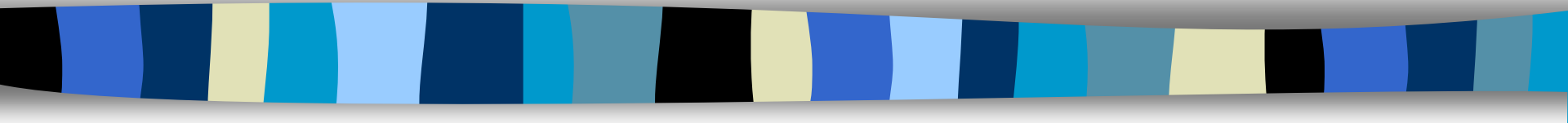


Birth Injury in Newborn





Definition

- Injuries to the infant resulting from mechanical forces during birth (compression, traction)
- Can coexist with hypoxemic-ischemic insult - may predispose to each other



Incidence

- In 1970 ~ 64 deaths/100 000 births related to birth trauma
- In 1985 ~ 7.5 deaths/100 000 births related to birth trauma
- Birth trauma causes < 2% of neonatal deaths
- Average ~ 6 - 8 injuries/1000 births



Predisposing factors

- Primigravida
- Cephalopelvic disproportion
- Small maternal stature
- maternal pelvic anomalies
- Prolonged or rapid labor
- Arrest of descent of presenting fetal part
- Oligohydramnios
- Resuscitation with CPR
- Abnormal presentation (breech/face)
- Use of forceps or vacuum extraction
- Versions
- VLBW infant or extreme prematurity
- Macrosomia
- Large fetal head
- Fetal anomalies
- Fetal neuromuscular disease
- HIE



Birth Injuries

- **Soft Tissue Injuries** (Abrasions, Bruising, Fat Necrosis, Lacerations)
- **Extracranial Bleeding** (Caput succedaneum, Cephalhematoma, Subgaleal Hematoma)
- **Intracranial Bleeding** (Subarachnoid, Epidural, Subdural, Cerebral, Cerebellar)
- **Nerve Injuries** (Facial and Cervical Nerve Roots, Horner Syndrome, Recurrent Laryngeal Nerve)
- **Fractures** (Clavicle, Humerus, Femur, Skull)
- **Eye Injuries** (Subconjunctival and Retinal Hemorrhage)



Soft Tissue Injuries

■ Bruises and Petechiae

- Can be seen in the GU area in breech presentations
- Can be seen around the head and neck when there is a nuchal cord or precipitous delivery
- Appearance of new bruises or petechiae after delivery warrants further investigation to r/o sepsis or bleeding disorder

Soft Tissue Injuries



- Fat Necrosis
 - Well-circumscribed firm nodule with purplish discoloration
 - Usually occurs after forceps use, but can occur at other sites of trauma
 - Resolves spontaneously over weeks to months

Nasal Deformities



- < 1% of nasal deformities are due to actual dislocations of the triangular cartilage of the nasal septum
- Differentiate from positional deformities by manually moving the septum to midline and observe the resultant shape of the nares
 - True dislocation = marked asymmetry of the nares persists; consult ENT
 - Failure to recognize a true dislocation can lead to permanent deformity



Torticollis

- Lateral tilt of the neck and head typically due to a tight sternocleidomastoid muscle
 - Head and neck tilt toward the involved side and chin is turned away from the involved side
- Most common causes:
 - Congenital Muscular Torticollis: fibrosis of the sternomastoid muscle from uterine packing problem
 - Vertebral Anomalies: Klippel-Feil syndrome (congenital anomalies of the cervical spine)



Torticollis

■ Diagnosis

- Usually made clinically, may palpate mass in the muscle early in postnatal period
- Examine infant for other congenital anomalies
- Radiographs of the cervical spine should be done to rule out any vertebral anomalies if there is no response to stretching exercises of the sternomastoid muscle

■ Treatment

- Stretching exercises are successful in 90% of the cases
- Surgical correction may be considered in resistant cases after 1 year of age

Torticollis





Head Trauma

■ Hemorrhages

– Extracranial

- Caput succedaneum
- Cephalhematoma
- Subgaleal Hemorrhage

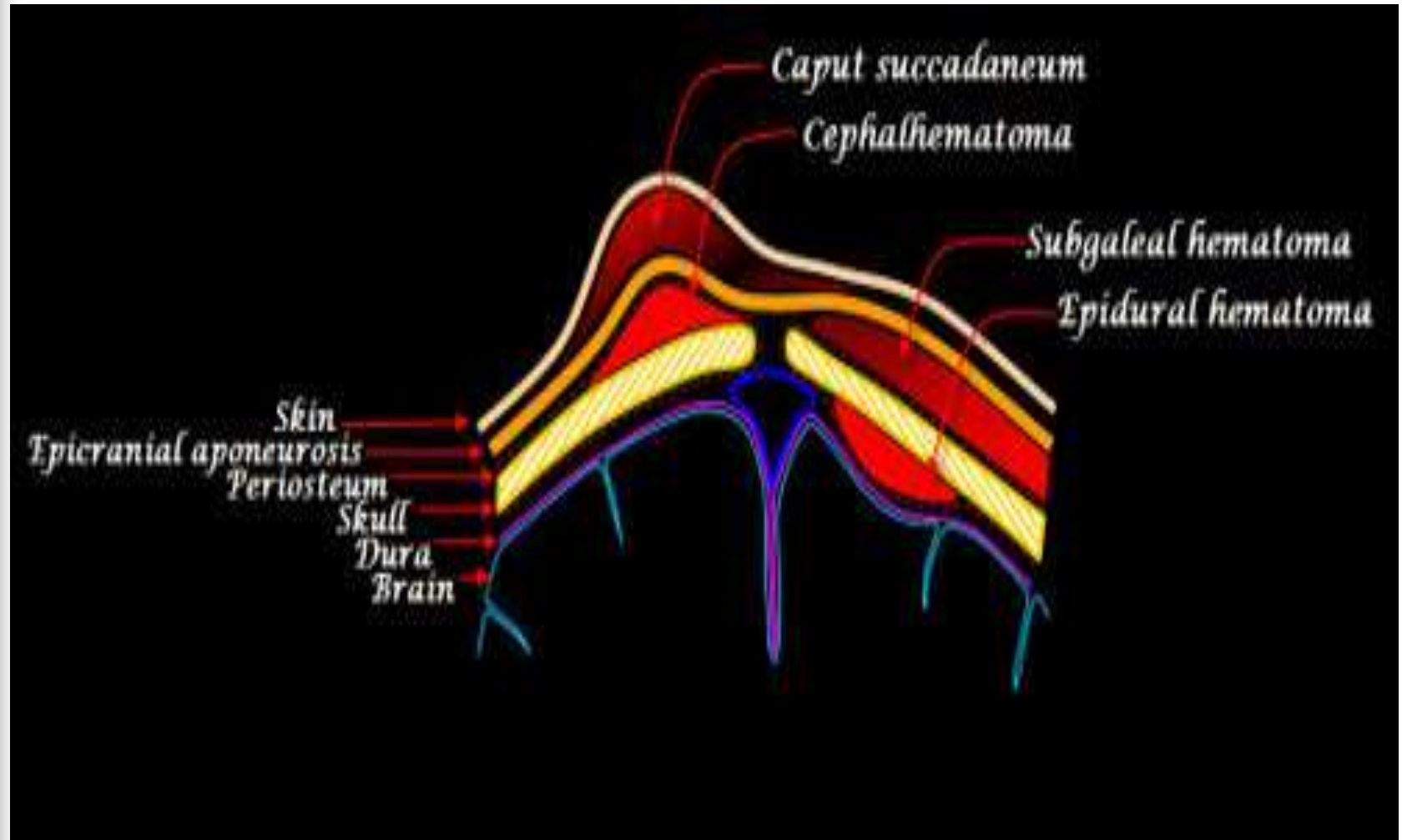
– Intracranial

- Epidural
- Subdural
- Subarachnoid

■ Fractures

- Linear
- Depressed

Extracranial hemorrhage



Caput Succedaneum



- Common after prolonged labor
- Accumulation of blood/serum above periosteum
- Soft tissue swelling / edema / petechiae / ecchymoses
- Crosses suture lines

Cephalhematoma





Cephalhematoma

- Occurs after prolonged labor and instrumentation
- It is a collection of blood in between the pericranium and the flat bone of the skull,
- Mostly unilateral, but can be bilateral also
- Possible skull fractures, sometimes elevated ridge.
- Ventouse application does not increase the incidence of cephal haematoma .
- The swelling is limited by the suture lines of the skull as the pericranium is fixed to the margins of the bone.

Subgaleal hemorrhage





Subgaleal Hemorrhage

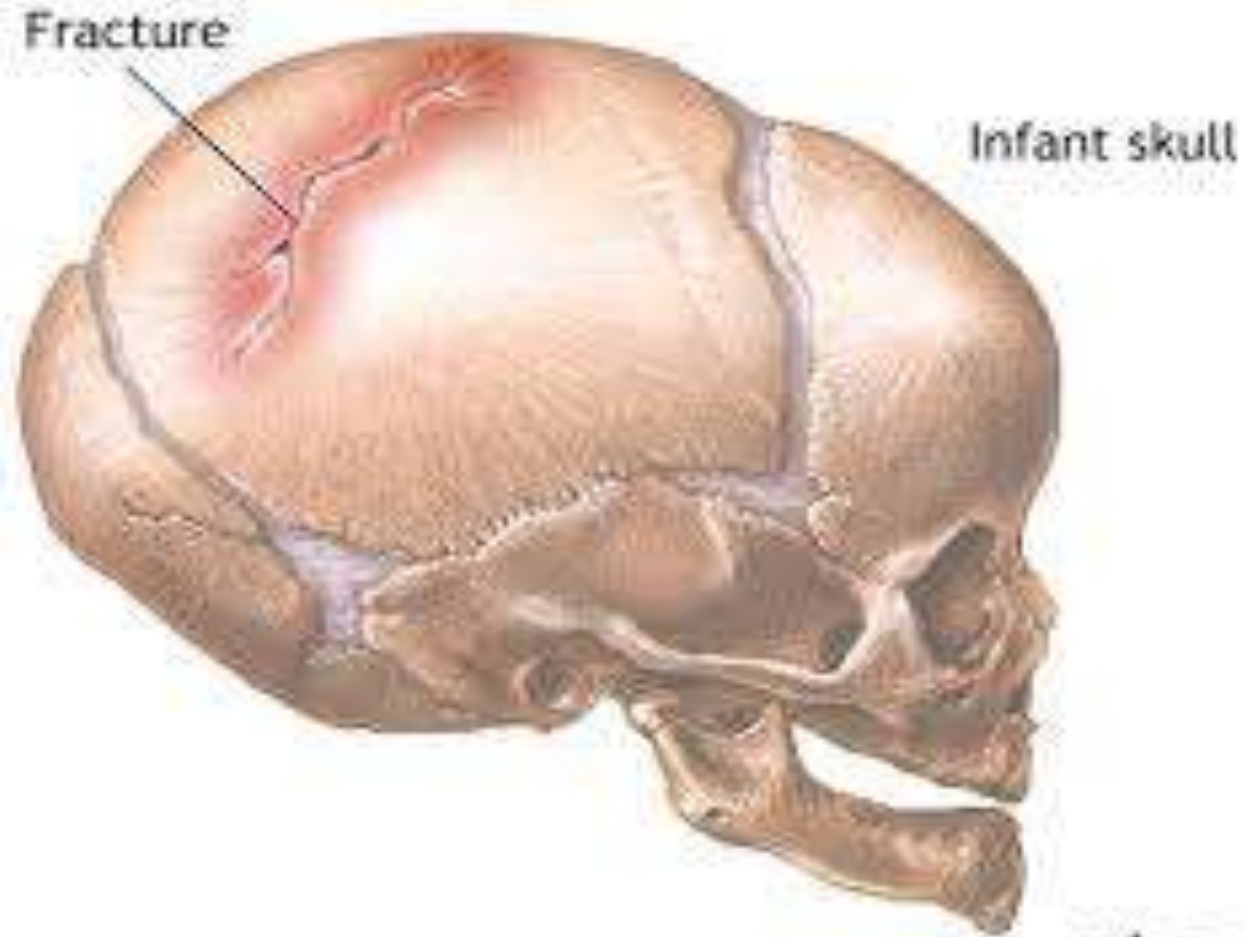
- Occurs between periosteum and epicranial aponeurosis
- Most often with difficult vacuum or forceps extraction
- 1 in 2,000 deliveries (1/200 vacuum)
- Boggy fluid collections with a fluid wave beneath the scalp
- Hemorrhage extending from above the eyes to the neck, frequently displacing ears anteriorly
- Presents with pallor, tachycardia, tachypnea, skin mottling, hypotension, hypotonia -- hemorrhagic shock
- Can cause consumptive coagulopathy
- Prognosis correlates with the degree of brain ischemia following delayed or incomplete correction of blood loss and hypotension

Skull Fractures

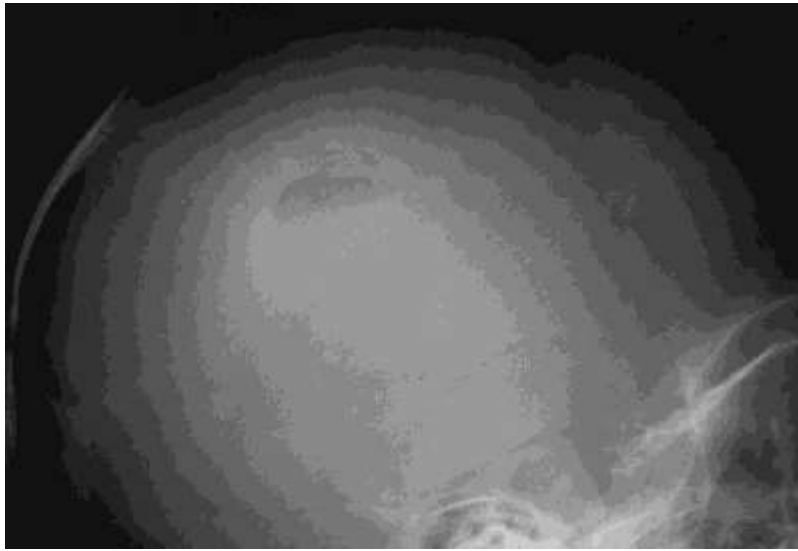


- Mostly linear, often with cephalhematoma
- Usually after prolonged labor or forceps delivery
- Fetal skull pressed against symphysis, sacral promontory or ischial spine
- Risk of leptomeningeal cyst
- Follow up Xrays ~ 2 months after injury

Skull Fracture



Leptomeningeal cyst



Skull fracture with dural tear leads to herniation of pia and arachnoid layers (leptomeninges) through the dural tear. CSF pulsations lead to progressive erosion of skull around the fracture site. Margins of fracture still apparent months after injury. Greater diastasis of the fracture as time goes on.



Intracranial Hemorrhages

■ **Epidural:**

- ✓ Rare
- ✓ Usually associated with fractures
- ✓ Irritability, lethargy, and seizures progress to signs of increased ICP and ultimately uncal herniation
- ✓ Diagnosed by CT

■ **Subdural:**

- ✓ Diagnosed by CT
- ✓ May be due to rupture of the straight sinus, vein of Galen, transverse sinus, inferior sagittal sinus, or superficial bridging vessels
- ✓ Symptoms within 24 hours of birth : apneas, seizure activity, altered state, irritability, focal neurologic signs, loss of consciousness
- ✓ With midline shift : consider neurosurgical Tx
- ✓ Can cause secondary cerebral infarction due to arterial compression
- ✓ Infants may develop normally or have persistent focal neurologic findings, including hydrocephalus

Intracranial Hemorrhages



Epidural Hematoma

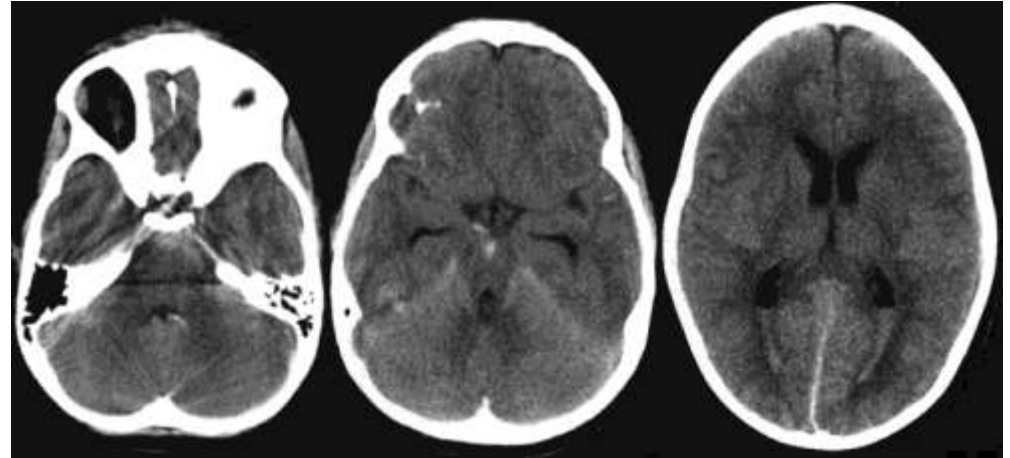


Subdural Hematoma

Intracranial Hemorrhages

■ Subarachnoid:

- ✓ often asymptomatic
- ✓ apnea
- ✓ irritability and seizures
- ✓ CSF bloody
- ✓ CT diagnosis

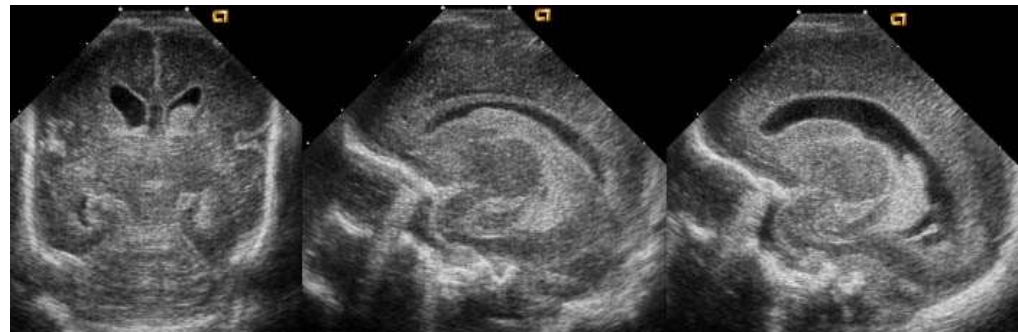


■ Intracerebellar:

- ✓ Can present with signs of brainstem compression

■ Intraventricular:

- ✓ Mostly premature infants
- ✓ Less likely caused by intrapartum factors
- ✓ Risk of post-hemorrhagic hydrocephalus





Investigations

- Ultrasonography is used to detect intraventricular hemorrhage.
- Doppler ultrasonography can detect any change in cerebral circulation.
- CT scan is useful to detect cortical neuronal injury.
- Magnetic resonance imaging is used to evaluate any hypoxic ischaemic brain injury.
- CSF – elevated RBCs, WBCs and protein



Treatment

Anti- convulsant:-

- Phenobarbitone- 3.5 mg/kg/ day in divided doses at 12 hourly intervals IM/orally.
- Phenytoin 20mg/kg/ IV.
- Diazepam 0.1mg/kg IV thrice daily.



Prevention

- Avoid birth asphyxia
- Fluctuation of blood pressure , correct acid base abnormalities surfactant therapy is found helpful.



Prognosis

- The surviving infants usually behave normally in later life .
- There is, however, some correlation with mental retardation and neurological disorders.
- Epilepsy may develop later in life .

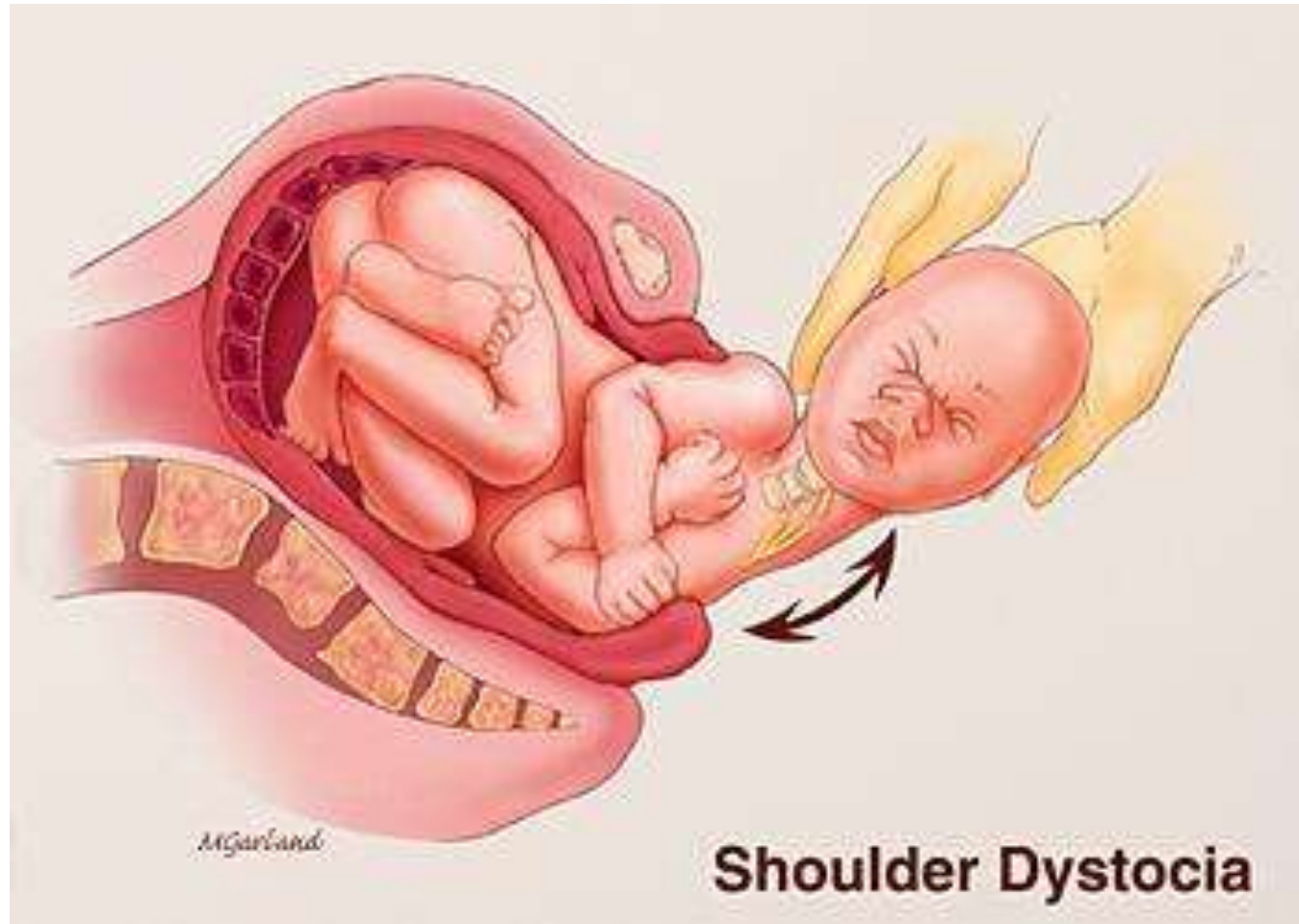


Traumatic Nerve & Spinal Cord Injuries

■ Spinal Cord

- ✓ Rare
- ✓ Associated with mid-forceps rotations and difficult breech extractions
- ✓ Lesion varies from localized hemorrhage to complete destruction of the cord at one or more levels
- ✓ Clinical presentations are paralysis and areflexia of the lower extremities with variable upper extremity involvement, distended bladder, respiratory failure, stillbirth or rapid neonatal death
- ✓ In 2/3 of cases, HIE is associated
- ✓ Look for vertebral fracture or dislocation that may be amenable with neurosurgical intervention
- ✓ Improved prognosis for lesions below T4

Traumatic Nerve & Spinal Cord Injuries





Traumatic Nerve & Spinal Cord Injuries

■ Peripheral Nerve

- ✓ Brachial plexus injuries in 0.5 to 2.5 per 1,000 live births
- ✓ Caused by stretching or rupture of the cervical nerve roots from traction on the neck during delivery with subsequent edema / scarring
- ✓ Risk factors are BW > 4,500g, shoulder dystocia, breech, multiparity, and assisted deliveries
- ✓ Upper arm palsy (**Erb-Duchenne**) is the most common and caused by damage to the 5th and 6th cervical nerve roots
- ✓ Isolated lower arm palsies (**Klumpke**) is rare and involves the 8th cervical and first thoracic nerve roots
- ✓ Injuries resolve within days to 4 weeks after birth. Surgery may be indicated if there is no return of function by 4.5 months of age

Brachial Plexus Palsy



Figure 2. Classic phenotype associated with an upper brachial plexus lesion.





Brachial Plexus Palsy

- Three forms - depending on site and extent of trauma
 - 5th and 6th cervical roots - upper arm (Erb-Duchenne) = most common form
 - 8th cervical and 1st thoracic roots - lower arm (Klumpke) = extremely rare
 - Paralysis of entire arm = rare
- Evaluation :
 - Xrays to r/o fractures of clavicle or humerus and to r/o epiphyseal detachment of humerus
 - US to r/o posterior dislocation of humerus epiphysis



Brachial Plexus Palsy - Symptoms

- Upper (Erb) paralysis:
 - Adduction, internal rotation, extended elbow, pronated forearm, wrist flexion
 - Moro, biceps, radial reflexes absent, grasp intact
 - Possible additional phrenic nerve (from 3rd/4th/5th cervical root) palsy
- Lower (Klumpke) paralysis
 - Intrinsic hand muscles and long flexors - hand paralyzed
 - No grasp reflex, but present deep tendon reflexes
 - Frequently with ipsilateral Horner's syndrome (enophthalmus, ptosis, miosis, anhidrosis) - cervical sympathetic fibers from 1st thoracic root affected



Brachial Plexus Palsy - Therapy

- Prevent contractures - passive range of motion with physical therapy involved
- Neurological/neurosurgical consultation
- Consider MRI to r/o avulsion of nerve root
- Reevaluate progress every month
- If no improvement by end of 3rd month, consider surgical exploration in 4th month



Prognosis

- It is usually good , if it is due to stretching.
- But if it is due to haemorrhage or avulsion the deformity may be permanent.

Horner's Syndrome



Figure 1: Left pupillary miosis, marked hypochromia of the left iris, ipsilateral mild ptosis and left hemifacial anhidrosis

Phrenic nerve palsy



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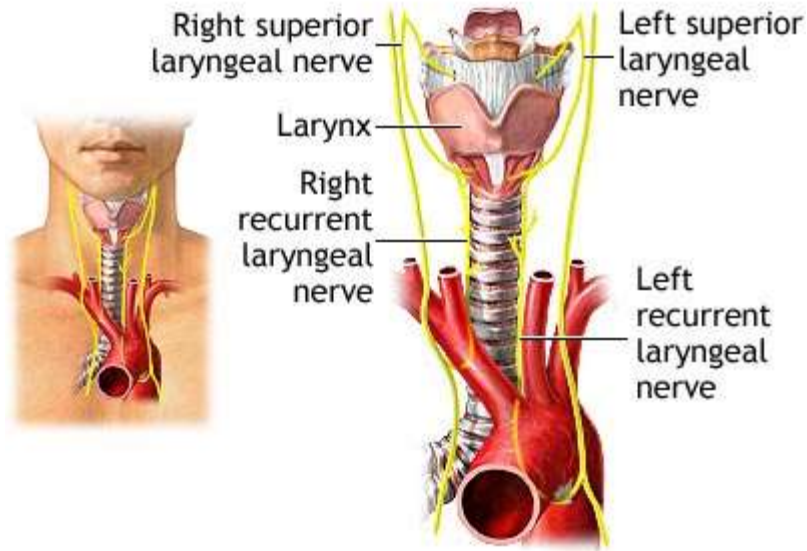
- Lateral hyperextension of neck causes overstretching or avulsion of 3rd, 4th and 5th cervical roots which supply phrenic nerve
- Respiratory distress, risk of infection, elevated hemidiaphragm, paradoxical diaphragmatic movement, atelectatic areas
- If no improvement within one month, recovery unlikely and plication needs to be considered

Treatment



- It is supportive continuous positive airway pressure or mechanical ventilation may be needed.
- Recovery is usually complete in 1 to 3 month time.

Laryngeal nerve injury



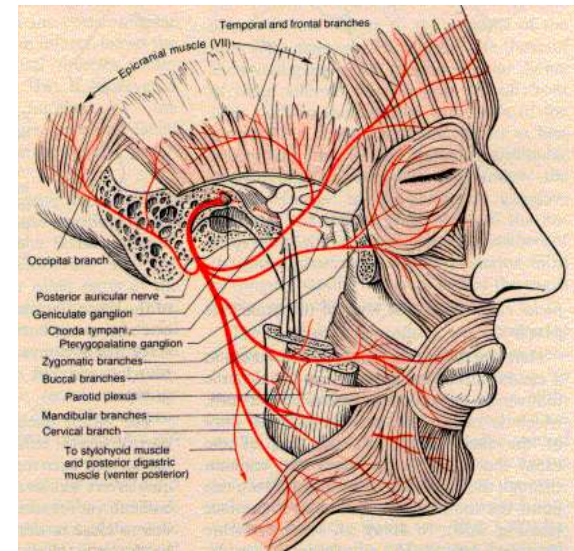
ADAM.

- Laryngeal nerve is part of vagus nerve - in neck behind jugular vein and carotid artery
- 10% of vocal cord paralysis caused by birth trauma
- Hoarse cry, stridor
- Risk for aspiration, feeding problems
- Recovery often over 4 - 6 weeks, sometimes longer

Facial nerve palsy



FIGURE 3. Asymmetry caused by facial nerve paralysis, with inability to close eye, nasolabial fold flattening, and inability to move lips on the affected side. Newborns with facial nerve paralysis have difficulty effecting a seal around the nipple and consequently exhibit drooling of milk or formula from the paralyzed side of the mouth.





Facial nerve palsy

■ Etiology :

- Compression of peripheral portion of facial nerve
- Compression either by forceps or by pressure against sacral promontory

■ Symptoms :

- Paralyzed side smooth, corner of mouth drooping, persistently open eye, and smooth forehead on side of damage

■ Differential diagnosis :

- Central paresis - affecting opposite side, does *not affect* orbicularis orbi and forehead muscles, caused by damage in posterior fossa
- Nuclear agenesis (Mobius syndrome) - frequently bilateral, face motionless, other cranial nerves affected as well
- Congenital absence or hypoplasia of depressor muscle of the angle of the mouth

■ Prognosis :

- Generally good, recovery usually occurs within the first month
- Surgery reserved for those with clear severing of the facial nerve

■ Protect cornea with moisturizing drops



Bone fractures

- ✓ Incidence of clavicular fracture is 0.5% to 1.5% of live births
- ✓ Humerus is the most common long bone fracture
- ✓ Treated by limiting mobility of the affected arm

Extremity fractures

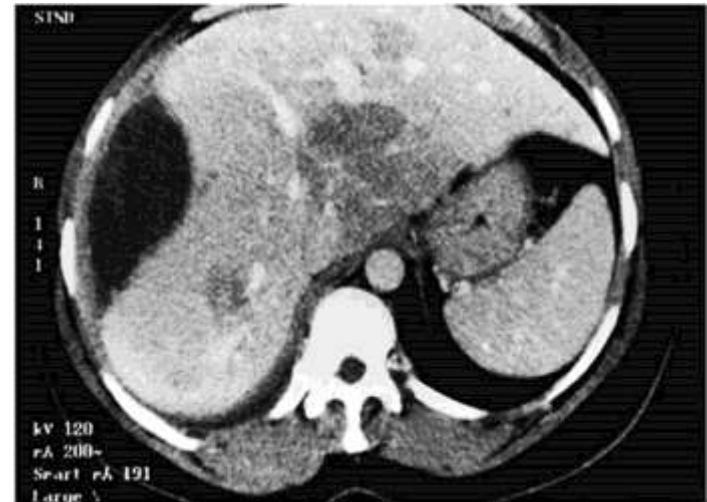
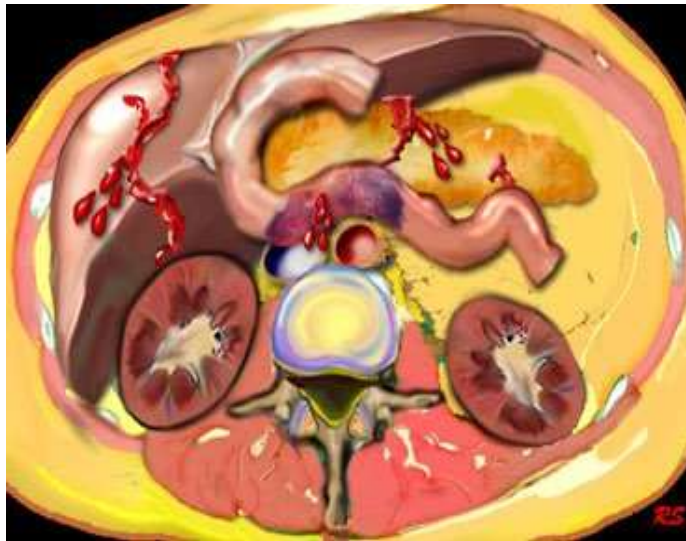


- Fracture at birth,
- 2 weeks later,
- 2 months later

Clavicular fracture



Subcapsular liver hemorrhage





Subcapsular liver hemorrhage

- At risk : IDM, erythroblastosis fetalis, breech delivery, resuscitation
- Anemia, pallor, poor feeding, tachycardia, tachypnea
- Abdominal distension, blueish discoloration, hemoperitoneum, shock
- Diagnosis : ultrasound and subsequent laparotomy
- Treatment : 1. To correct hypovolaemia anaemia & coagulation disorders.
- Specific management: surgical or otherwise to tackle the injured viscera.

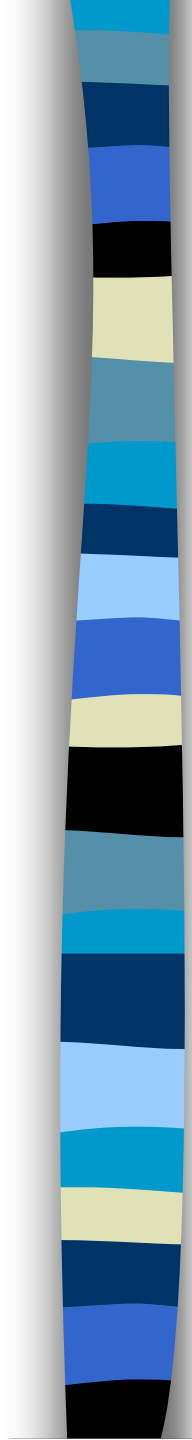


Nursing Diagnosis

- Acute pain related to fracture, skin break down or edema.
- Risk for injury related to improper position paralyzed extremity.
- Impaired skin integrity related to disruption of skin surface from trauma.
- Imbalanced nutrition less than body requirement related to poor nipping.



Summary





THANK YOU!