
  - » Posture is extended
  - » Reflexes absent or weak – suck, gag

Low birth weight baby, thin skin with minimal sc fat

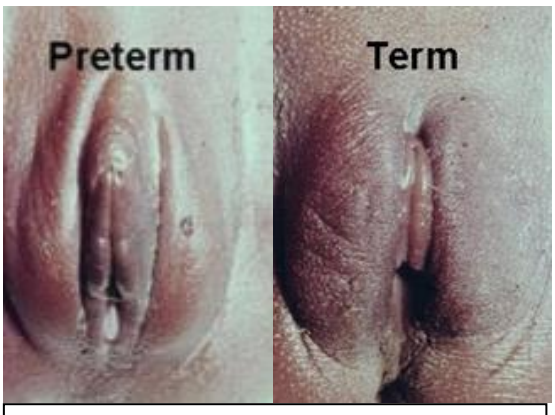


Male genitalia

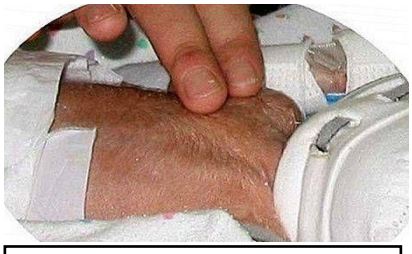


Few sole creases

Soft ear cartilage



Female genitalia



Lanugo

What kinds of health problems can premature babies have?

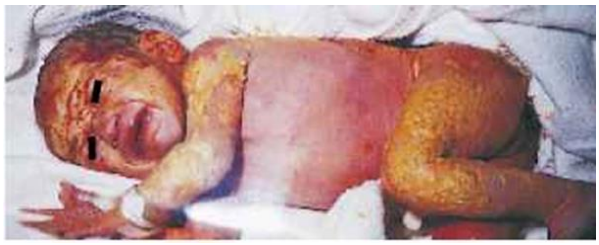
- Anemia.
- Breathing problems (Respiratory distress syndrome, apnea).
- Infections or neonatal sepsis.
- Intraventricular hemorrhage (IVH).
- Neonatal jaundice.
- Necrotizing enterocolitis (NEC).
- Patent ductus arteriosus (PDA).
- Retinopathy of prematurity (ROP).

In the long term, premature birth may lead to the following complications:

- Cerebral palsy
- Impaired learning
- Vision problems
- Hearing problems
- Dental problems
- Behavioral and psychological problems
- Chronic health issues

Characteristics of post mature infant

- Increased birth weight
- Absence of lanugo
- Decreased or no vernix
- Desquamating, pale, loose skin
- Long fingernails
- Abundant scalp hair
- If placental insufficiency may be meconium stained skin, cord, nails



Post mature infant

Quizz

Q1:

On physical exam, a 12-hour-old newborn is noted to have non tender swelling of the head that does not cross the suture line.

What is the most likely diagnosis?

a) Intracranial hemorrhage.
b) Caput succedaneum.
c) Subcutaneous scalp hematoma.
d) Cephalohematoma.
e) Erb's palsy

Q2:

A newborn has a flat, red-colored lesion on the glabella, which becomes darker when he cries.
What is the most likely diagnosis?

What is the best management?

Q3:

A newborn infant has a blue-gray pigmented lesion on the sacral area. It is clearly demarcated and does not fade into the surrounding skin.
Which of the following is the most likely diagnosis?

Q4:

Which of the following statements is consistent with the diagnosis of symmetrical intrauterine restriction (IUGR)?

a) Increased risk of respiratory distress syndrome.
b) large for gestational age (birth weight above 90th percentile).
c) Increased fetal movements.
d) The circumference of the head is proportional to the rest of the body.
e) Reduced Risk of neurologic sequelae

Lec. 1b| Newborn 2 Endocrine and respiratory disorders

By Dr. Nafisa Hassan Refat

NEONATAL ENDOCRINE DISORDERS

Infants of Diabetic Mothers (IDM)

You are called to see a 9.5-pound (4.25 Kg) newborn infant who is jittery. Physical exam reveals a large plethoric infant who is tremulous. A murmur is heard. Blood sugar is low.

Pathogenesis

- Maternal hyperglycemia (types I and II DM) → fetal hyperinsulinemia
- Insulin is the major fetal growth hormone → increase in size of all organs except the brain
- Major metabolic effect is at birth with sudden placental separation → **hypoglycemia**
- Infants may be **large for gestational age and plethoric** (ruddy).
- Other **metabolic findings: hypocalcemia and hypomagnesemia** (felt to be a result of delayed action of parathyroid hormone)

Common findings

- **Birth trauma** (macrosomia)
- **Tachypnea** (transient tachypnea, respiratory distress syndrome, cardiac failure, hypoglycemia)
- **Cardiomegaly—asymmetric septal hypertrophy** (insulin effect, reversible)
- **Polycythemia (and hyperviscosity) →** hyperbilirubinemia → jaundice
- **Renal vein thrombosis** (flank mass, hematuria, thrombocytopenia) from polycythemia
- **Increased incidence of congenital anomalies**
  - » Cardiac—especially VSD, ASD, transposition of great vessels (TGA)
  - » Small left colon syndrome (transient delay in development of left side of colon; presents with abdominal distention)
  - » Caudal regression syndrome: spectrum of structural neurologic defects of the caudal region of spinal cord, which may result in neurologic impairment.

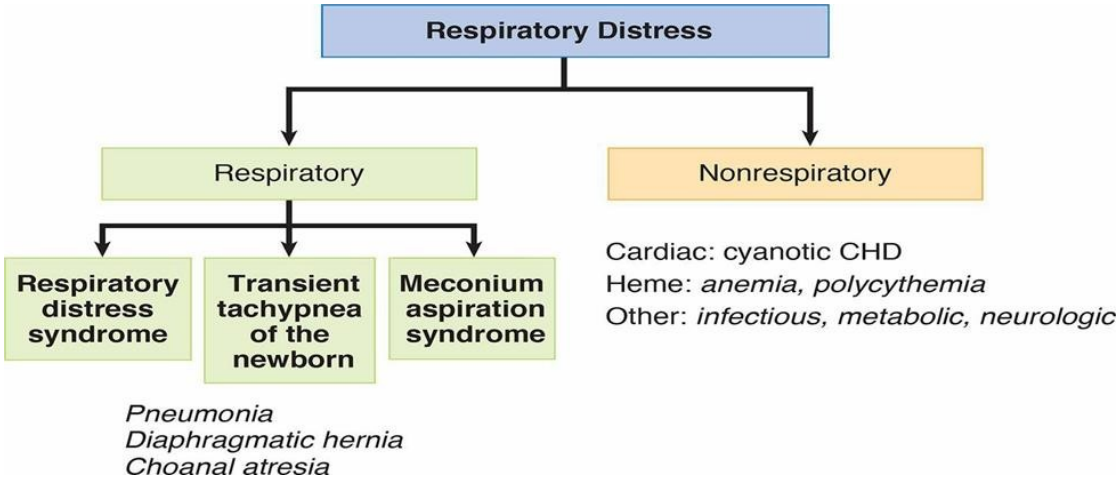
Prognosis

- Infants of diabetic mothers are more predisposed to diabetes
- LGA infants are at increased risk of childhood obesity.

Treatment

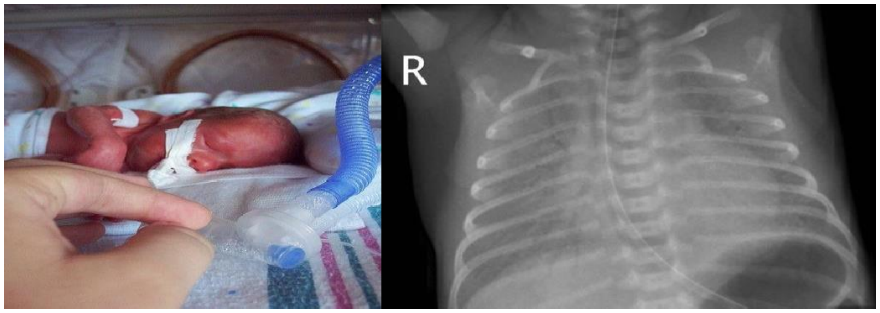
- Careful monitoring and glucose control during pregnancy.
- Close monitoring of infant after delivery.
- Early frequent feeds (oral, nasogastric (NG) if hypoglycemia continues) followed by
- IV dextrose if euglycemia has not achieved by NG feeding

NEONATAL RESPIRATORY DISORDERS



Respiratory Distress Syndrome (RDS)

Shortly after birth, a **33-week** gestation infant develops tachypnea, nasal flaring, and grunting and requires intubation. **Chest radiograph** shows a hazy, ground-glass appearance of the lung

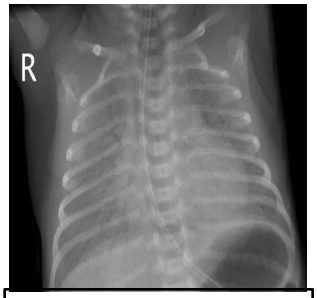


Pathogenesis

- Deficiency of **mature surfactant** (surfactant matures biochemically over gestation; therefore, the incidence of surfactant deficiency diminishes toward term.)
- Inability to maintain alveolar volume at end expiration → decreased FRC (functional residual capacity) and atelectasis
- Primary initial pulmonary hallmark is **hypoxemia.** Then, **hypercarbia and respiratory acidosis ensue.**

Diagnosis

- **Antenatal:**
  - Most accurate diagnostic test—L/S ratio (part of complete lung profile; lecithin-to-sphingomyelin ratio)
  - Done on amniotic fluid prior to birth
- **After birth:**
  - Best initial diagnostic test—chest radiograph
  - Findings: ground-glass appearance, atelectasis, air bronchograms



Ground-glass appearance and air bronchogram

Treatment

- **Best initial treatment**—oxygen
- **Most effective treatment**—intubation and exogenous surfactant administration

Primary prevention

1. Avoid prematurity (tocolytics)
2. Antenatal betamethasone

Transient Tachypnea Of The Newborn (TTN)

Pathogenesis: Slow absorption of fetal lung fluid → decreased pulmonary compliance and tidal volume with increased dead space

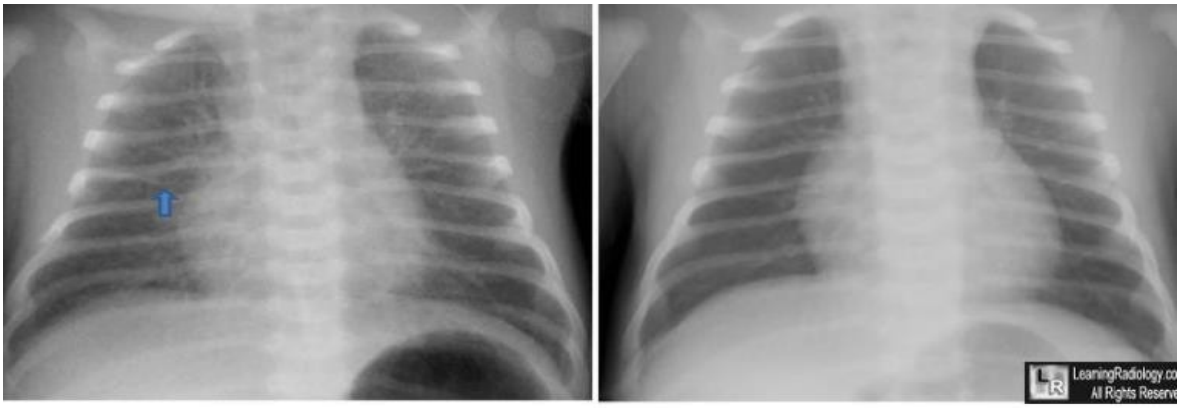
Clinical presentation:

- Common in term infant delivered by Cesarean section or rapid second stage of labor
- Tachypnea after birth
- Generally minimal oxygen requirement

Diagnosis: **Chest x-ray (best test)**—air-trapping, fluid in fissures, perihilar streaking

Prognosis: Rapid improvement generally within hours to a few days

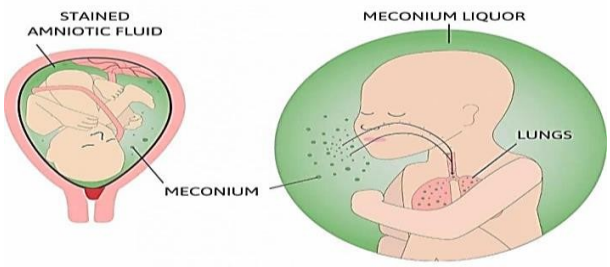
Treatment: observation and supplemental oxygen as required



Meconium Aspiration

Pathogenesis:

Meconium passed as a result of hypoxia and fetal distress; may be aspirated in utero or with the first postnatal breath → airway obstruction and pneumonitis → respiratory failure and pulmonary hypertension

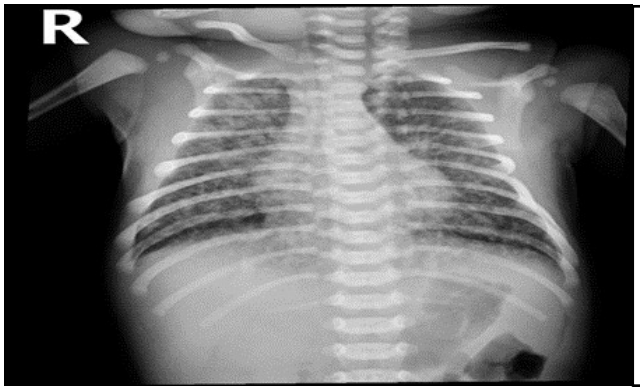


Diagnosis:

- **Chest x-ray (best test)** patchy infiltrates, increased AP diameter, flattening of diaphragm
- **Other complications**: air leak (pneumothorax, pneumomediastinum)

Prevention: Endotracheal intubation and airway suction of depressed infants with thick meconium

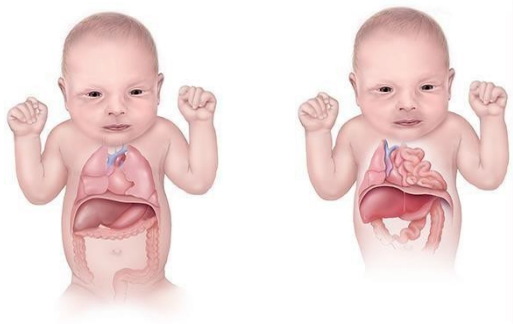
Treatment: **Positive pressure ventilation and other complex NICU therapies**



» **Bilateral patchy alveolar opacities are seen.**
» **Hyperinflated lungs with flattened hemidiaphragms.**
» **Clear costophrenic angles.**
» **Normal cardiothoracic ratio.**

Congenital Diaphragmatic Hernia (CDH)

Pathogenesis: **Failure of the diaphragm to close → abdominal contents enter into chest, causing pulmonary hypoplasia.**



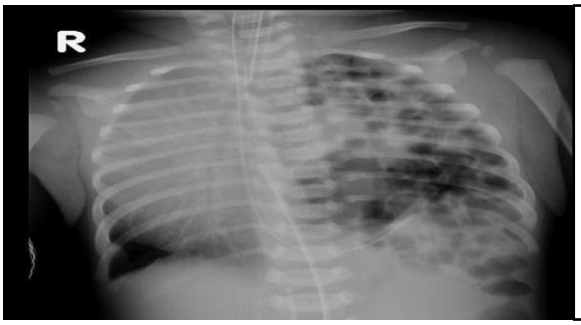
Normal Diaphragm	Left diaphragmatic hernia

Clinical presentation:

- 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



- ***Multiple gas locules within the lower left chest, the majority of the rest of the left lung opacified.***
- ***The left hemidiaphragm cannot be seen. The mediastinum and the heart are deviated to the contralateral right side.***

Treatment Best initial treatment—immediate intubation in delivery room for known or suspected CDH, followed by surgical correction when stable (usually days)

Quiz

Q1: Which of the following is commonly seen in infants of diabetic mothers?

a) Microsomia
b) Small heart size
c) Polycythemia
d) Renal artery thrombosis
e) Slow respiratory rate

Q2: A term boy born to a mother with insulin-dependent pregestational diabetes has a bedside capillary glucose of 32 mg/dL at 1 hour of life. He is awake and has normal vital signs.

Which of the following is the most appropriate next step in management?

a) Instruct the mother to breast-feed him and recheck the glucose in 30 minutes.
b) Place an IV and administer glucose.
c) Recheck the glucose in 1 hour.
d) Measure his serum insulin level.
e) Take him to the nursery for observation.

Q3:A term male is born via cesarean section to a 30-year-old woman. Immediately after birth he has respiratory distress. On examination, there is mild chest retractions and RR 80/m. Chest x-ray revealed air-trapping, fluid in fissures, and perihilar streaking.

Which of the following is the most likely diagnosis?

a) Respiratory distress syndrome
b) Meconium aspiration syndrome
c) Congenital pneumonia
d) Transient tachypnea of the newborn
e) Diaphragmatic hernia

Q3: Shortly after birth, a 33-week gestation infant develops tachypnea, nasal flaring, and grunting and requires intubation. Chest radiograph shows a hazy, ground-glass appearance of the lungs with air bronchogram.

Which of the following is the most effective next step for treatment?

a) Giving IV antibiotics
b) Suction via the endotracheal tube
c) Giving exogenous surfactant
d) Administer prostaglandin
e) Giving 100% oxygen

Q4: You are called to the delivery room because a full-term infant has developed cyanosis and respiratory distress immediately after birth. A brief examination of the infant reveals cyanosis on room air not completely relieved by oxygen administered by mask. There is subcostal and intercostal retractions, absent air entry, with audible bowel sounds in the left chest. The heart is best heard in the right hemithorax; the abdomen looks flat.

Which of the following is the most appropriate initial treatment?

a) Supplying oxygen 100% by nasal prongs
b) Refer for immediate surgery
c) Start IV antibiotics
d) Continue resuscitation with bag and mask till cyanosis improved.
e) Immediate intubation in delivery room

Q6: A male newborn infant was born at 42 weeks gestation via spontaneous vaginal delivery to an old multipara woman. Birth weight was 3.700 kg. Examination showed respiratory distress with intercostal retraction. On endotracheal suction, a thick greenish aspirate was found.

Which of the following lines of management is appropriate for this newborn?

a) Chest physiotherapy.
b) Endotracheal surfactant administration.
c) Intravenous antibiotics including gentamycin.
d) NICU admission considering positive pressure ventilation.
e) Reassurance and send him home.