Common Neonatal Problems

Part I

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Objectives

By the end of this presentation the student should be able to:

- Recognize the uniqueness of neonatal pathophysiology affecting illness presentation
- Mention some of the most common neonatal problems encountered in well-baby nursery and their management.

How The Newborn Infant Differs

Developmental considerations:

- Varying degree of immaturity in multiple systems
- Lower glomerular filtration rate (GFR) in the first few days
- Higher basal metabolic rate (BMR)
- Larger body surface area

Neonates Are NOT Just Small Children

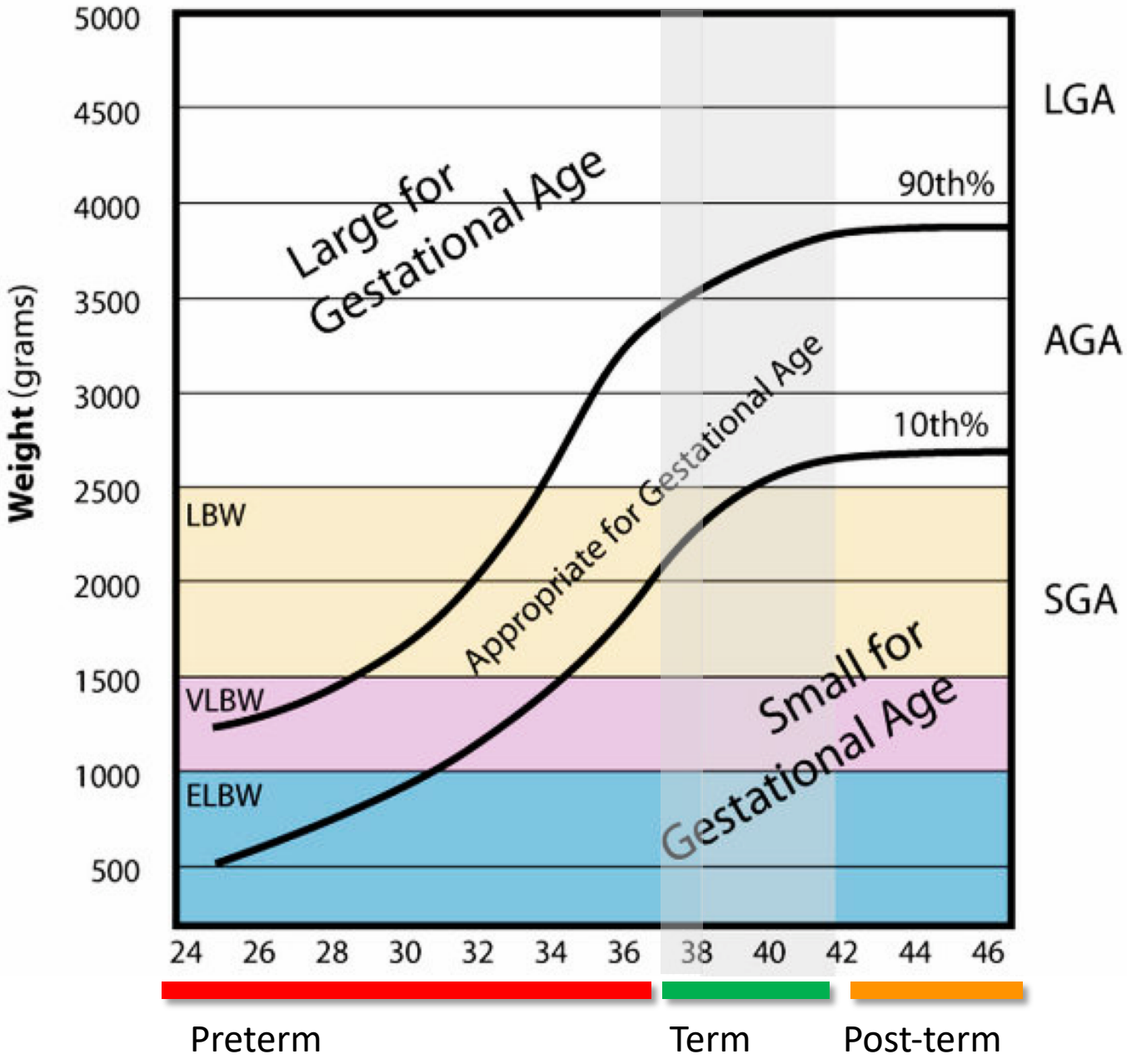
Maternal Factors

Examples of ***maternal health issues*** and its effects on the newborn:

- Hypertension and small for gestational age (SGA) infants
- Myasthenia Gravis and neonatal hypotonia
- DM and macrosomic infants
- SLE and neonatal lupus

Birth Weight (BW) & Gestational age (GA)

Low BW (LBW)	<2500 g
Very low BW (VLBW)	<1500 g
Extremely low BW (ELBW)	<1000 g



Signs ~~and symptoms~~

Thermal regulation
- Hypothermia
- Fever

Color changes
- Cyanosis
- Pallor
- Jaundice

Breathing pattern
- Apnea
- Tachypnea

Movement
- Convulsions
- Jitteriness
- Pseudo-paralysis

Sensorium
- Irritability
- Lethargy

GI tract changes
- Poor feeding
- Vomiting
- Abdominal distension

Thermal regulation abnormalities

Hypothermia:

- Sepsis
- Environmental

Hyperthermia:

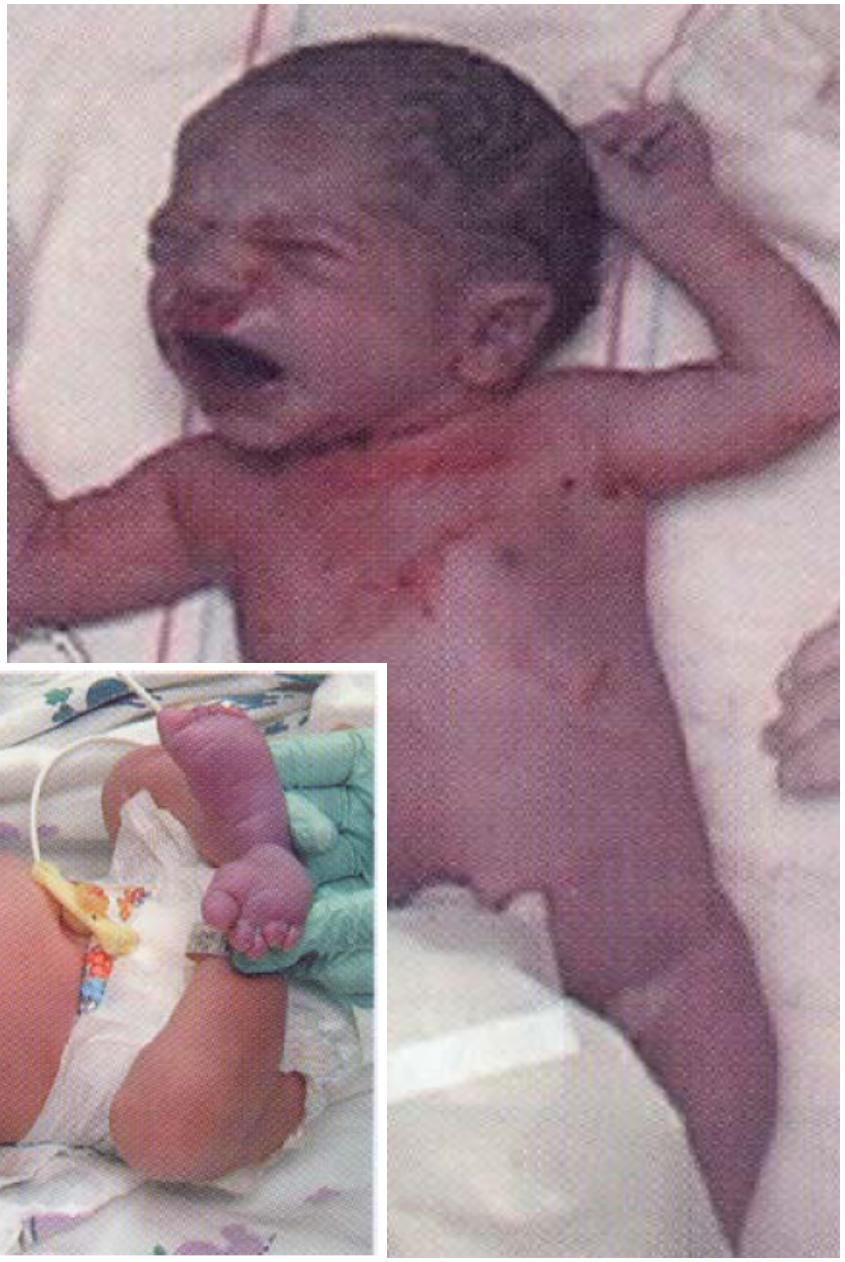
- Environmental
- Over clothing
- Dehydration
- Infection

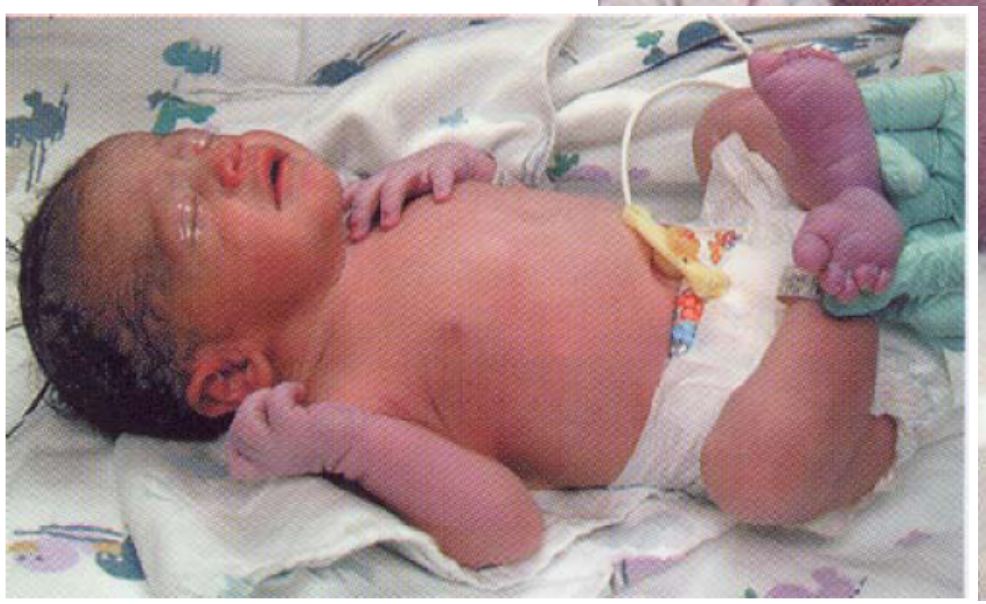
Cyanosis

Central cyanosis :

- Respiratory insufficiency
- Cyanotic heart disease
- PPHN
- CNS depression
- Hypoglycemia
- Sepsis

Peripheral cyanosis





Pallor

- Anemia
  - Hemorrhage and hemolysis and less likely aplastic
  - Acute vs. chronic; prenatal vs. postnatal
- Shock
  - Adrenal failure
  - Cardiogenic
  - Sepsis

Convulsions

Distinguish it from jitteriness and apnea

Focal, generalized or subtle

Causes:

- Electrolyte abnormalities: Ca, Na.
- Hypoglycemia
- Inborn error of metabolism
- Drug withdrawal
- Pyridoxine deficiency
- Cerebral anomalies
- Cerebral Infarction
- Intracranial hemorrhage
- Birth Asphyxia
- Meningitis
- Familial

Lethargy

- Sepsis
- Asphyxia
- Sedation
- Hypoglycemia
- CNS anomalies
- Inborn error of metabolism

Irritability

- Sepsis
- Drug withdrawal
- Meningeal irritation
- Congenital glaucoma
- Intra-abdominal conditions

Poor Feeding

- Prematurity
- Sick newborn infants (*especially sepsis*)

Vomiting

- Sepsis
- Over-feeding
- GI obstruction
- Pyloric stenosis
- Increased intracranial pressure
- Milk allergy

Abdominal Distention

- GI obstruction
- Abdominal mass
- Necrotizing Enterocolitis (NEC)
- Ileus
  - Hypokalemia
  - Sepsis

Pseudo-paralysis

- Fracture
- Dislocation
- Nerve injury
- Osteomyelitis

Selected Issues

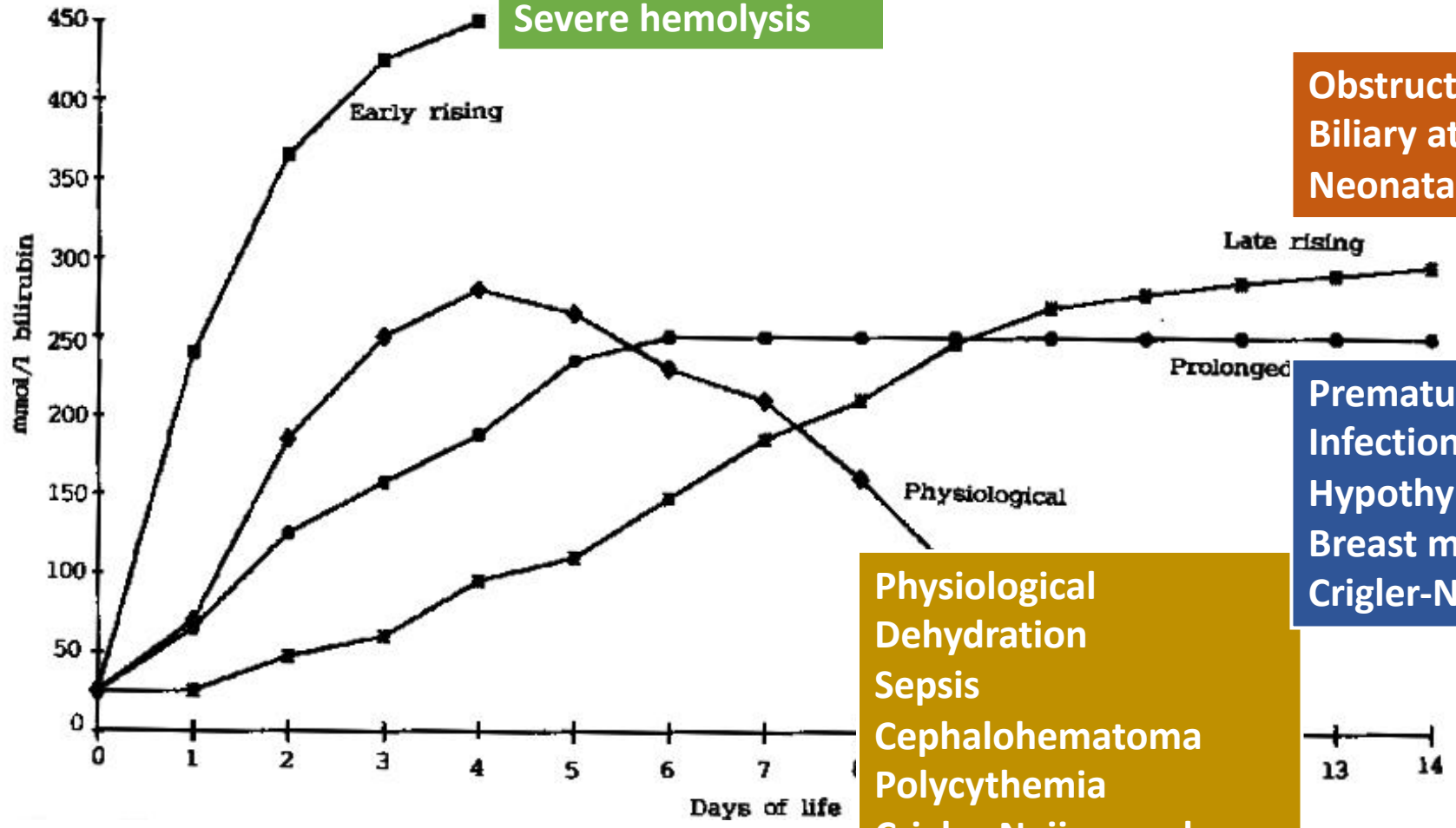
JAUNDICE

Hyperbilirubinemia

Jaundice

- *In the first 24 hours*:
  (*almost always pathologic*)
  - Erythroblastosis fetalis
  - Hemolysis
  - Sepsis
  - TORCH
- *After 24 hours*:
  - Physiologic
  - Sepsis
  - Hepatitis
  - Hemolytic anemia
  - Congenital infections
  - Inborn Errors of Metabolism (*e.g.* Galactosemia)

Patterns of neonatal jaundice



Severe hemolysis

Obstructive lesion
Biliary atresia
Neonatal hepatitis

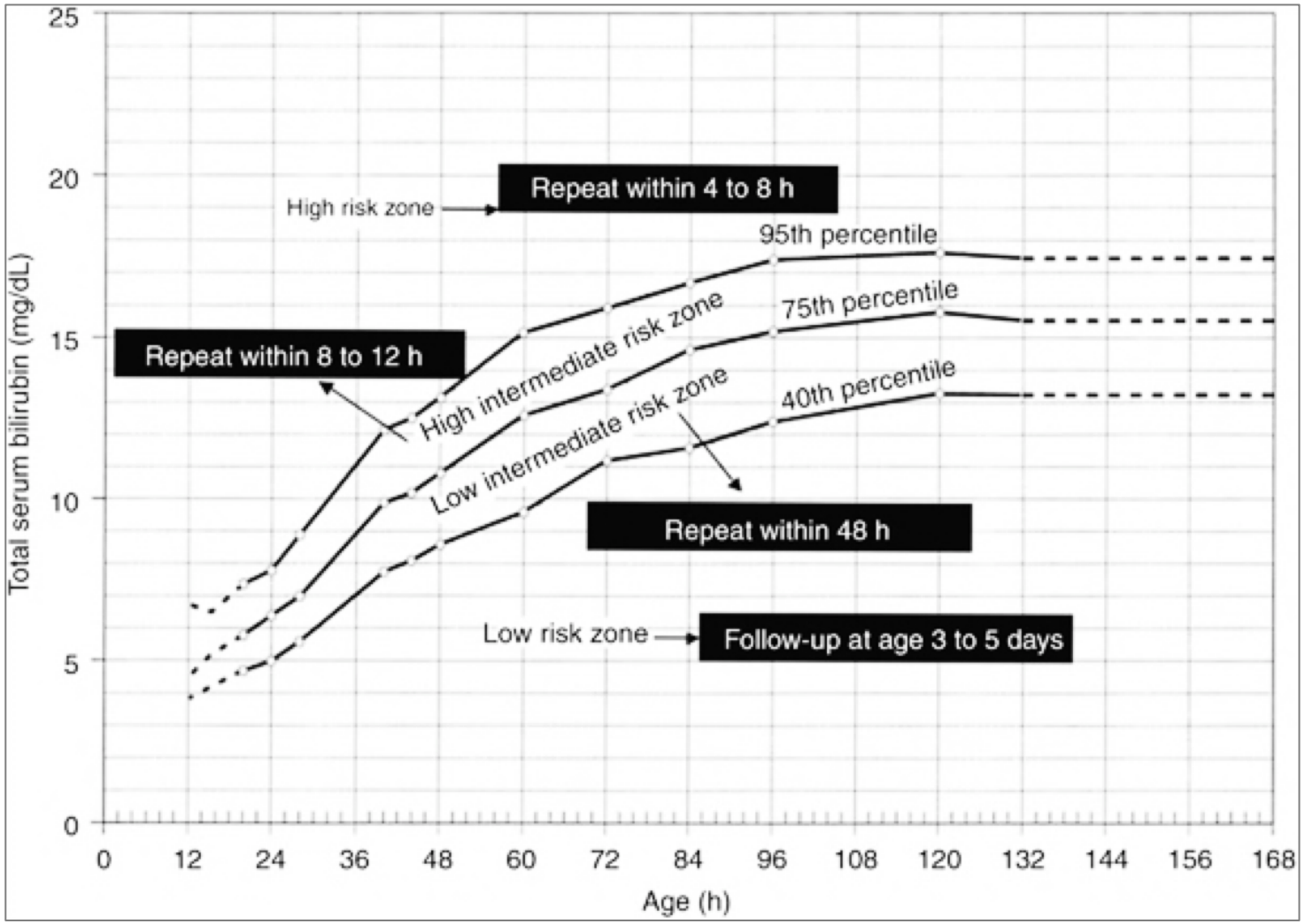
Prematurity
Infection
Hypothyroidism
Breast milk jaundice
Crigler-Najjar syndrome

Physiological
Dehydration
Sepsis
Cephalohematoma
Polycythemia
Crigler-Najjar syndrome

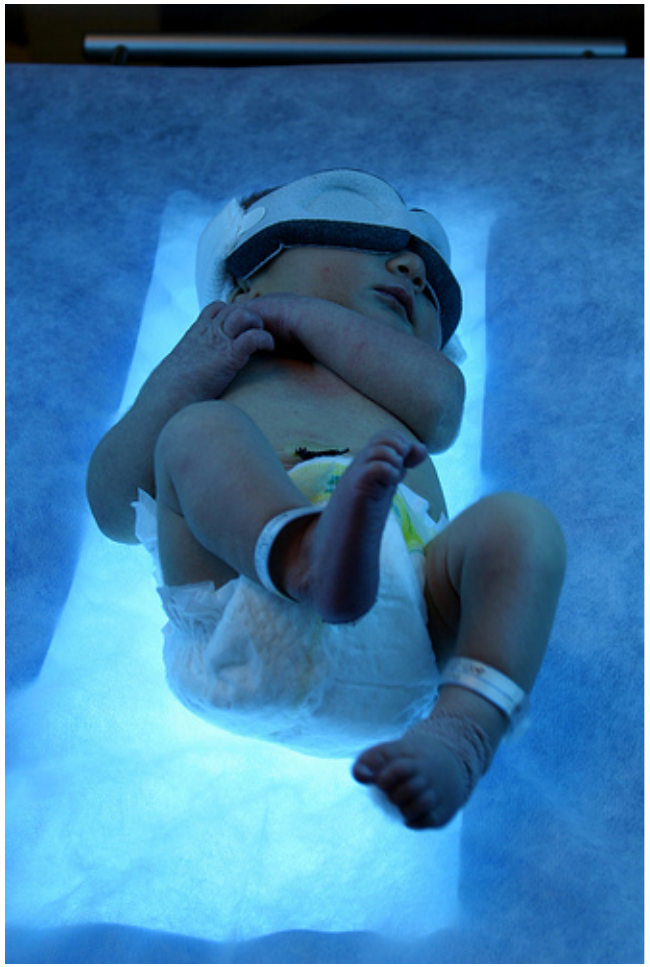
Physiological vs. Pathological

	Physiological	Pathological
Onset	2^{nd}-3^{rd} day of life	At any time
Level of Bilirubin	Usually lower	Usually higher
Type of Bilirubin	Unconjugated	Any
Rate of increase	Slow increase *(usually <85 μmol/L/24h)*	May be faster *(usually >85 μmol/L/24h)*
Duration	Shorter *(7-10 days in the term &* *14 days in the Preterm)*	May be longer
Physical Exam and Lab. tests	Normal, healthy infant	Abnormal

Management


25
20
15
10
5
0
Total serum bilirubin (mg/dL)
0
12
24
36
48
60
72
84
96
108
120
132
144
156
168
Age (h)
High risk zone
Repeat within 4 to 8 h
95th percentile
High intermediate risk zone
75th percentile
Repeat within 8 to 12 h
Low intermediate risk zone
40th percentile
Repeat within 48 h
Low risk zone
Follow-up at age 3 to 5 days

Phototherapy



Breast MILK Jaundice

- Unconjugated hyperbilirubineamia beyond 2nd week of life
  - Disappears within 2 days of breast feeding discontinuation
  - May take up to 3 months to resolve completely
  - Due to (?) a substance in human milk that inhibits the activity of glucoronyl transferase

Treatment

- Reassurance after exclusion of other pathologies
- Stoppage of breast feeding is NOT recommended

Breast FEEDING Jaundice

- May be related to decreased amount of milk consumed by the infant (breast-feeding failure)
- More effective nursing may prevent early “starvation” in breastfed newborns and reduce the incidence of this type of jaundice

Intrauterine growth restriction (IUGR)

IUGR vs. SGA

IUGR vs. SGA

IUGR

Failure of normal fetal growth caused by multiple adverse effects

SGA

When infant birth-weight is:

- <10th percentile for gestational age ***or***
- >2 standard deviations below the mean for gestational age

Why IUGR matters

- Increased risk of perinatal complications
  - Perinatal asphyxia
  - Cold stress
  - Hyper-viscosity (due to polycythemia)
  - Hypoglycemia

Outcomes of IUGR infants

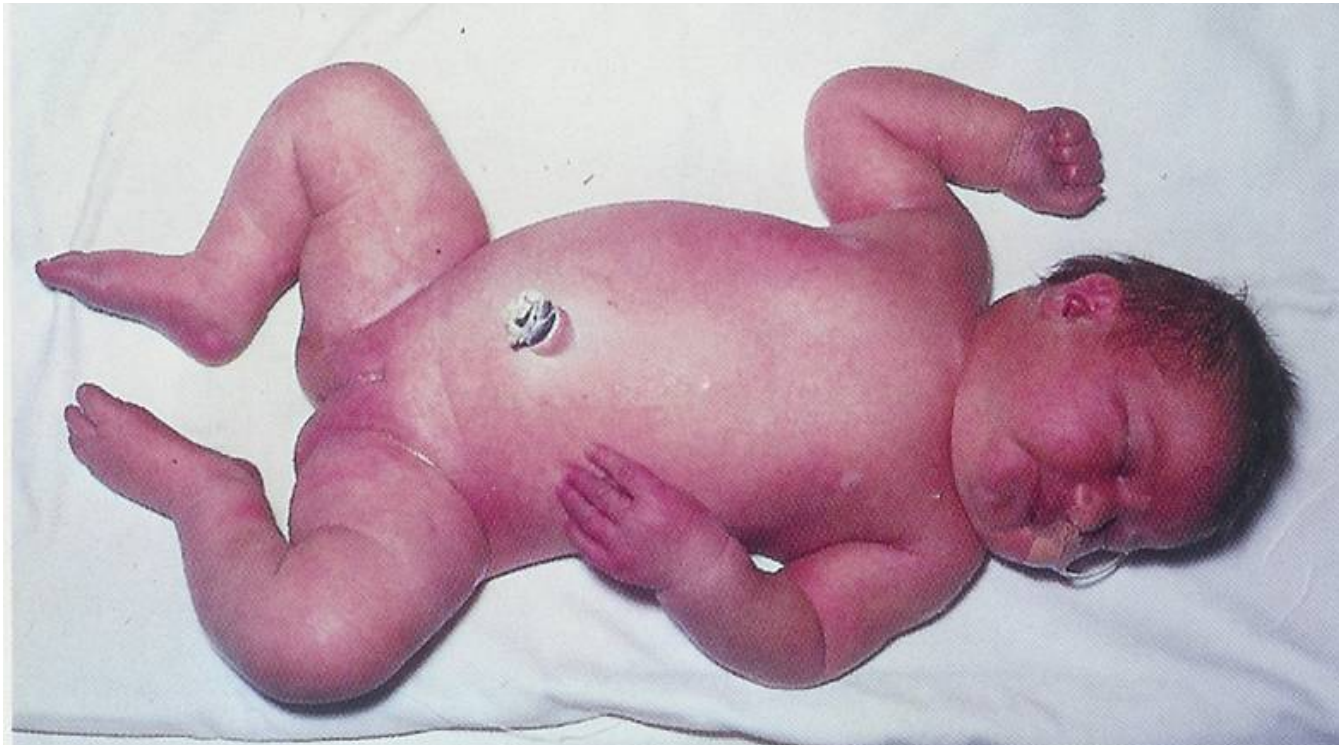
- Depends on:
  - The ***cause*** (the most important determinant of outcome)
  - The ***time*** detected
  - The presence of ***fetal compromise***
- Infants with chromosomal disorders or congenital infections (*e.g.* CMV) experience early IUGR, and commonly have a disability

Macrosomia

Infant of diabetic mother (IDM)

Macrosomia

- Defined as:
  - Birthweight > 90th percentile for gestational age ***or***
  - Greater than 4,000 g
- More in IDMs (15% - 45%) vs. normal infants (8% to 14%)

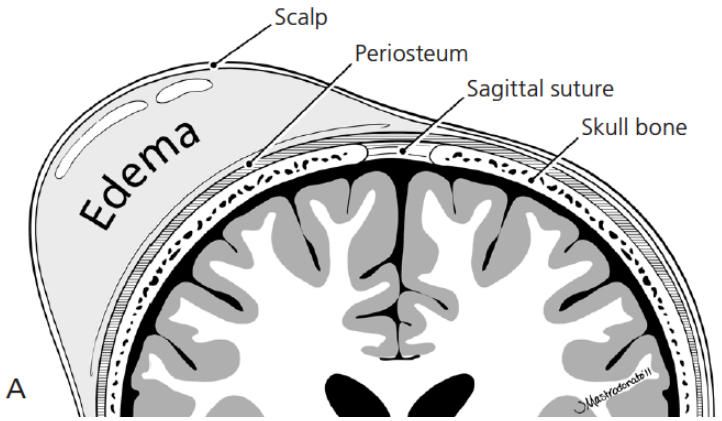


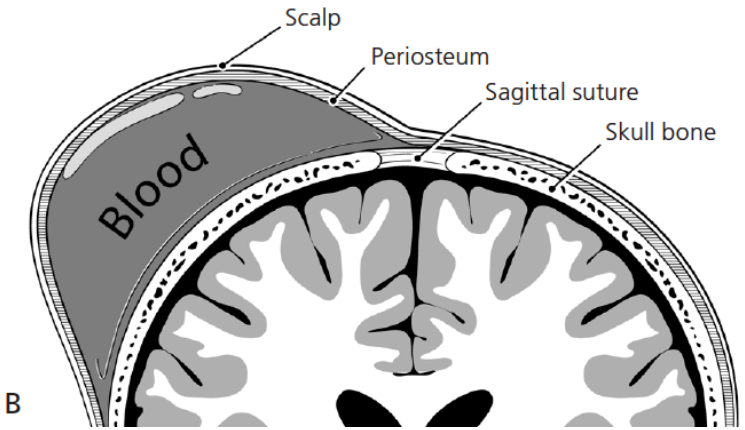
Macrosomia

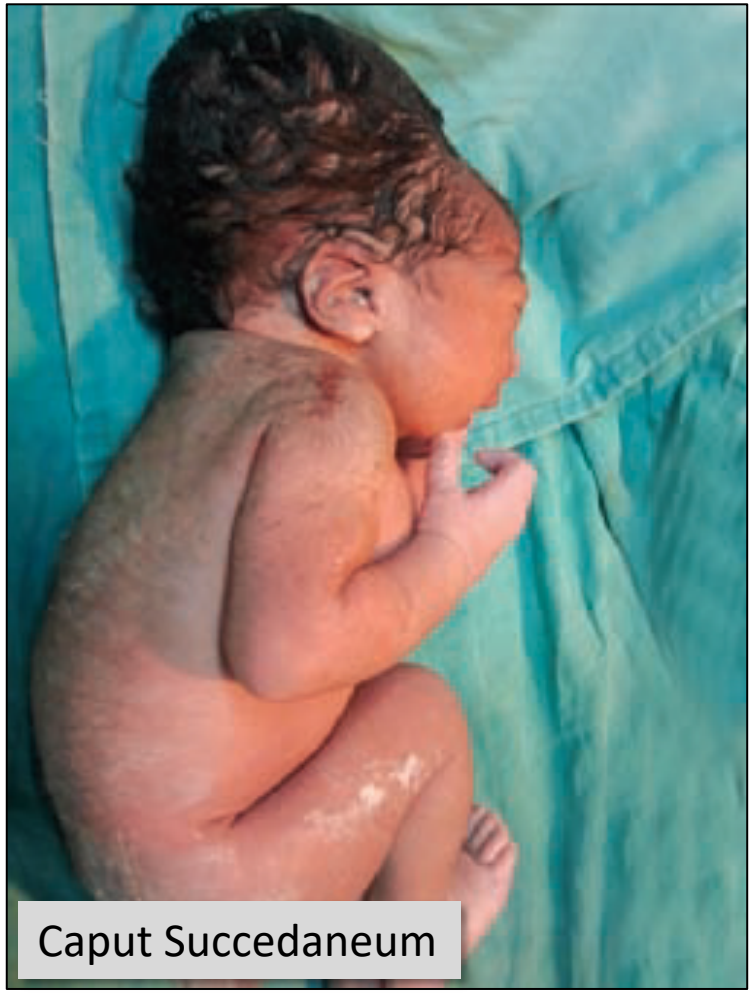
- Fetal hyperglycemia and hyperinsulinemia affect primarily insulin sensitive tissues such as fat
- The risk of macrosomia is similar for all classes of diabetes (type 1, type 2, and gestational)
- Glycemic control in the 2nd and 3rd trimesters may reduce the macrosomia rate to near baseline
- Macrosomia is a risk factor for intrapartum injury (shoulder dystocia and asphyxia) and for cesarean delivery

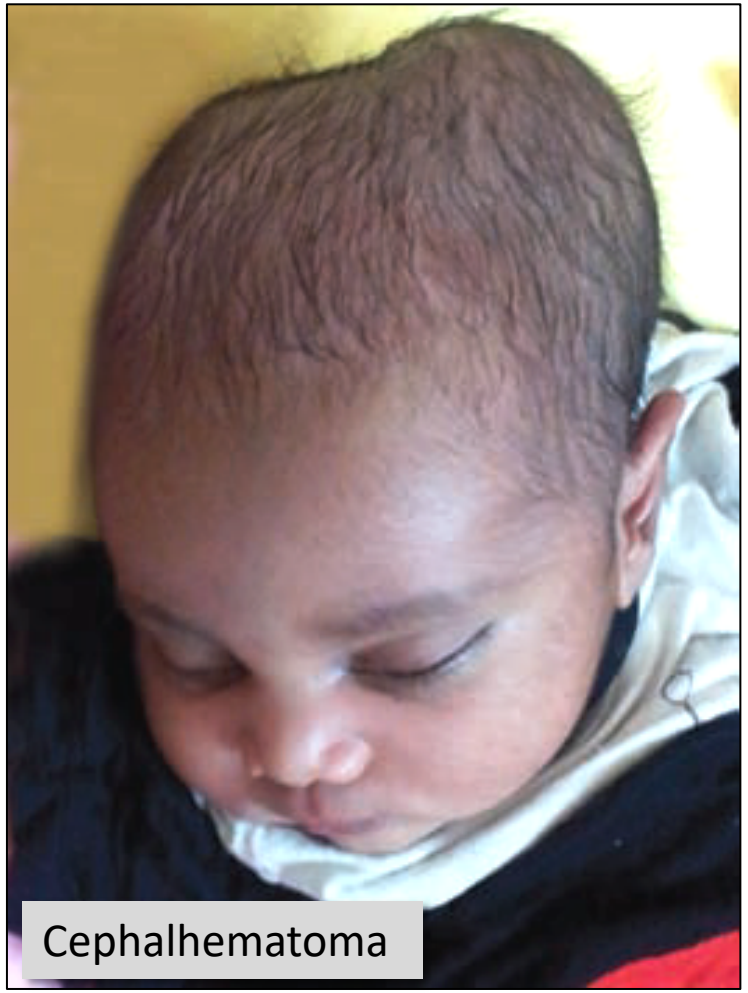
Birth injuries

Birth trauma

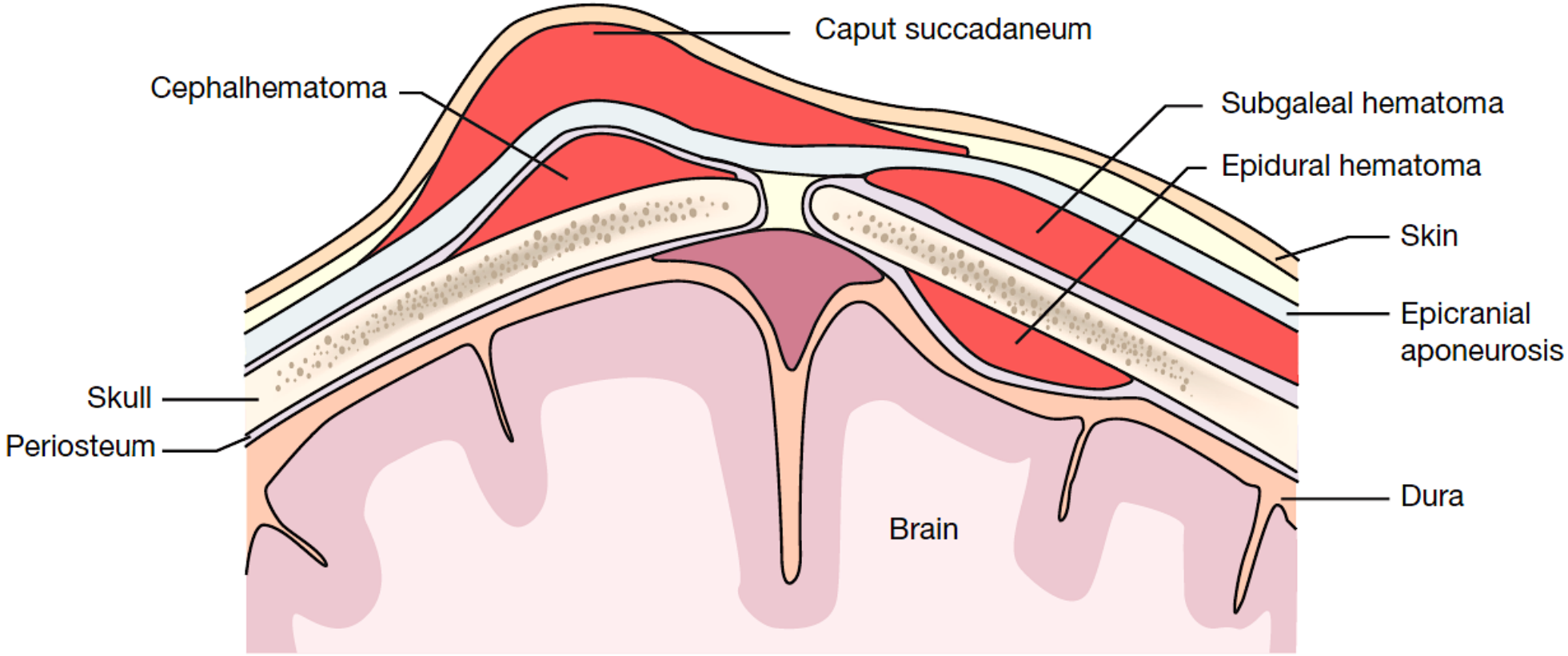





Caput Succedaneum

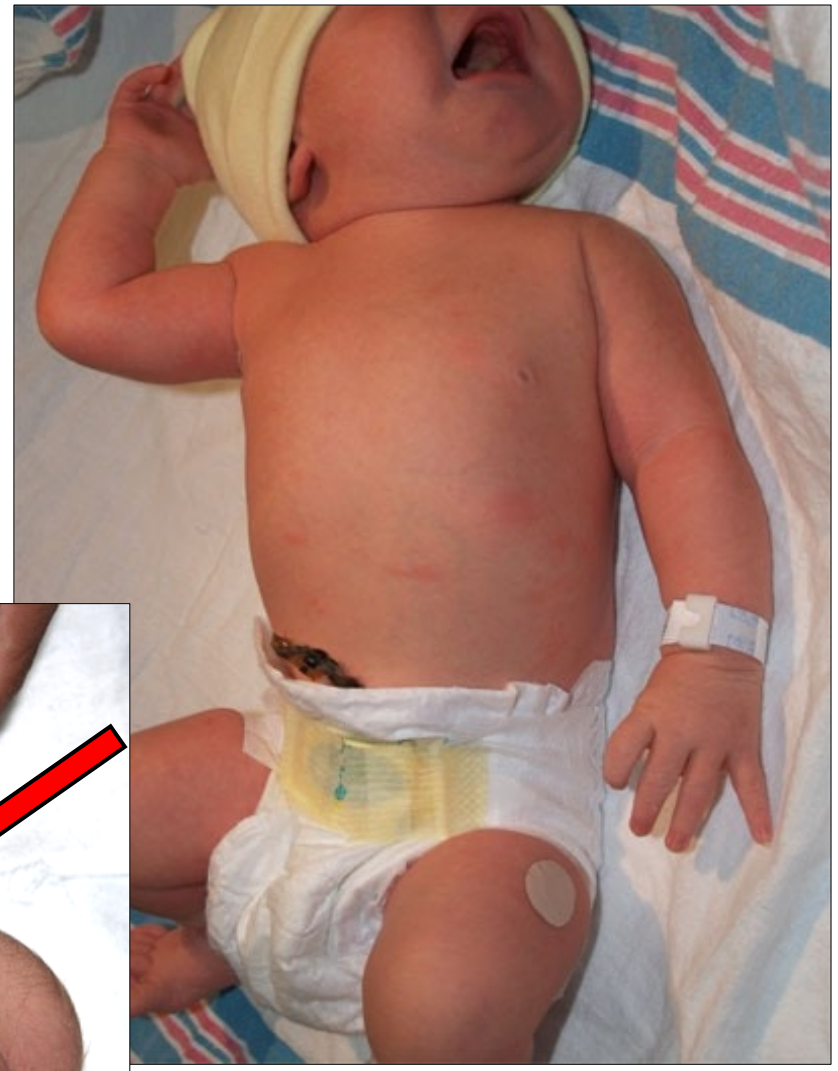

Cephalhematoma

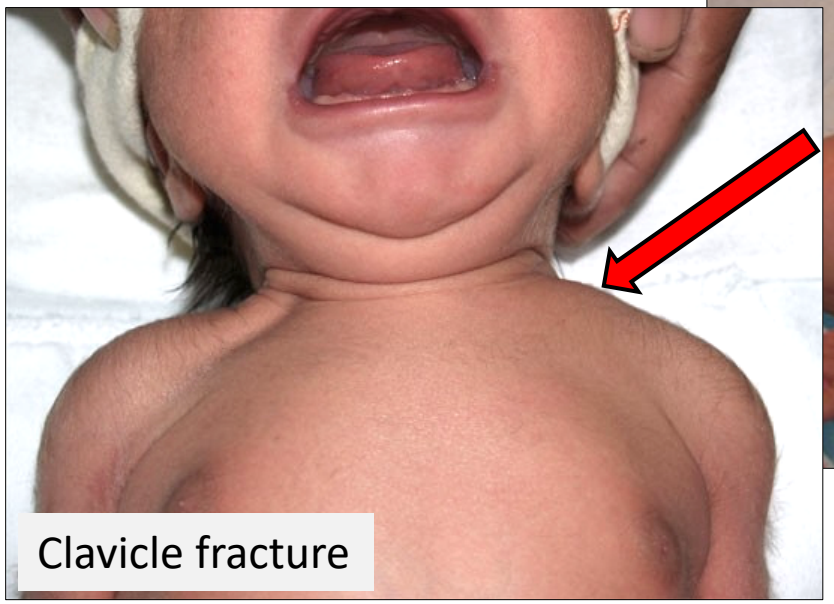
Other Scalp Hemorrhages



Erb's Palsy

- C5-C6 Injury
- ***Paralysis*** of deltoid, supraspinitus, biceps and teres major.
- ***Loss of sensation*** over deltoid, lateral forearm and hand.
- ***Porter's Tip Position:*** Adduction and internal rotation of the arm and extension of elbow joint.





Clavicle fracture

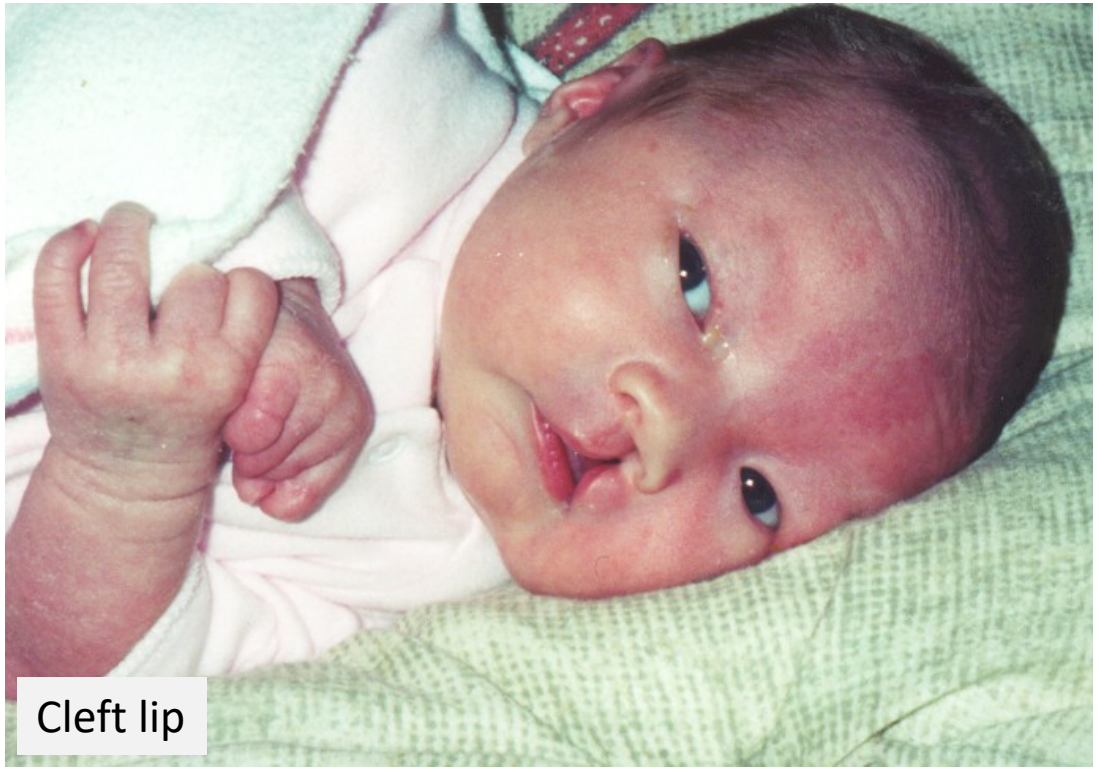
Congenital Anomalies

Malformations, deformations and disruptions

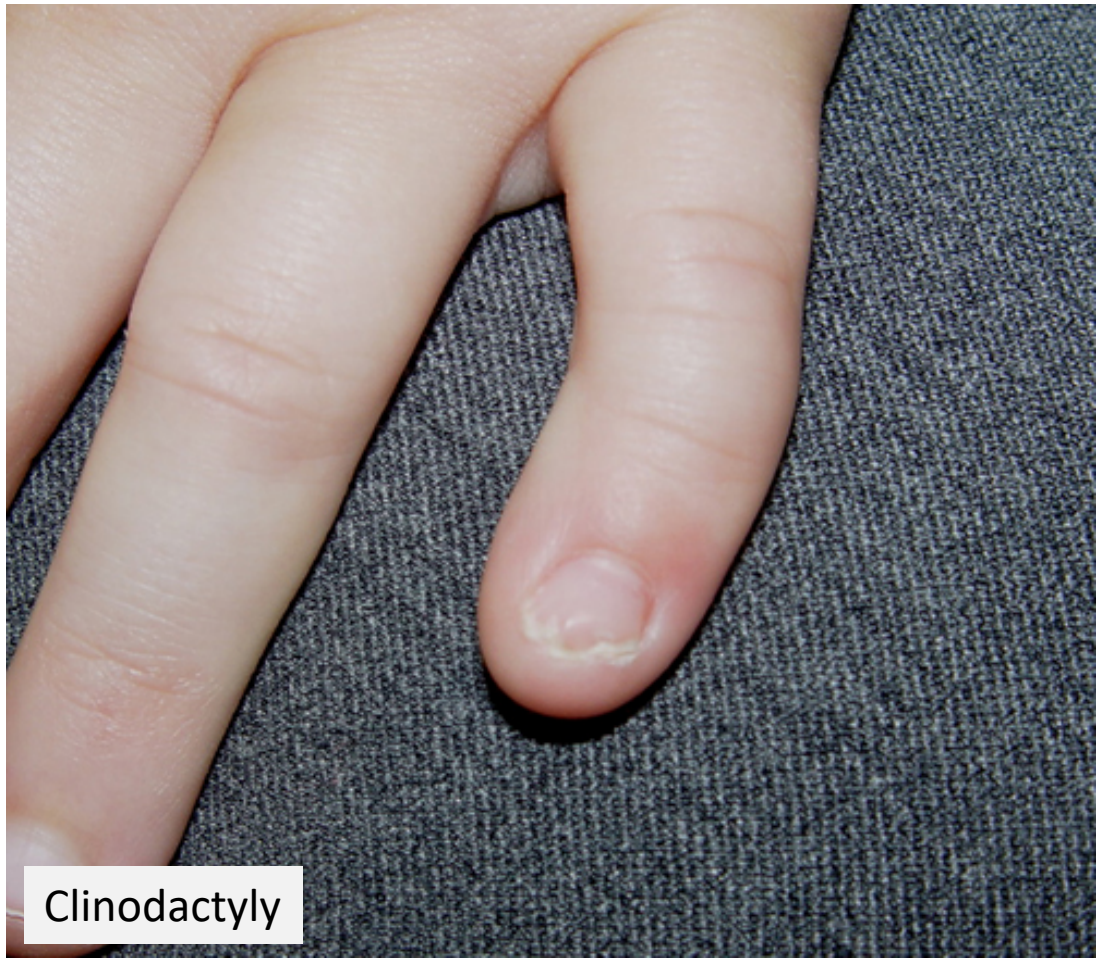
Congenital Anomalies

- "Congenital"__ the defect is present at birth
- *Major* (2% to 3% of live born infants)
    - Medical and social consequences (*e.g.* cleft palate and neural tube defects)
- *Minor* (Up to 15%)
    - No significant health or social burden (*e.g.* a single palmar crease)
- *Normal phenotypic variants*
    - Physical differences occurring in 4% or more of a general population

Major vs. minor



Cleft lip



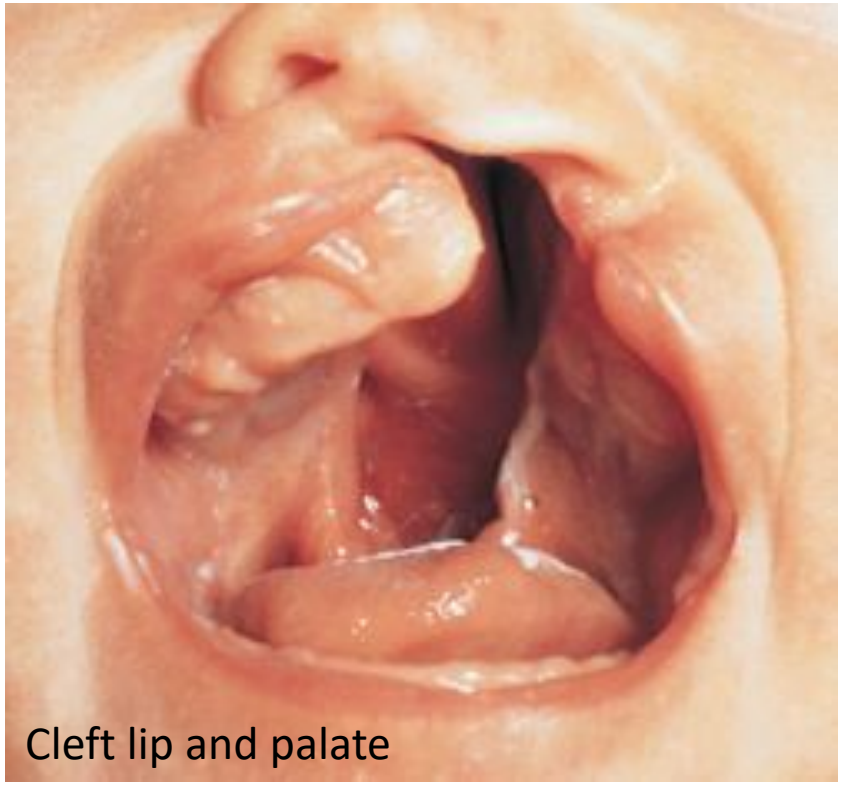
Clinodactyly

Normal variant


Simian crease

Malformations

- Abnormal processes ***during*** the initial formation of a structure
- May result in:
  - Faulty configuration (*e.g.* TGA)
  - Incomplete formation (*e.g.* cleft palate)
  - Agenesis (*e.g.* absence of radius)

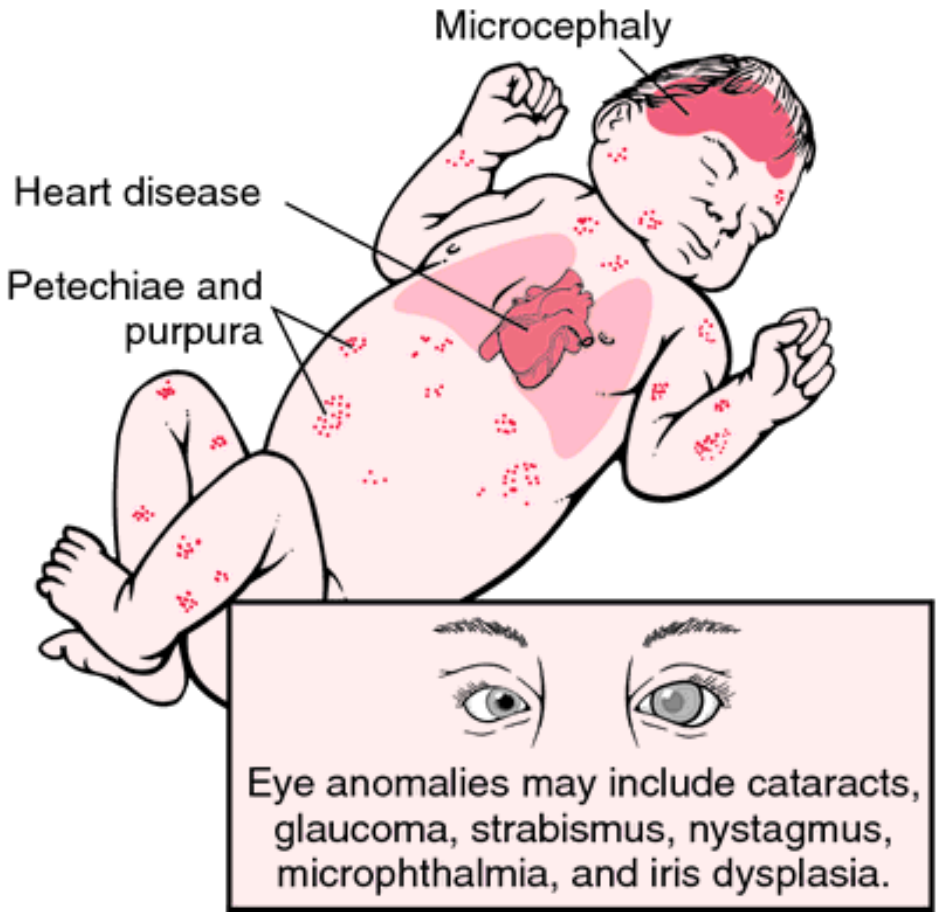


Cleft lip and palate

Malformations

Causes

- Genetic - chromosomal (10%), ***or***
  - single gene (4%)
- Environmental insults (teratogens)
  - Drugs – thalidomide
  - Congenitally acquired viruses – Rubella
- Multifactorial (25%)
- Unknown (40%-45%)



Disruptions

- Breakdown of normal tissue ***after*** formation

Causes

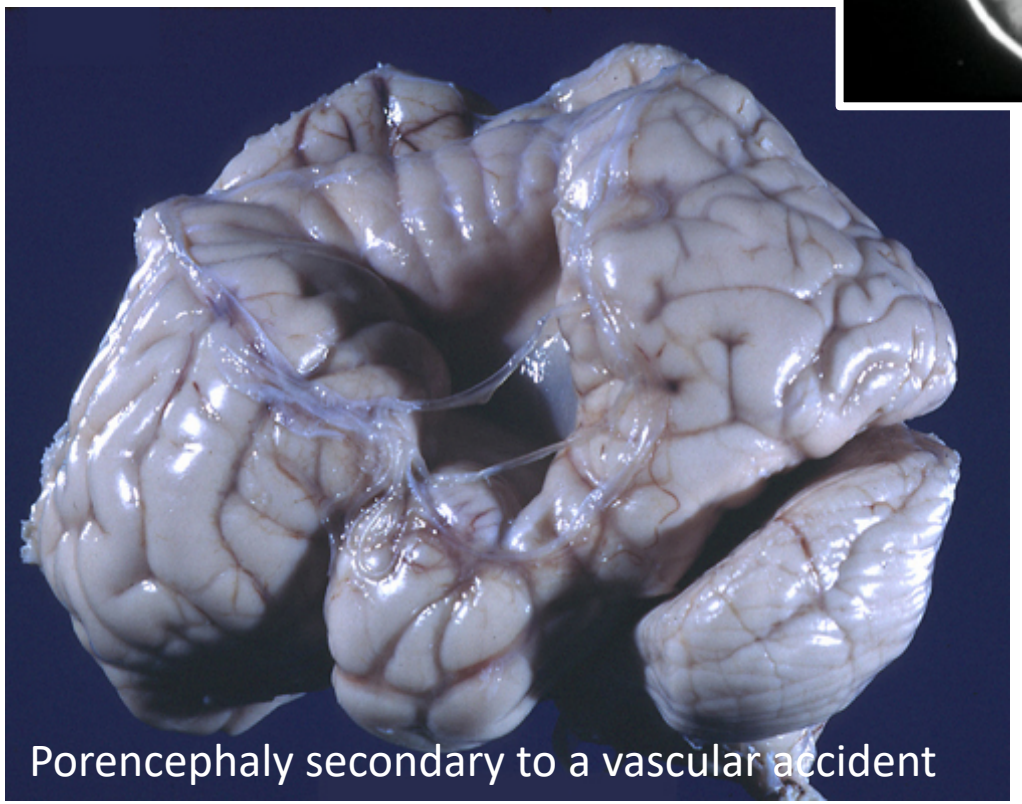
- Mechanical compressive forces, hemorrhage, thrombosis, and other vascular impairments

Manifestations

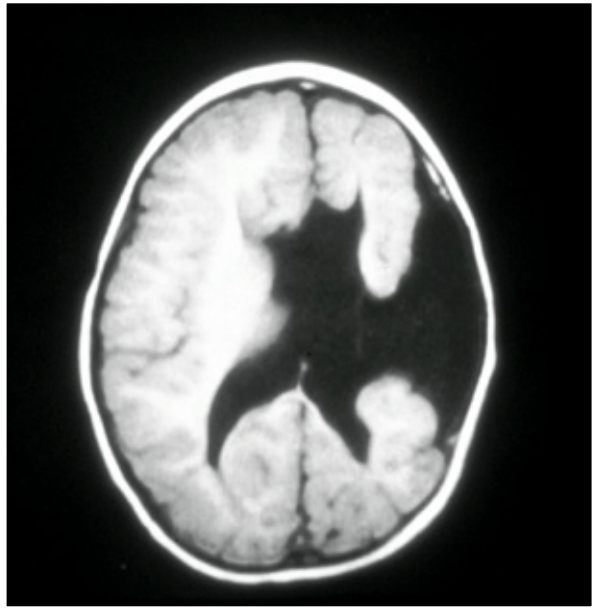
- Alterations of configuration, division of parts not usually divided, fusion of parts not usually fused, and the loss of previously present parts

Disruptions

Limb amputations caused by *amniotic bands*

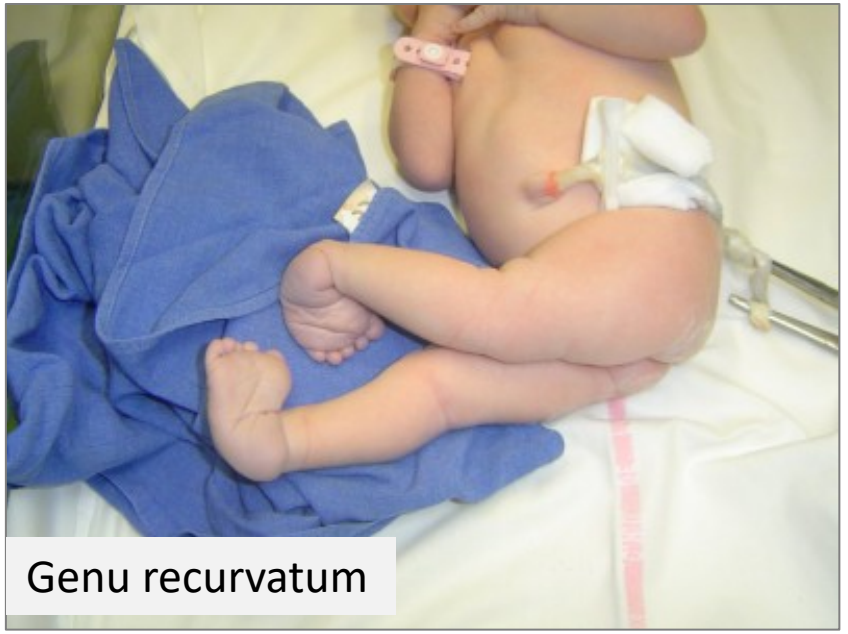


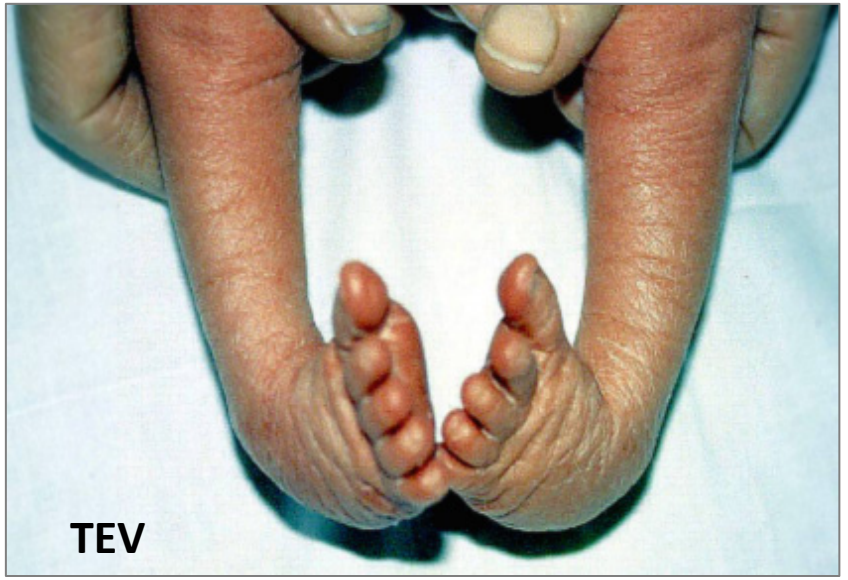
Porencephaly secondary to a vascular accident



Deformations

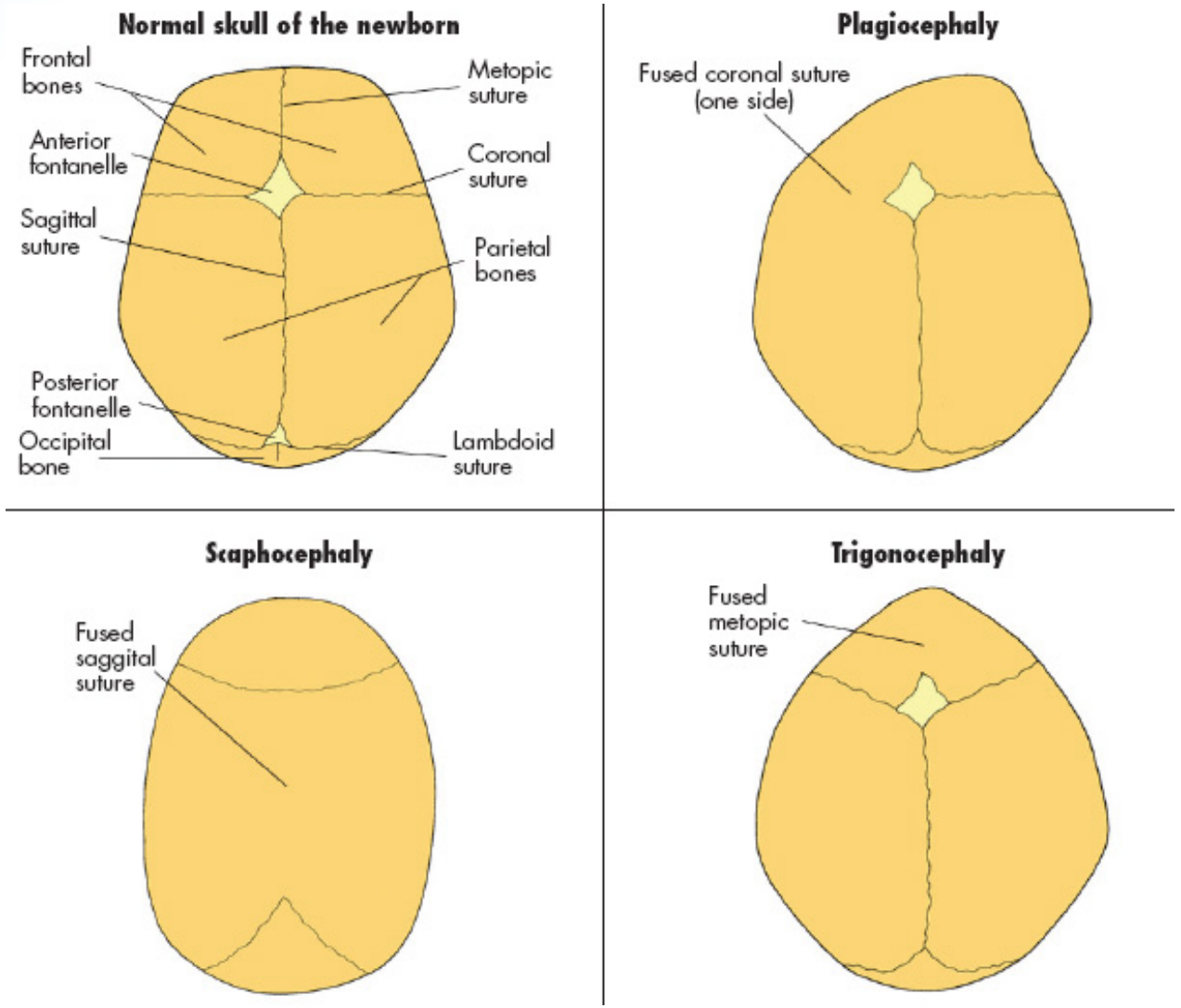
- Unusual and ***prolonged mechanical forces*** acting on normal tissue
- External (uterine constraint) vs. intrinsic (edema)
- Mostly Musculoskeletal tissues
  - Tibial bowing and hip dislocation associated with breech presentation
  - Webbing of the neck upon the involution of a giant cystic hygroma)


Genu recurvatum



Deformations

- Typically, deformations improve postnatally
- Their resolution depends on the duration of the abnormal forces and the extent of subsequent growth



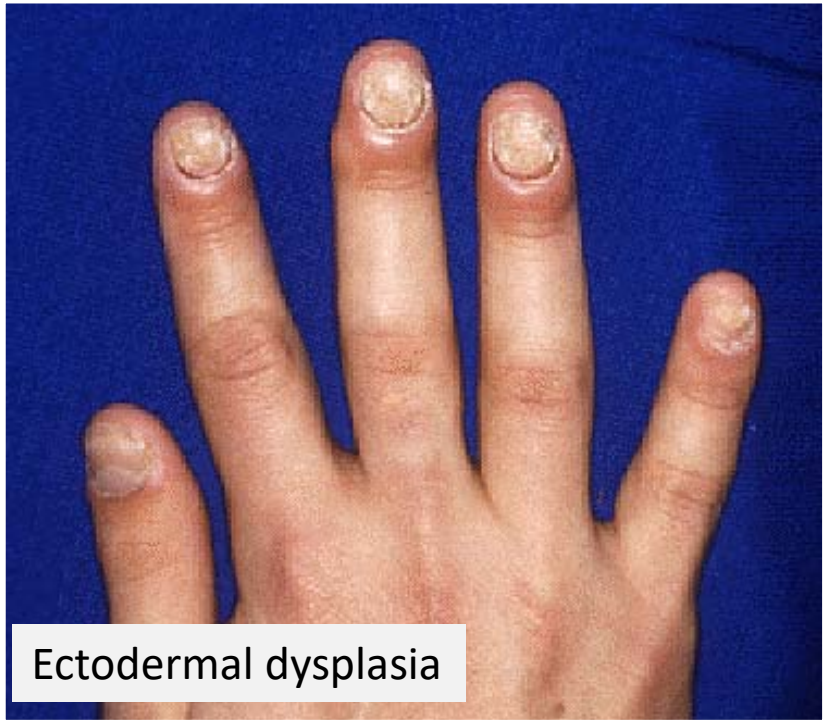
Cranio-stenosis resulting from in-utero constraint

Dysplasia

- Abnormal cellular organization or function
- Typically, affects a single tissue type

Examples

- Ectodermal dysplasia, Skeletal dysplasia and hamartoma



Ectodermal dysplasia

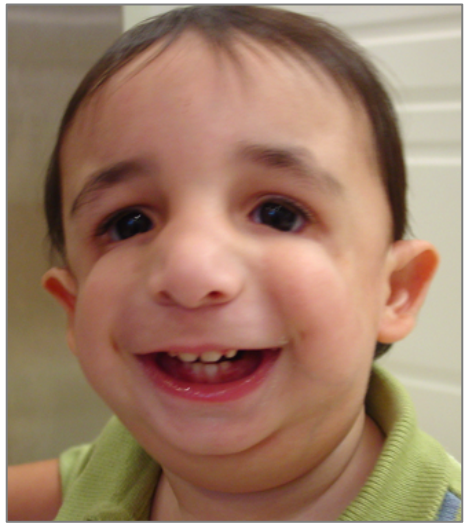
Multiple Anomalies!

Syndrome

Multiple defects that are **NOT** explained on the basis of a single initiating defect, but share a cause (*e.g.* chromosome or single gene disorders, or environmental teratogens)

Examples:

- Trisomies
- Tracher collins

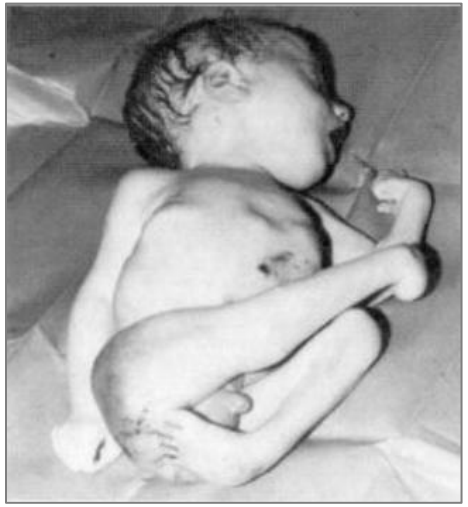


Sequence

All of the anomalies can be explained on the basis of a single problem

Examples

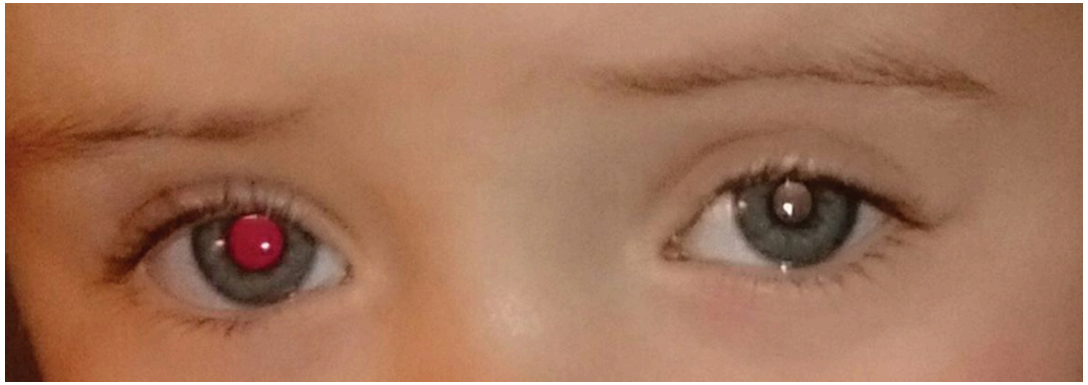
- Pierre Robin sequence
- Oligohydramnios

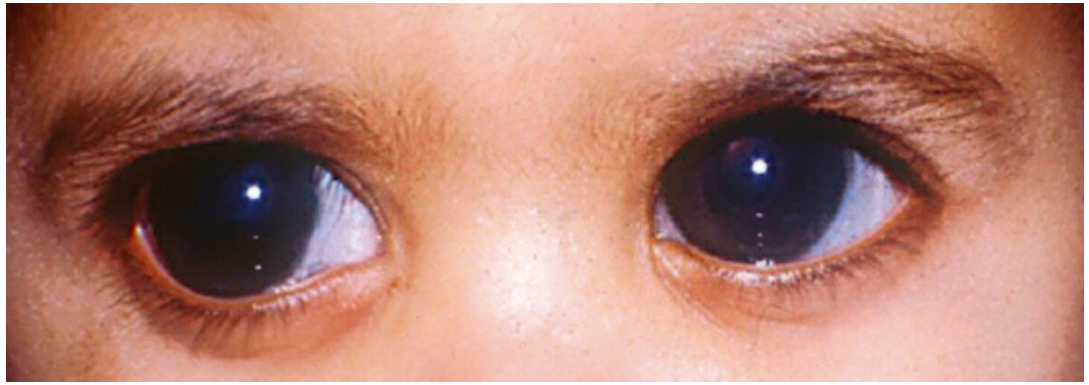


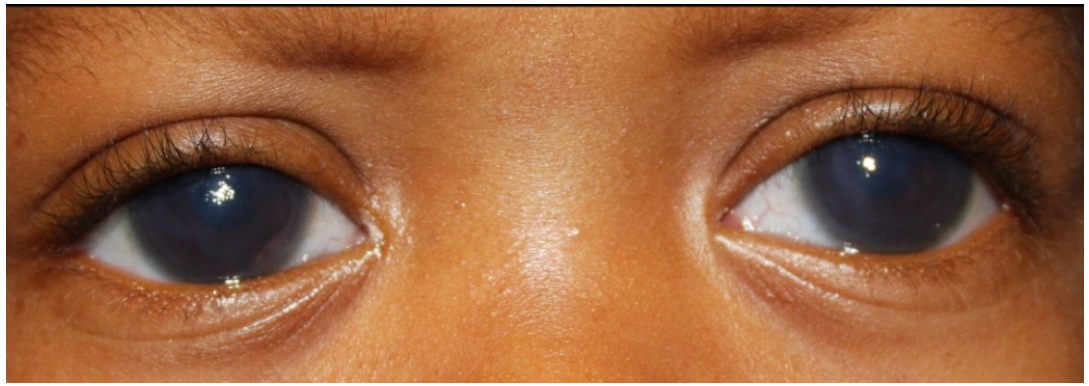
Common encounters!

Head to Toe

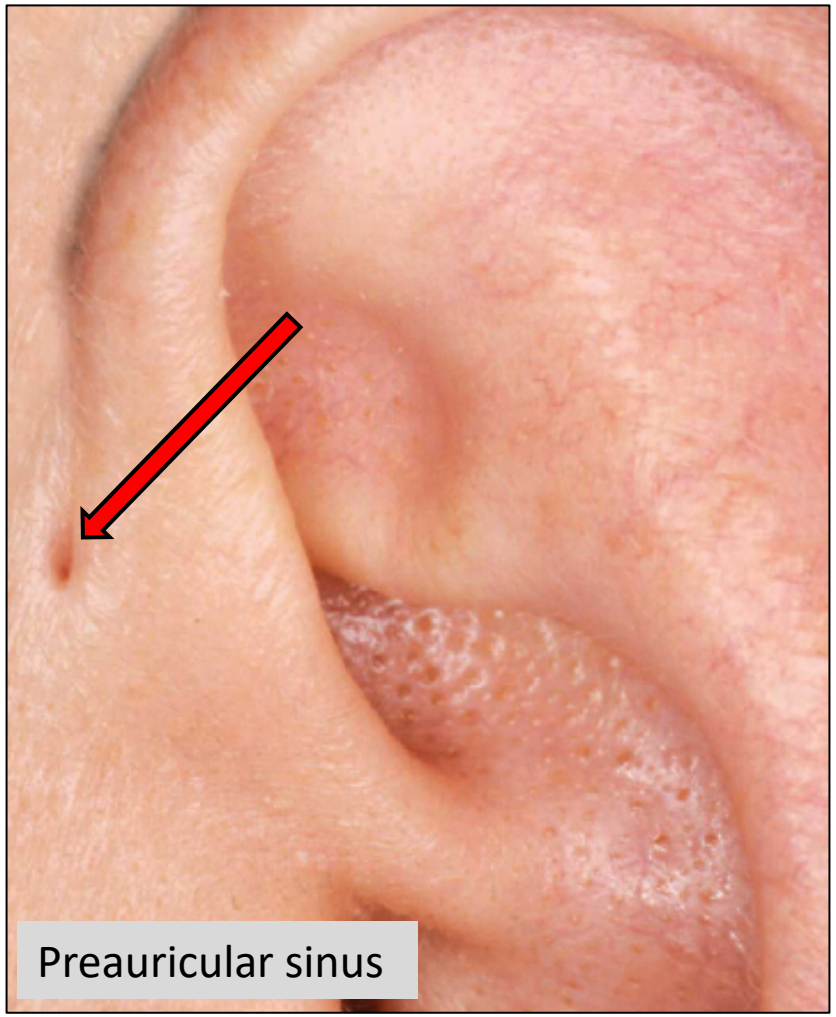
The eyes

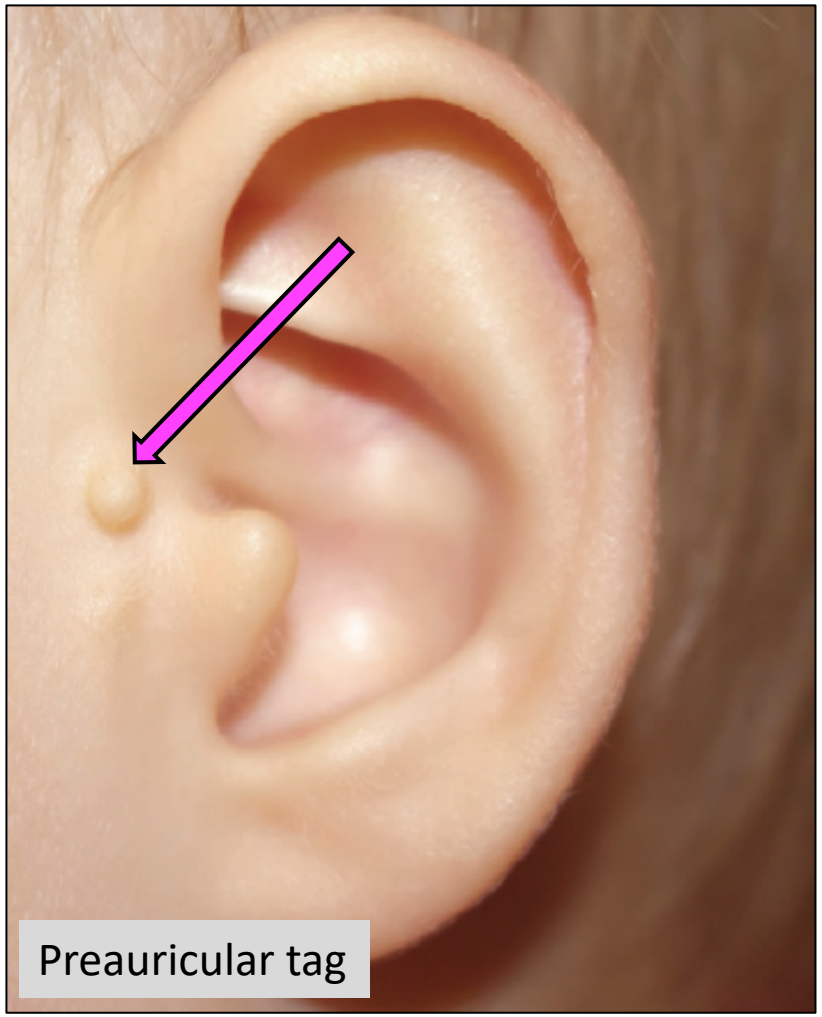


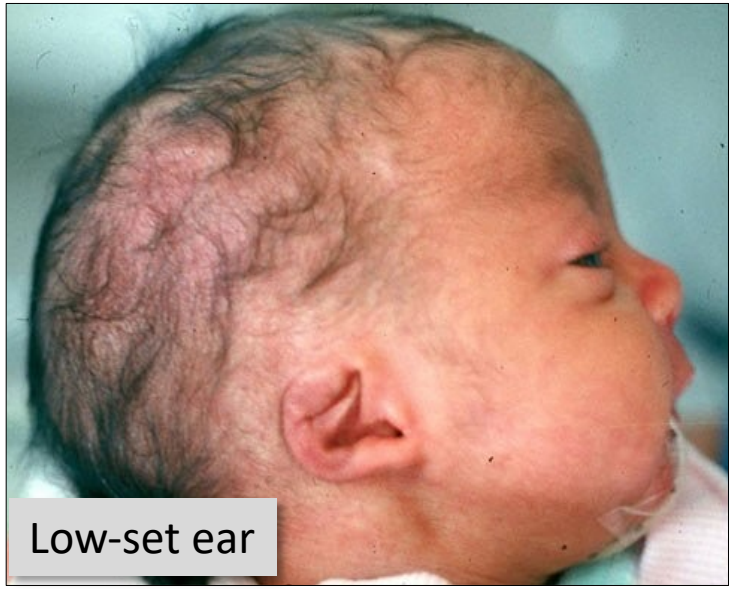




The ears

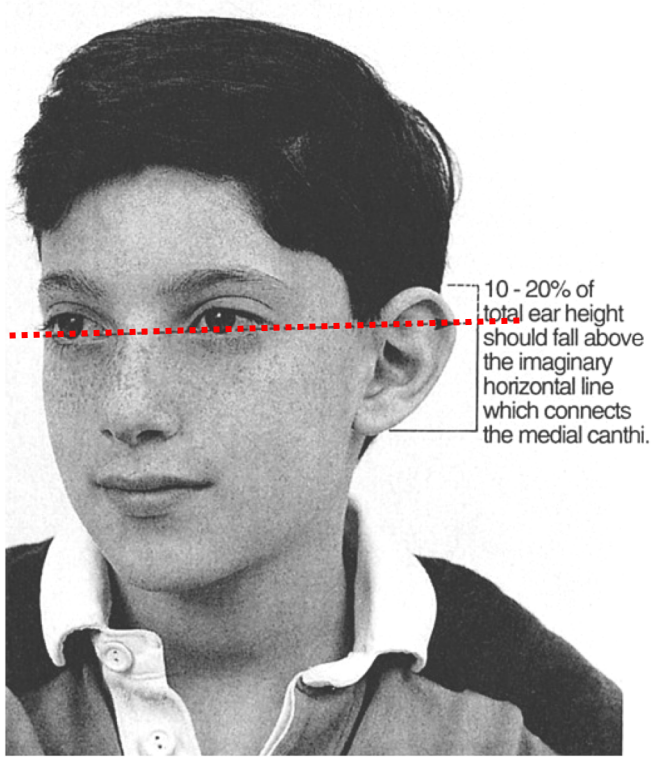

Preauricular sinus


Preauricular tag

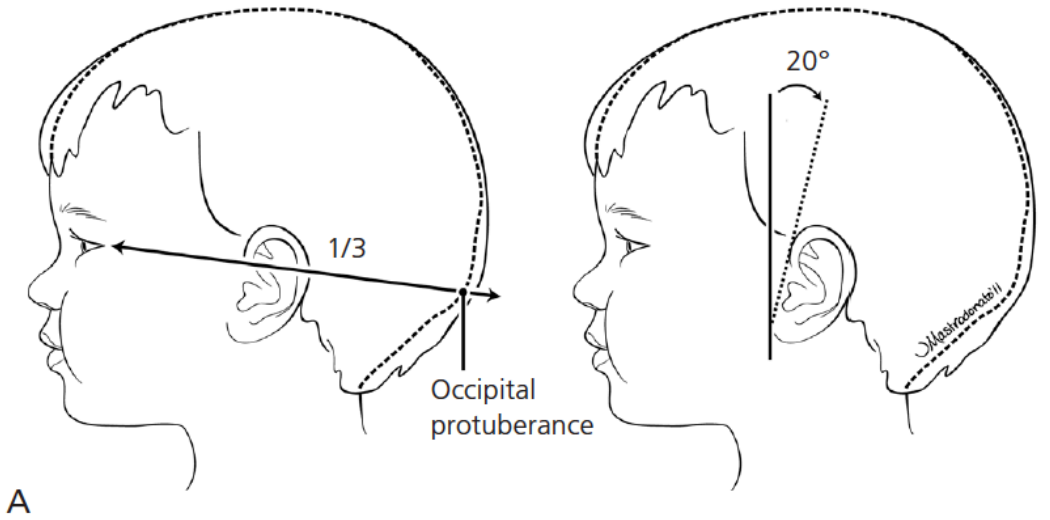

Low-set ear


Microtia

The ears

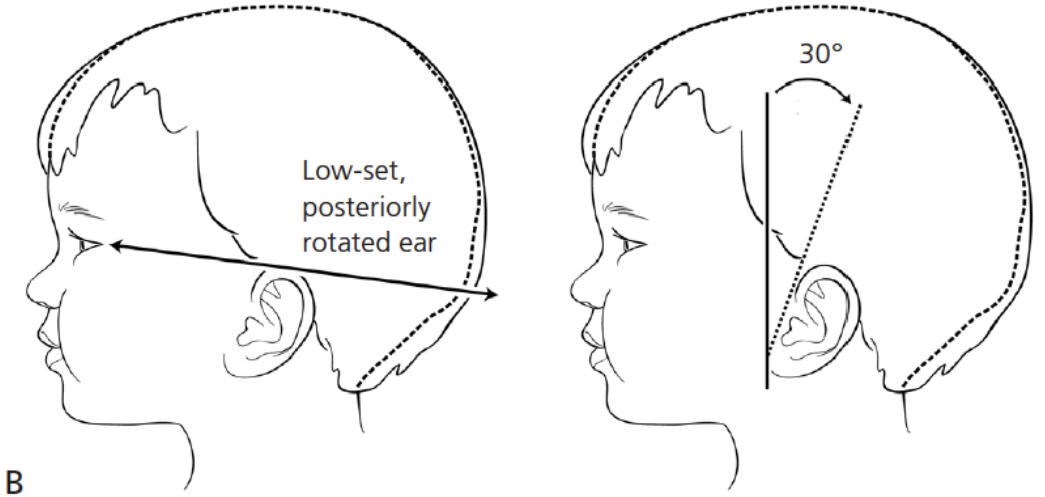


Normal ear



A

Low-set, posteriorly rotated



B

The nose

Shape and size

Race and family determined

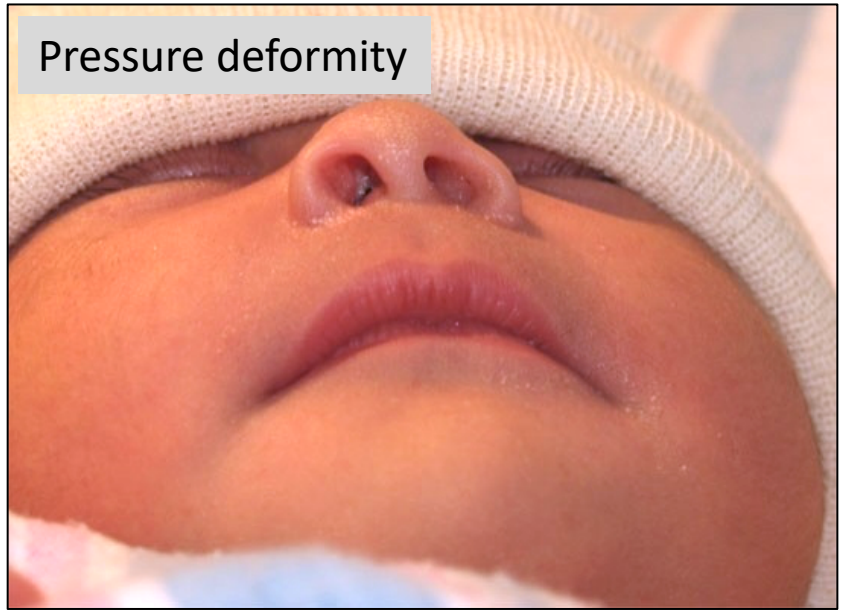
Patency

Infant is an “obligate nasal breather”

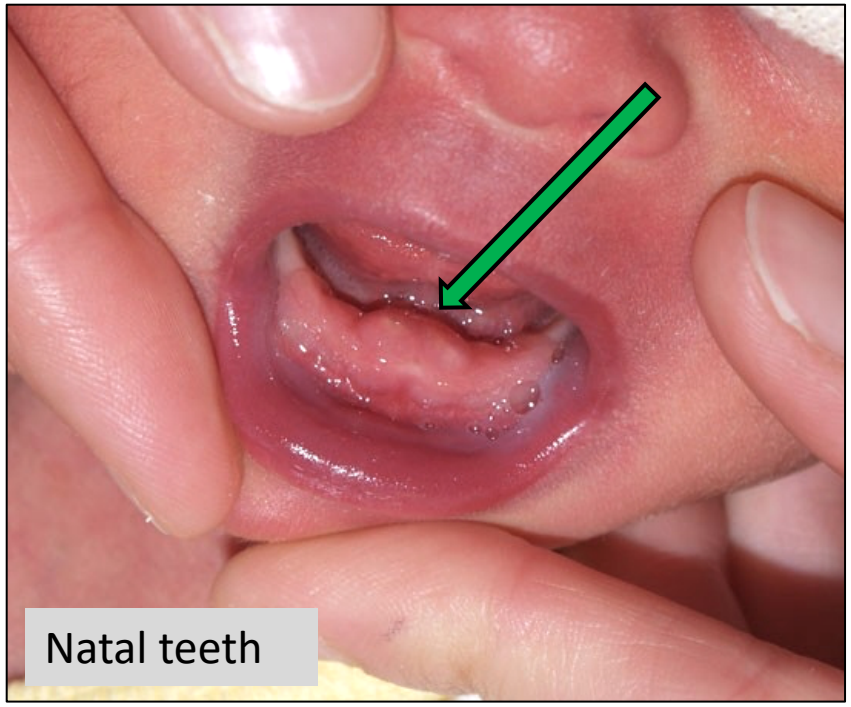
- Shut infant’s mouth to look for choanal atresia

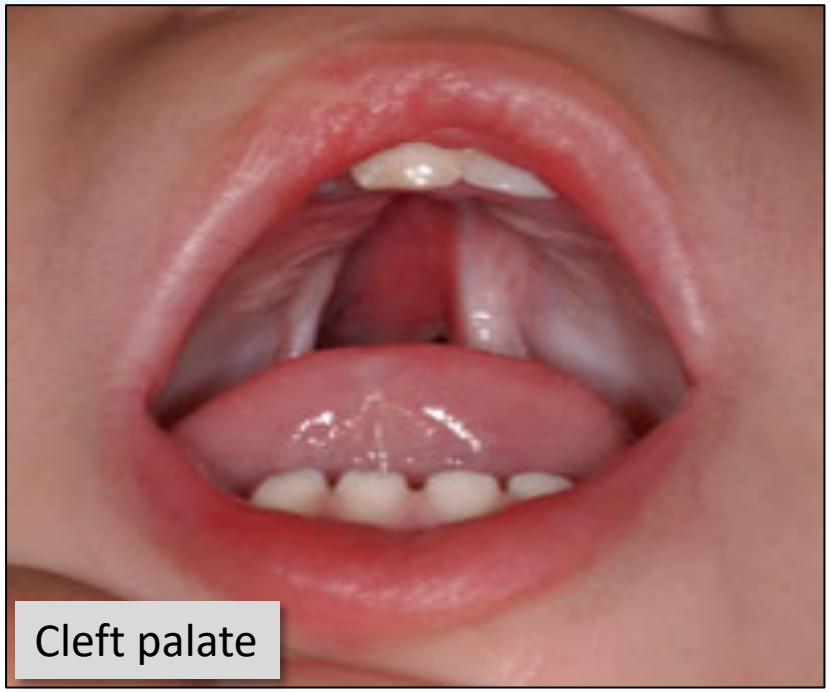
Deformities

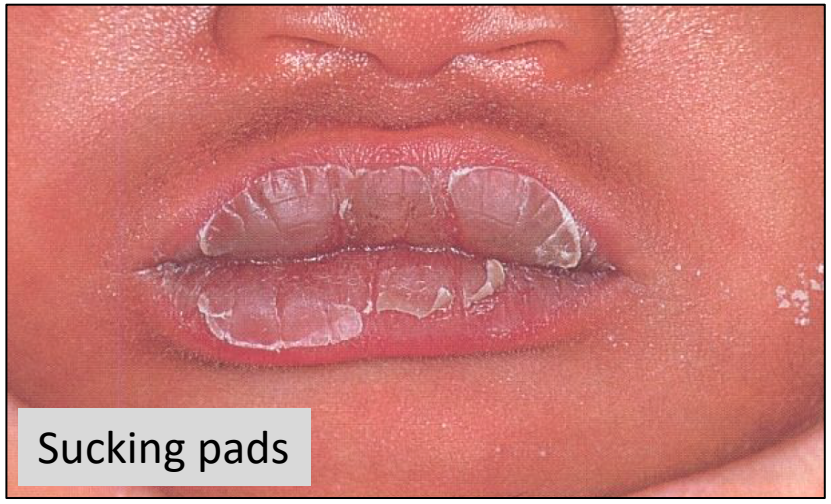
Trauma or syndromic

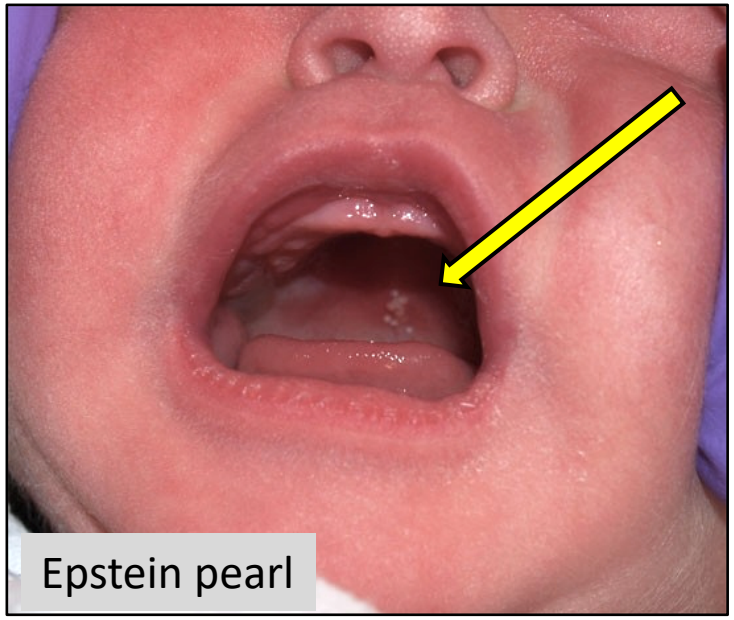


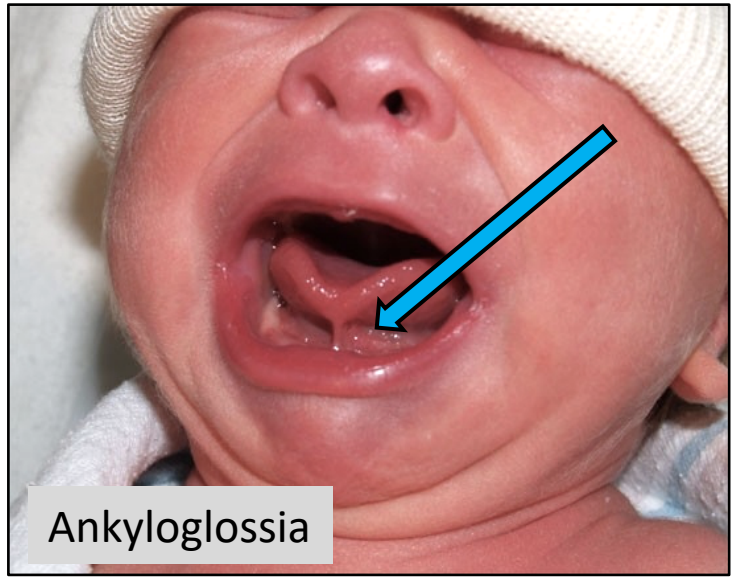
The mouth


Natal teeth


Cleft palate


Sucking pads


Epstein pearl


Ankyloglossia

The mouth

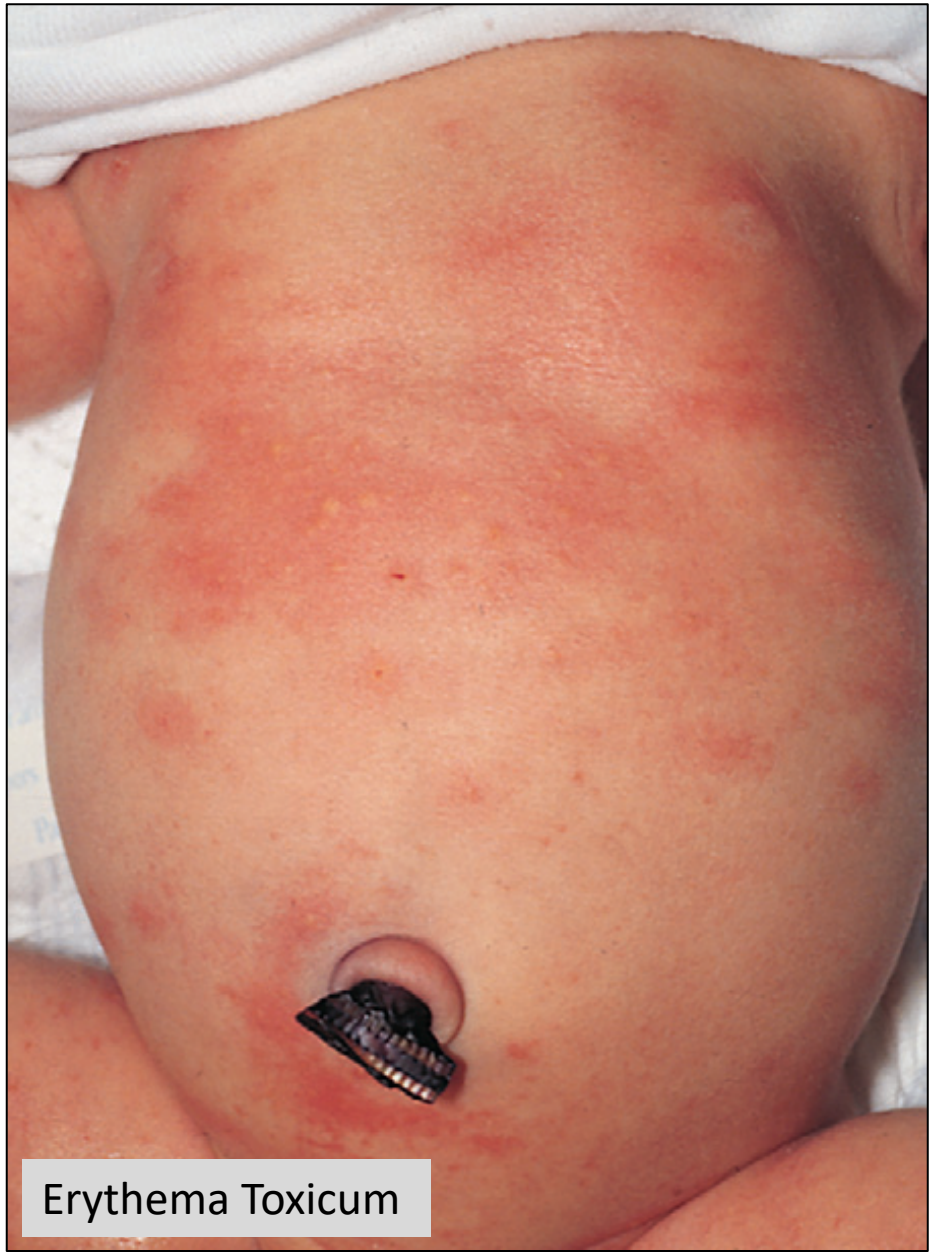
Facial nerve palsy

Skin Lesions

Erythema Toxicum

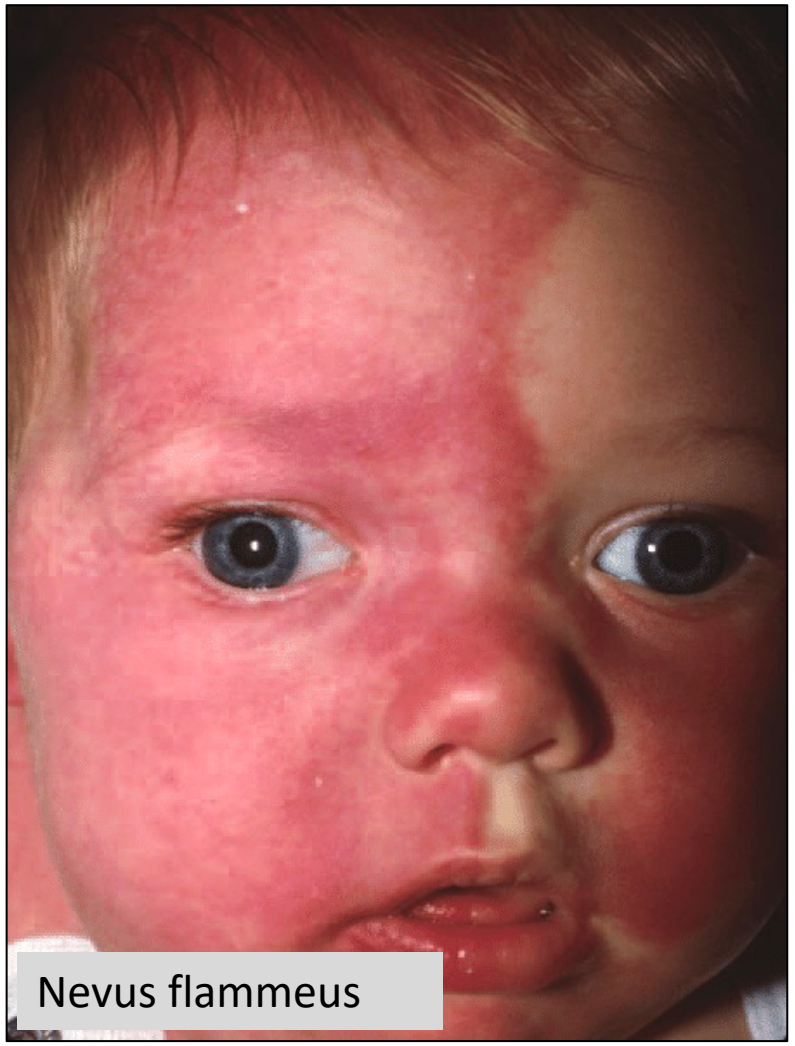
Erythematous flares with central pin point vesicles or papules.

May appear and disappear over several hours to days during the first week of life

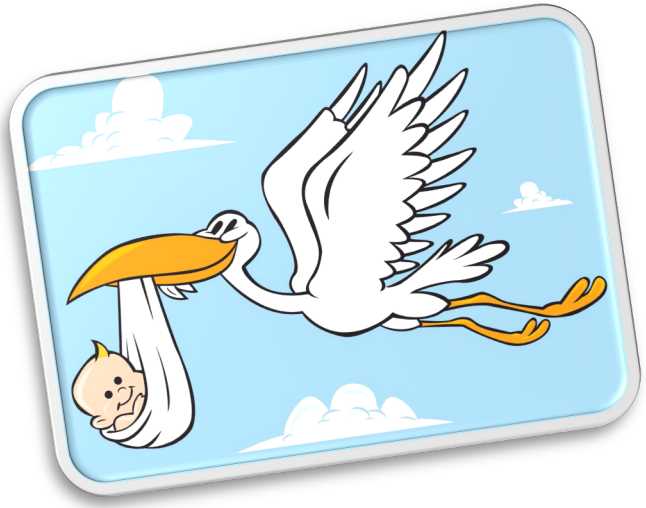


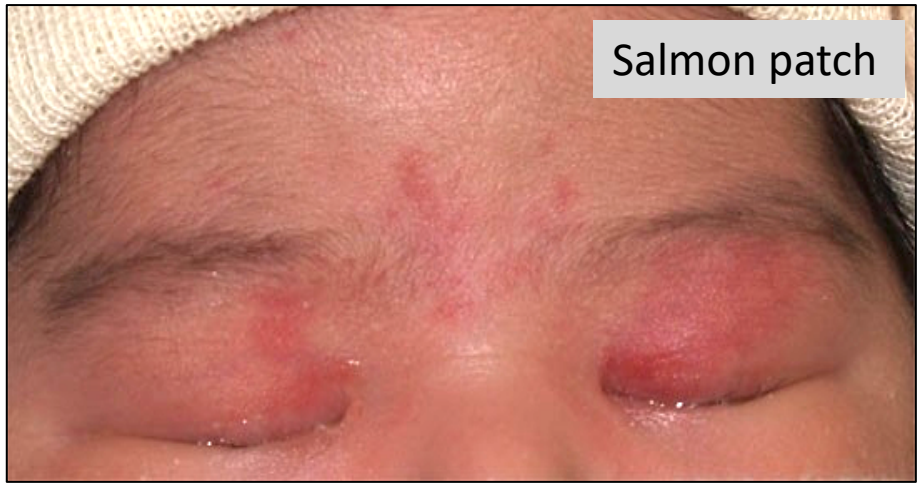
Erythema Toxicum

Hemangiomas

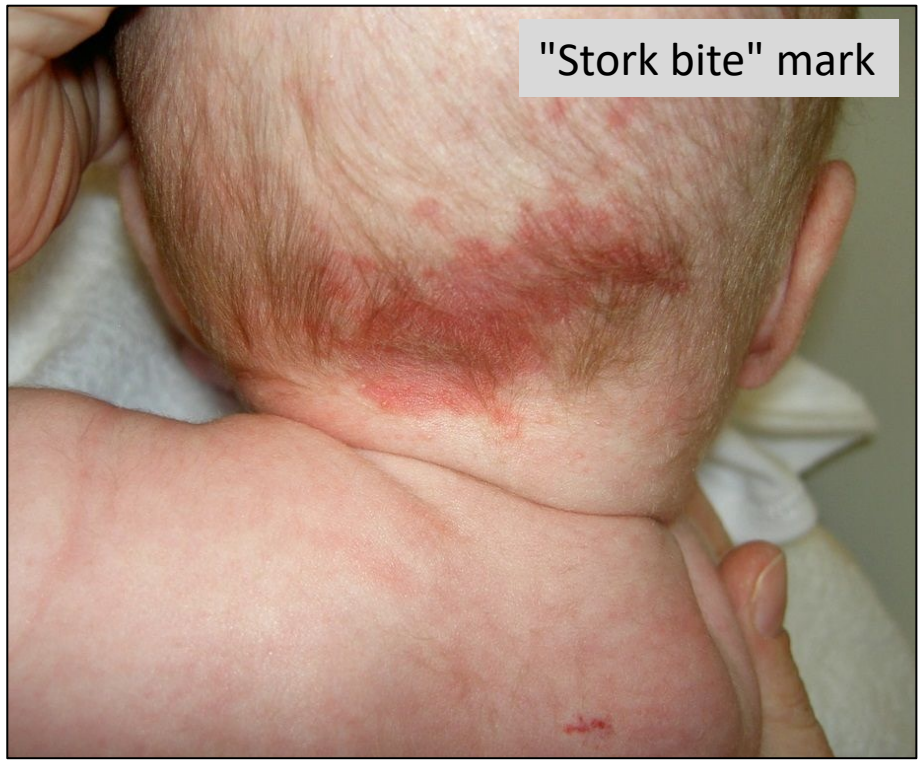


Nevus flammeus





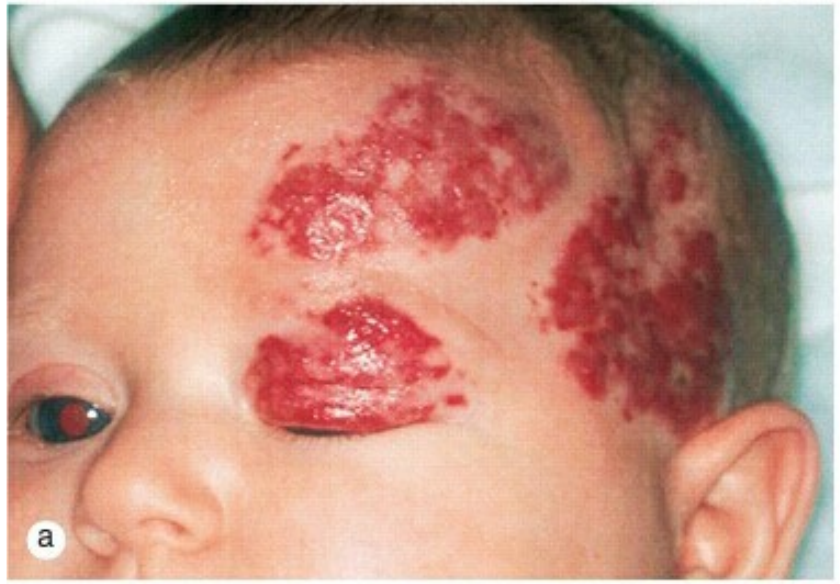
Salmon patch

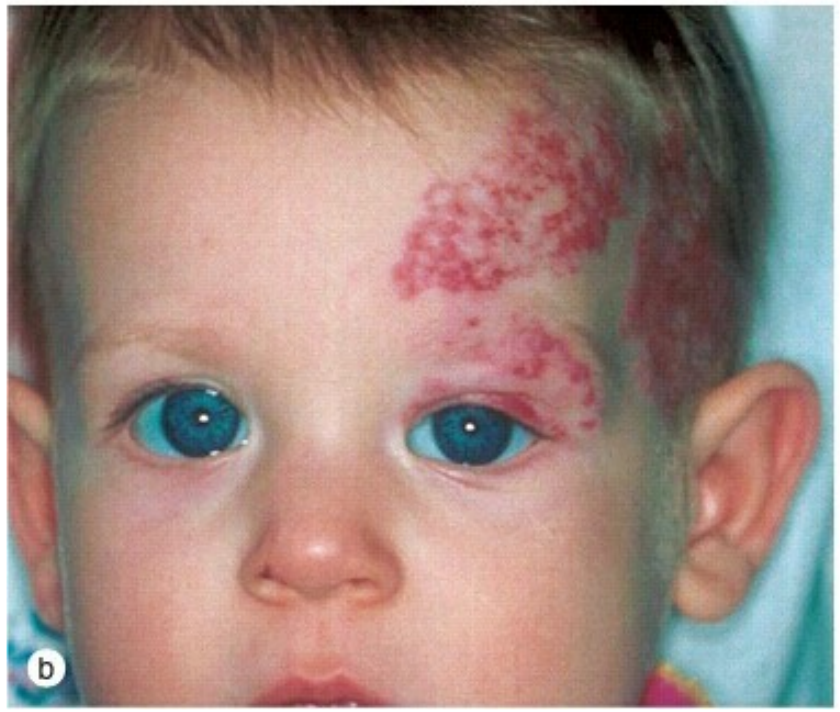


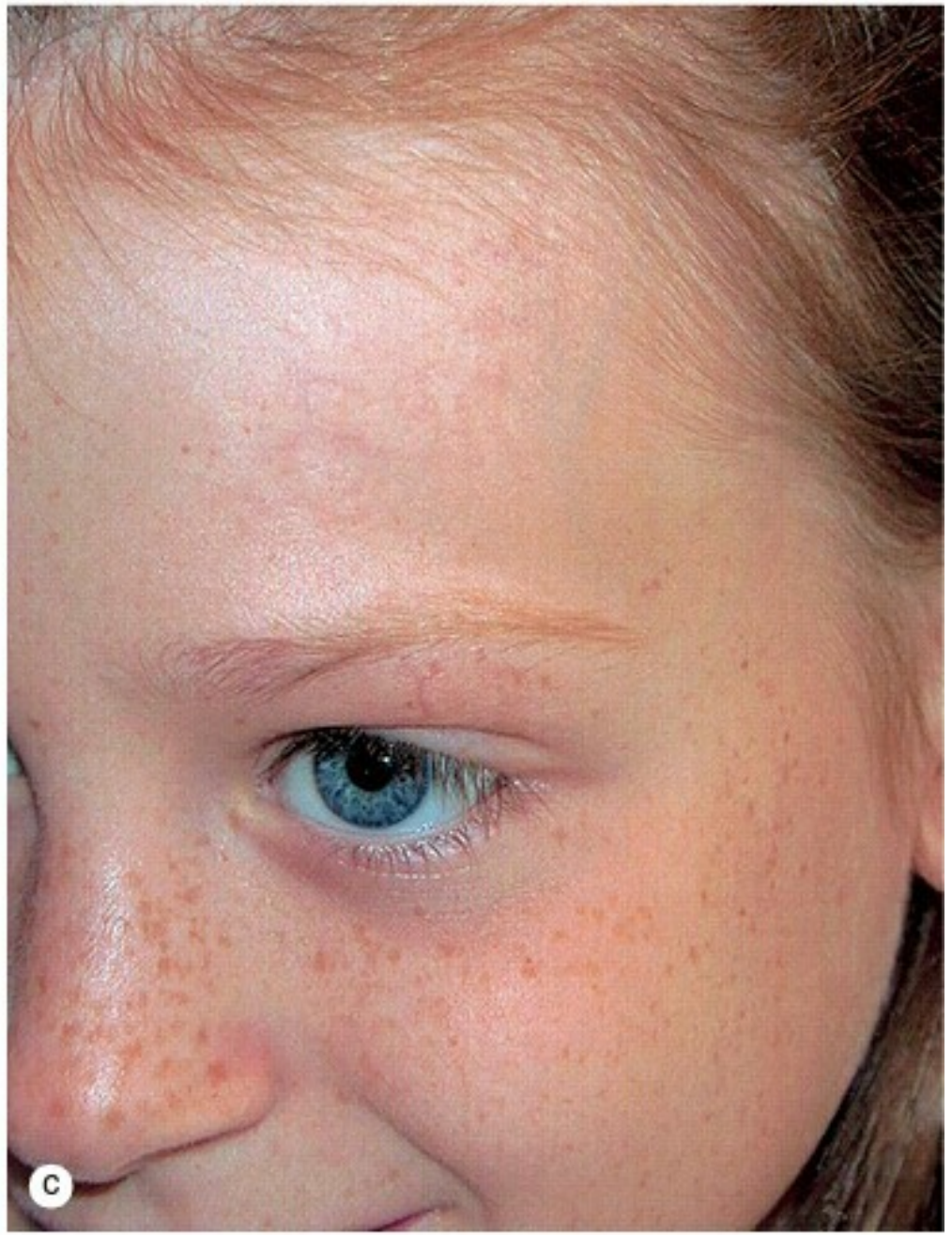
"Stork bite" mark

Hemangioma Natural History

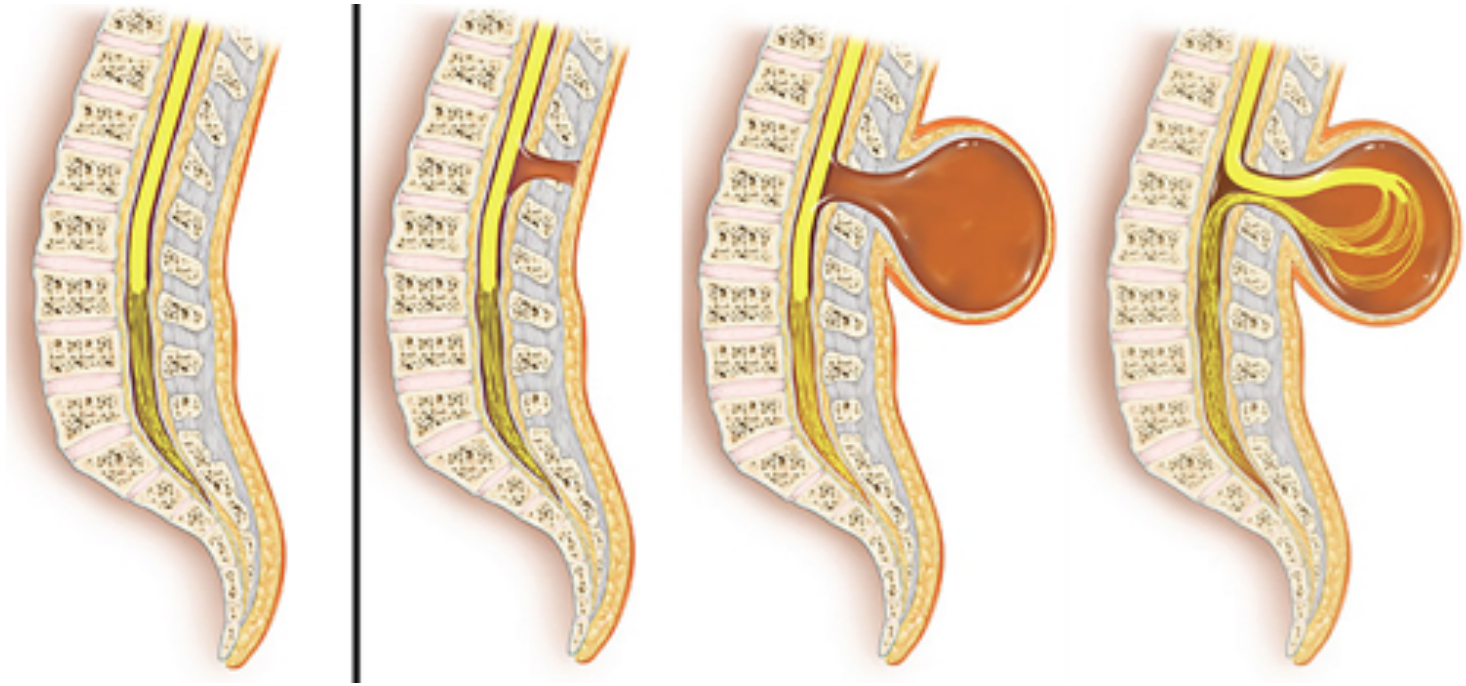
A. At 1 month
B. At 2 years
C. At 7 years

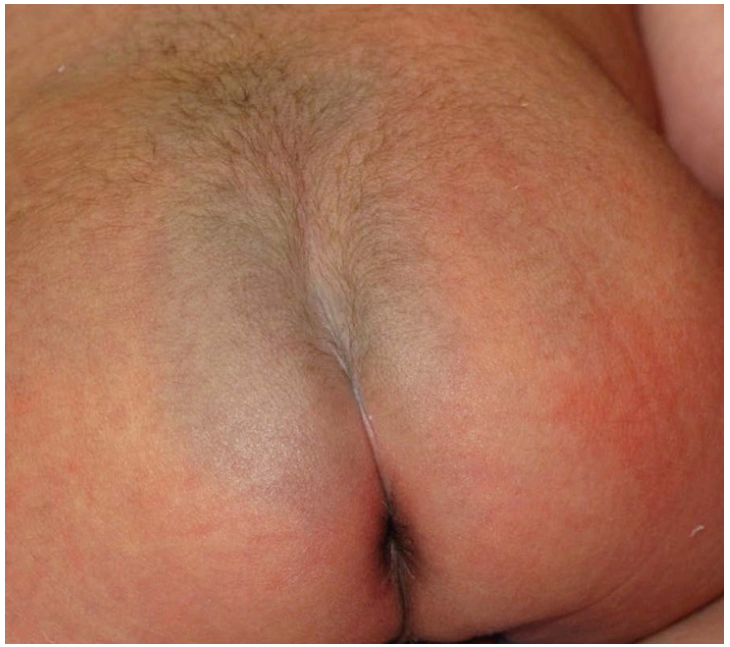


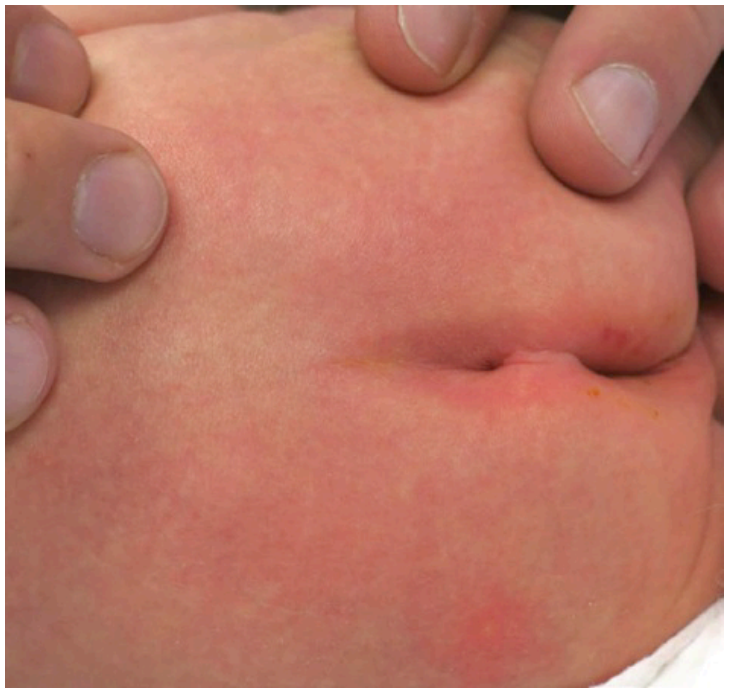




Sacral dimples







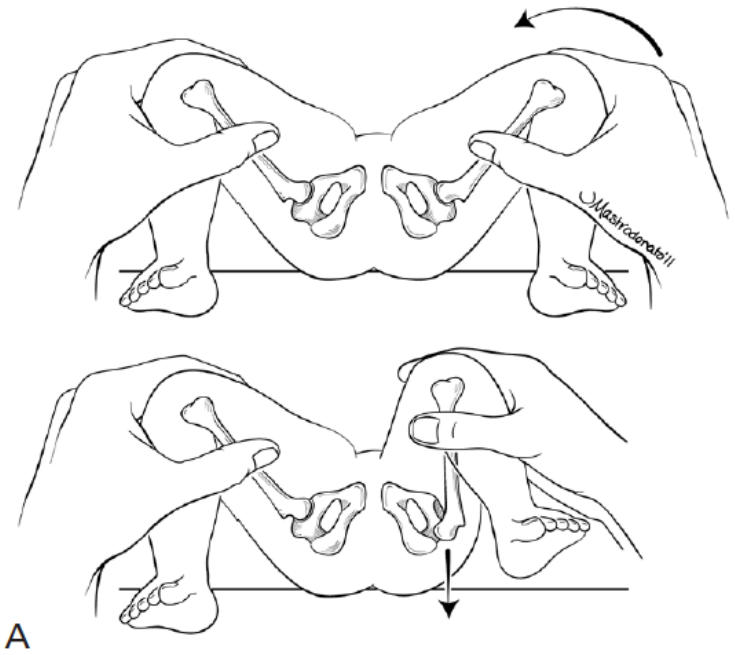
Which sacral dimple to investigate?

Ultrasonography is the screening modality of choice

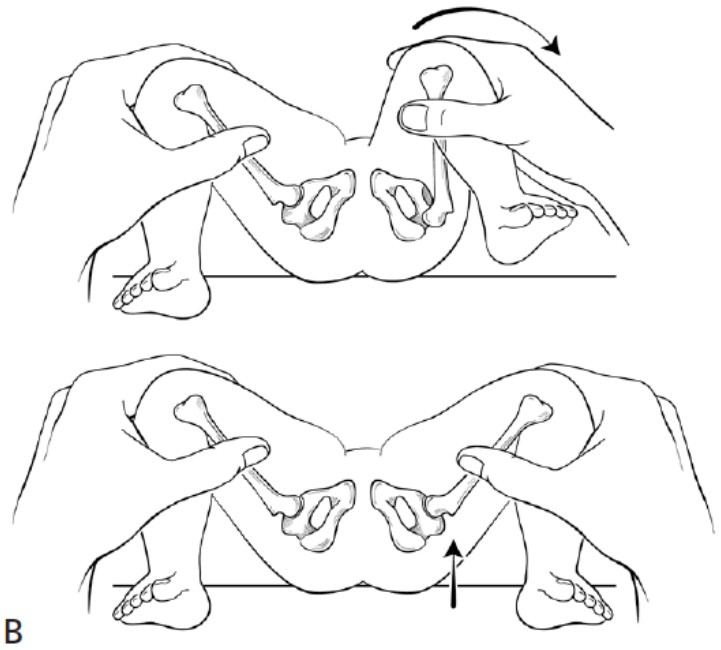
- >5 mm in size.
- >25 mm cephalad to the anal orifice.
- Associated with overlying cutaneous markers:
  - True hypertrichosis, or hairs within the dimple
  - Skin tags.
  - Telangiectasia or hemangioma
  - Subcutaneous mass or lump.
  - Abnormal pigmentation.
  - Bifurcation (fork) or asymmetry of the superior gluteal crease

The hips

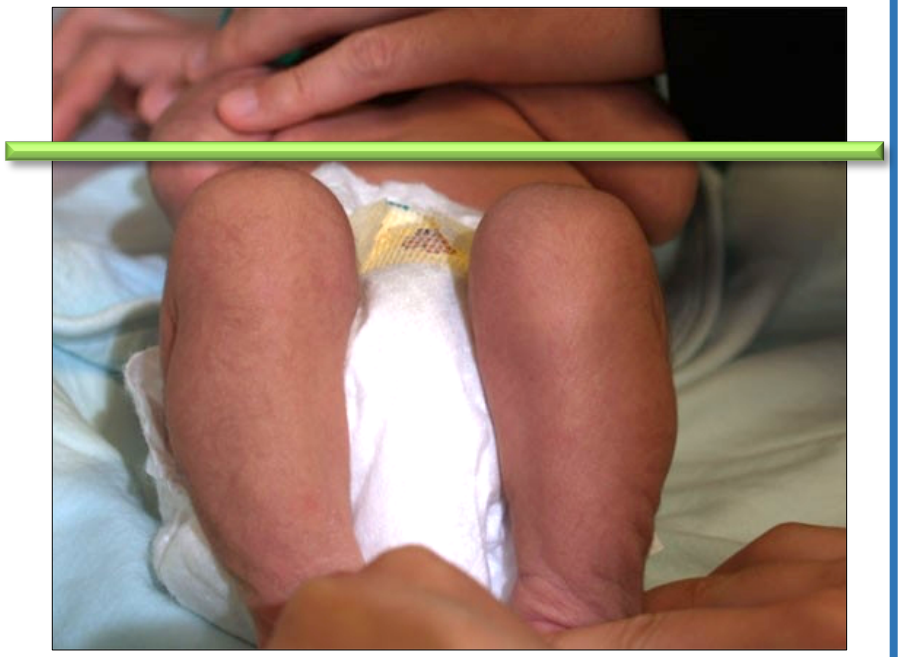
Barlow



Ortolani

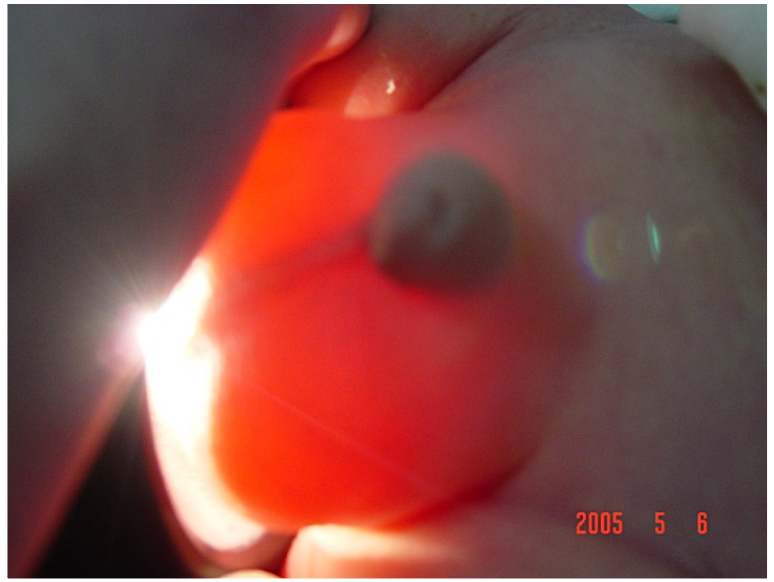


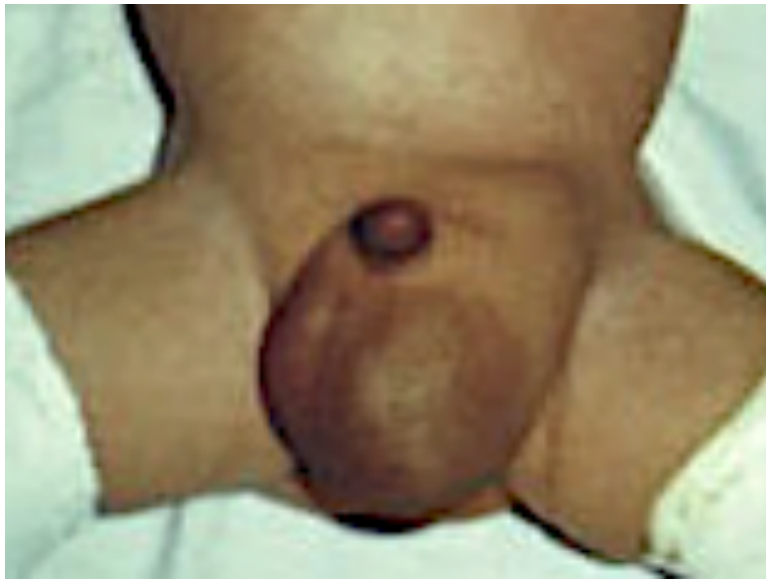
Developmental Dysplasia of the Hip (DDH)

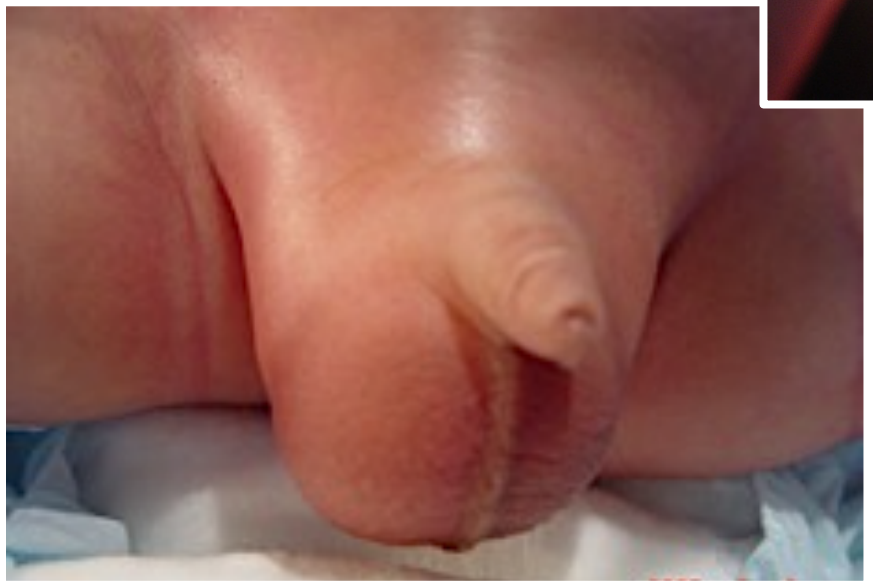


The genitals

Inguinal hernia vs. Hydrocele

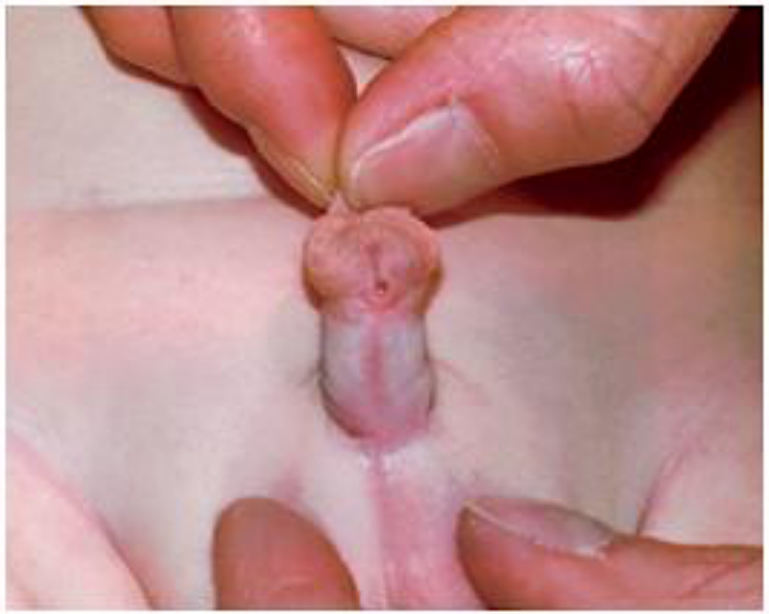


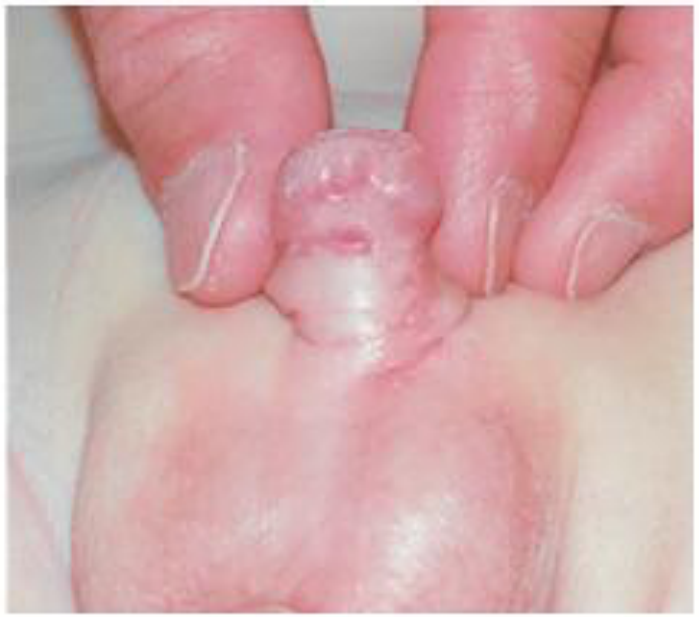


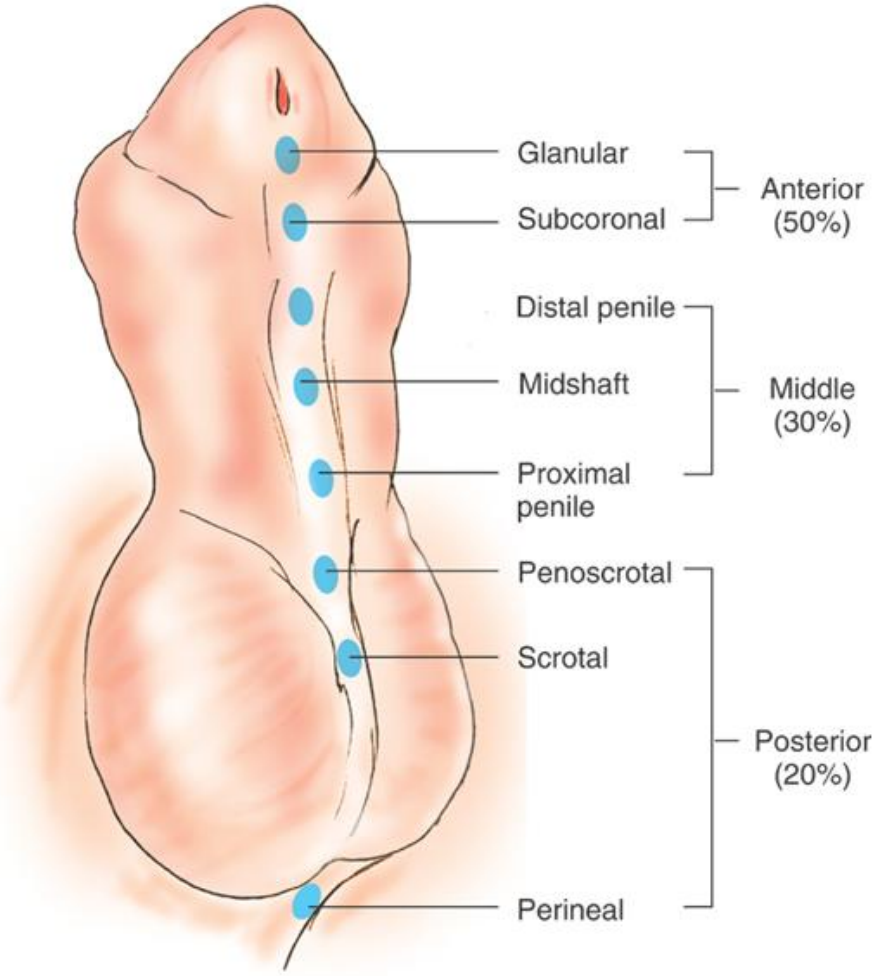


The genitals

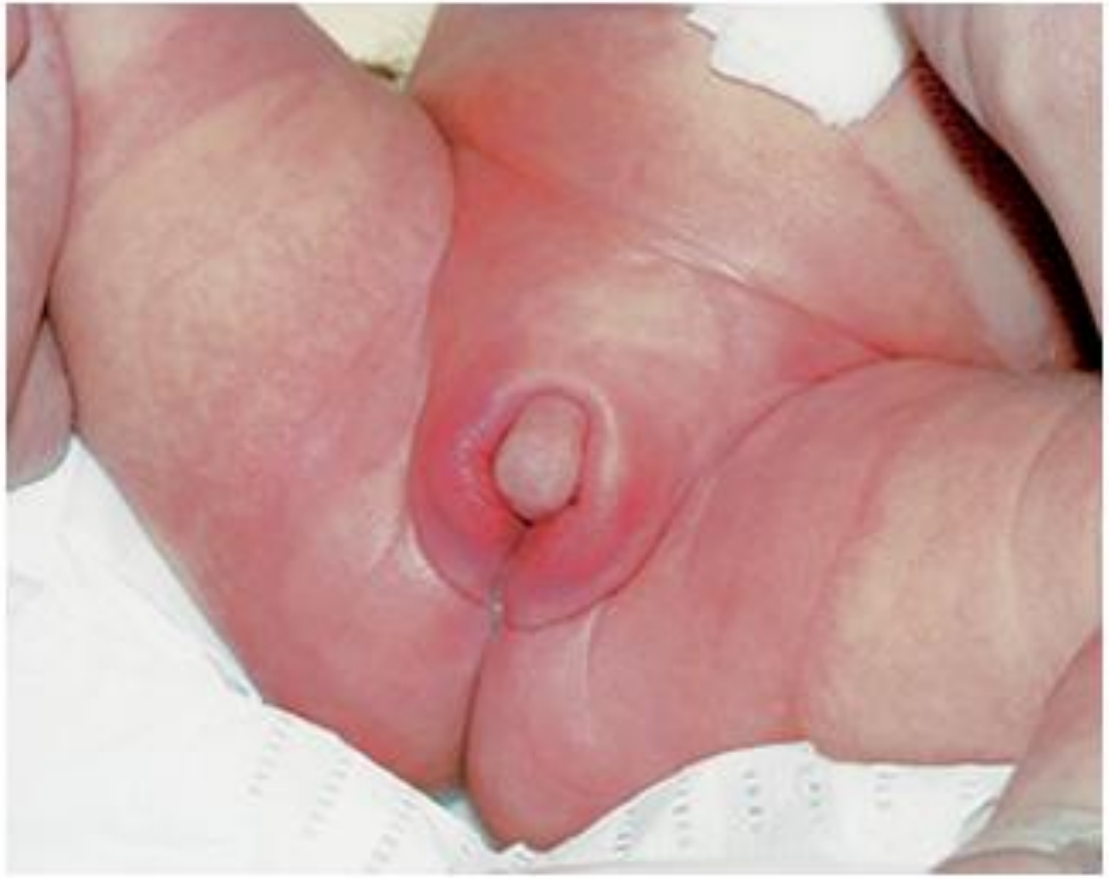
Hypospadias

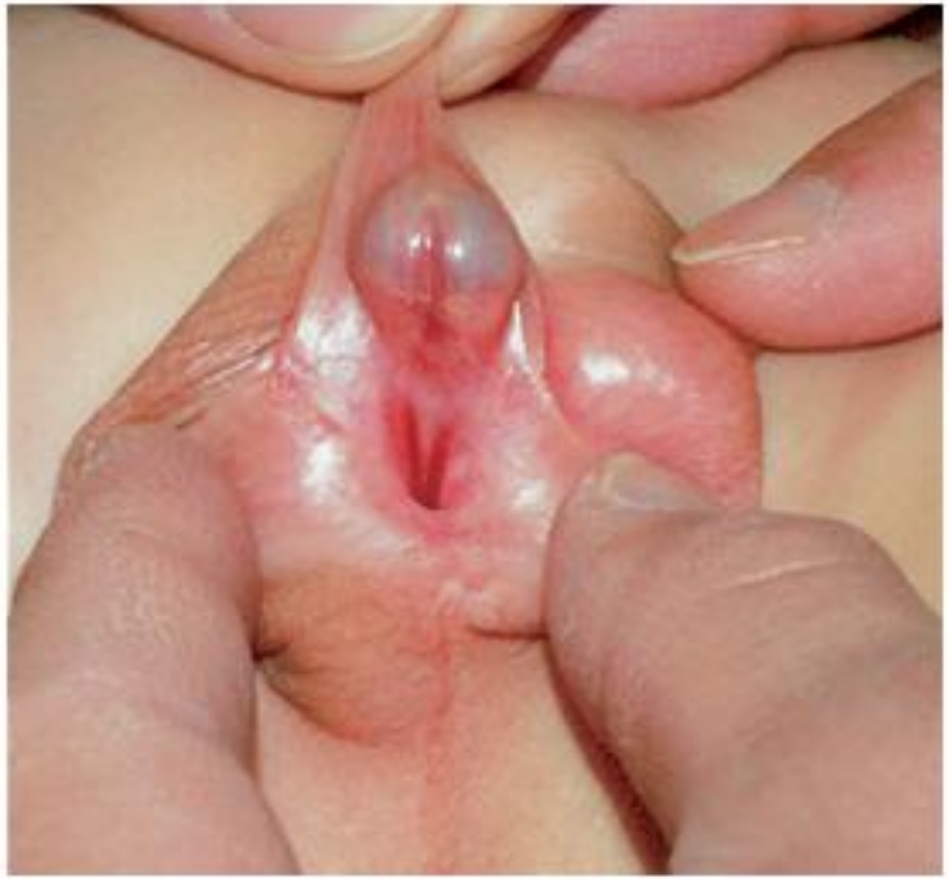






Ambiguous genitalia





Common Neonatal Problems

Comments? …

Please email them to:

kaltirkawi@ksu.edu.sa