

Lecturer: Ass.Prof. Dr. Luay Farhood

Class: 5TH Class

Time: 1Hour

■ By the end of this lecture the student should be able to:

1. Define the concept of neonatal asphyxia
2. Clarify the causes of neonatal asphyxia
3. Identify investigations of neonatal asphyxia
4. Outline the treatment of neonatal asphyxia
5. Mention the main birth injuries and it's mechanisms

Birth asphyxia

- **Anoxia:** indicate the consequences of complete lack of oxygen as a result of a number of primary causes.
- **Hypoxia:** decreased arterial concentration of oxygen.
- **Ischemia:** insufficient blood flow to cells or organs to maintain their normal function.

Birth asphyxia is characterised by a critical reduction in oxygen delivery to the fetus antenatally, during labour and/or delivery sufficient to produce a lactic acidosis and render the infant in poor condition at birth with delayed respiration. It remains an important cause of brain damage resulting in disability or death.

Asphyxia

- APGAR score at 1 minute < 7
- Interruption in oxygen delivery to the fetus
 - Hypoxia
 - Hypercapnia

Neonatal Evaluation and Resuscitation

APGAR Scoring

A Appearance

P Pulse

G Grimace

A Activity

R Respirations

APGAR Score

TABLE 33-1 The APGAR Score

Sign	0	1	2	Score	
				1 min	5 min
Appearance (Skin color)	Blue, pale	Body pink, extremities blue	Completely pink		
Pulse Rate (Heart Rate)	Absent	Below 100	Above 100		
Grimace (Irritability)	No response	Grimaces	Cries		
Activity (Muscle Tone)	Limp	Some flexion of extremities	Active motion		
Respiratory (Effort)	Absent	Slow and irregular	Strong cry		
			TOTAL SCORE =		

Apgar Score

- Total Score = 10

score 7-10

normal

score 5-6

mild birth asphyxia

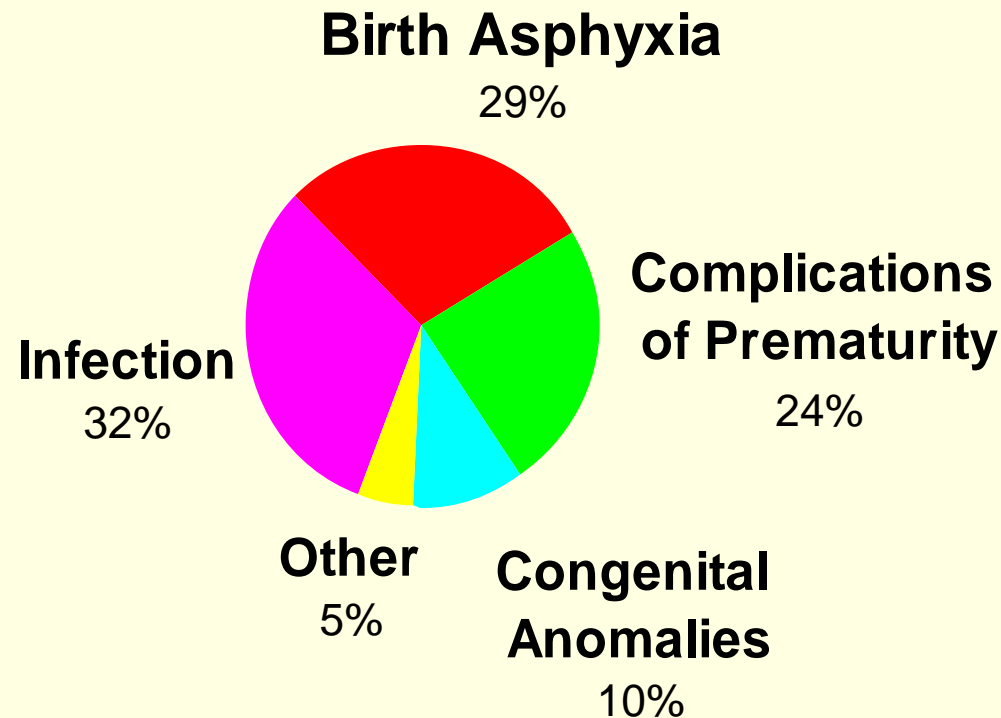
score 3-4

moderate birth asphyxia

score 0-2

severe birth asphyxia

Causes of Neonatal Mortality



Source: WHO 2001 estimates (based on data collected around 1999)

Etiology

- Birth asphyxia in undeveloped countries
 - 10% of newborns suffer mild to moderate birth asphyxia
 - 1% of newborns suffer severe birth asphyxia

Risk factors

Antepartum :

Maternal diabetes

Pregnancy induced hypertension

Chronic hypertension

Previous Rh sensitization

Previous stillbirth

Bleeding in second or third trimester

Maternal infection

Polyhydramnios or oligohydramnios

post-term gestation

multiple gestation

maternal drug abuse

maternal age >35 or <16

no prenatal care

Risk factors

Intrapartum :

Elective or emergency c/s

Precipitous labour, prolonged labour

Prolonged second stage of labour

Premature labour

Abnormal presentation

Rupture of membranes > 24 hours

Foul-smelling amniotic fluid

Non reassuring fetal heart rate patterns

Use of general anesthesia

Prolapsed cord

Assessment

- Fetal heart rate slows
- Electronic fetal monitoring
 - persistent late deceleration of any magnitude
 - persistent severe variable deceleration
 - prolonged bradycardia
 - decreased or absent beat-to-beat variability
- Thick meconium-stained amniotic fluid
- Fetal scalp blood analysis show pH less than 7.2

Effects of Asphyxia

- Central nervous system
 - infarction, intracranial hemorrhage, cerebral edema, seizure, hypoxic-ischemic encephalopathy

- Cardiovascular
 - bradycardia, ventricular hypertrophy, arrhythmia, hypotension, myocardial ischemia

Effects of Asphyxia

- Respiratory system
 - apnea, respiratory distress syndrome
 - cyanosis

- KUB
 - acute tubular necrosis, bladder paralysis

- Gastrointestinal tract
 - necrotizing enterocolitis , stress ulcer

Effects of Asphyxia

- Hematology

- Disseminated intravascular coagulation

- Metabolic

- hypoglycemia, hyperglycemia,
hypocalcemia, hyponatremia

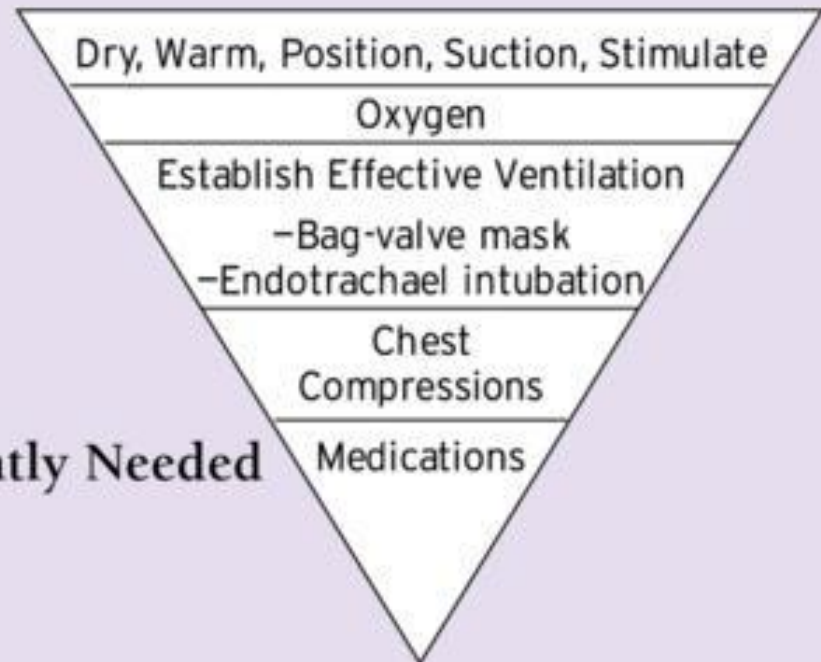
- Integument

- subcutaneous fat necrosis

Neonatal Resuscitation

Assess and Support: Temperature
(warm and dry)
Airway
(position and suction)
Breathing
(stimulate to cry)
Circulation
(heart rate and color)

**Always
Needed**



Infrequently Needed

Newborn Resuscitation Guidelines

- **Meconium -stained amniotic fluid: endotracheal suctioning of the depressed - not the vigorous child**
- **Hyperthermia should be avoided**
- **100% oxygen is still recommended, however if supplemental oxygen is unavailable room air should be used**
- **Chest compression: Initiated if heart rate is absent or remains < 60 bpm despite adequate ventilation for 30 sec**
- **Medications: Epinephrine 0.01-0.03 mg/kg if heart rate < 60 bpm in spite of 30 seconds adequate ventilation and chest compression**
- **Volume: Isotonic crystalloid solution**

Prognosis

- Apgar score < 5 at 10 minutes : nearly 50 % death or disability
- No spontaneous respiration after 20 min : 60 % disability in survivors .
- No spontaneous respiration after 30 minutes : nearly 100 % disability in survivors .



The most important is to get air into the lungs
Facts About Newborn Resuscitation

Hypoxic-ischemic encephalopathy(HIE)

- is the terminology used in the term infant to describe the clinical manifestation of brain injury starting immediately or up to 48 hours after asphyxia, whether antenatal, intrapartum or postnatal.
- Hypoxic-ischemic encephalopathy is an important cause of permanent damage to central nervous system cells, which may result in
 - neonatal death
 - manifest later as cerebral palsy or mental deficiency

It can be graded as:

- mild - the infant is irritable, responds excessively to stimulation, may have staring of the eyes and hyperventilation and has impaired feeding
- moderate - the infant shows marked abnormalities of tone and movement, cannot feed and may have seizures
- severe - there are no normal spontaneous movements or response to pain; tone in the limbs may fluctuate between hypotonia and hypertonia; seizures are prolonged and often refractory to treatment; multi-organ failure is present.

Essential criteria:

1. Metabolic acidosis on cord blood or very early (1 hour) neonatal blood (pH 7.0 or base deficit > 12 mmol/l.)
2. Early onset of severe or moderate neonatal encephalopathy in infants of > 34 weeks gestation.
3. Cerebral palsy of the spastic quadriplegic or dyskinetic type.
- 4.evidence of hypoxia antenatally (e.g. antepartum haemorrhage) or during labour (e.g. cord prolapse or markedly abnormal CTG trace) or at delivery (e.g. shoulder dystocia)
- 5.resuscitation needed at birth
- 6.evidence of hypoxic damage to other organs such as liver, kidney, or heart
- 7.no other prenatal or postnatal cause identified
- 8.characteristic findings on neuroimaging.

SECOND PART

BIRTH INJURIES

Birth injuries

- ❑ Soft tissue injuries:

- ✓ caput succedaneum, cephalhaematoma, chignon, bruises and abrasions
- ✓ subaponeurotic haemorrhage

- ❑ Nerve palsies:

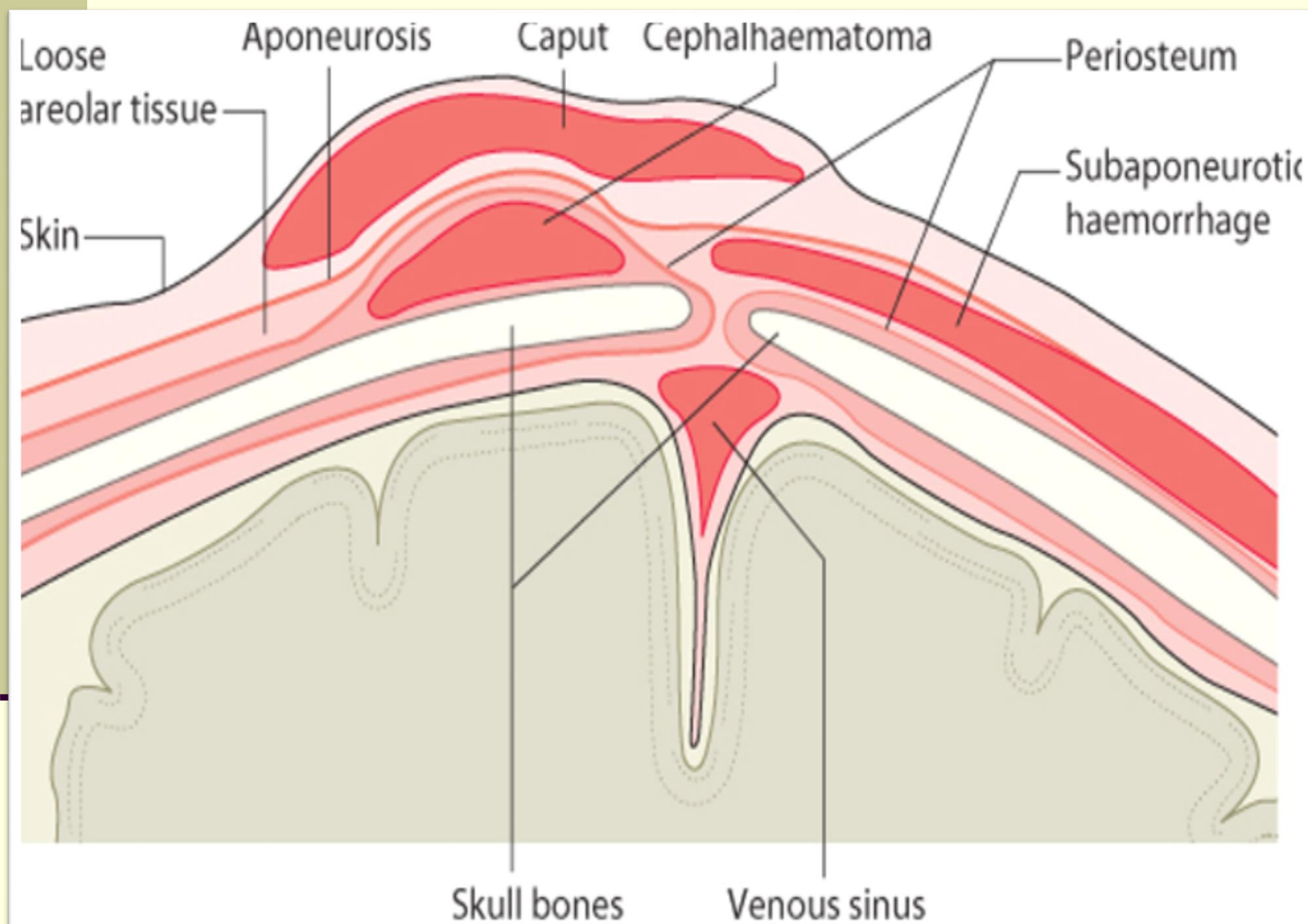
- ✓ brachial plexus - Erb's, Klumpke's
- ✓ facial nerve

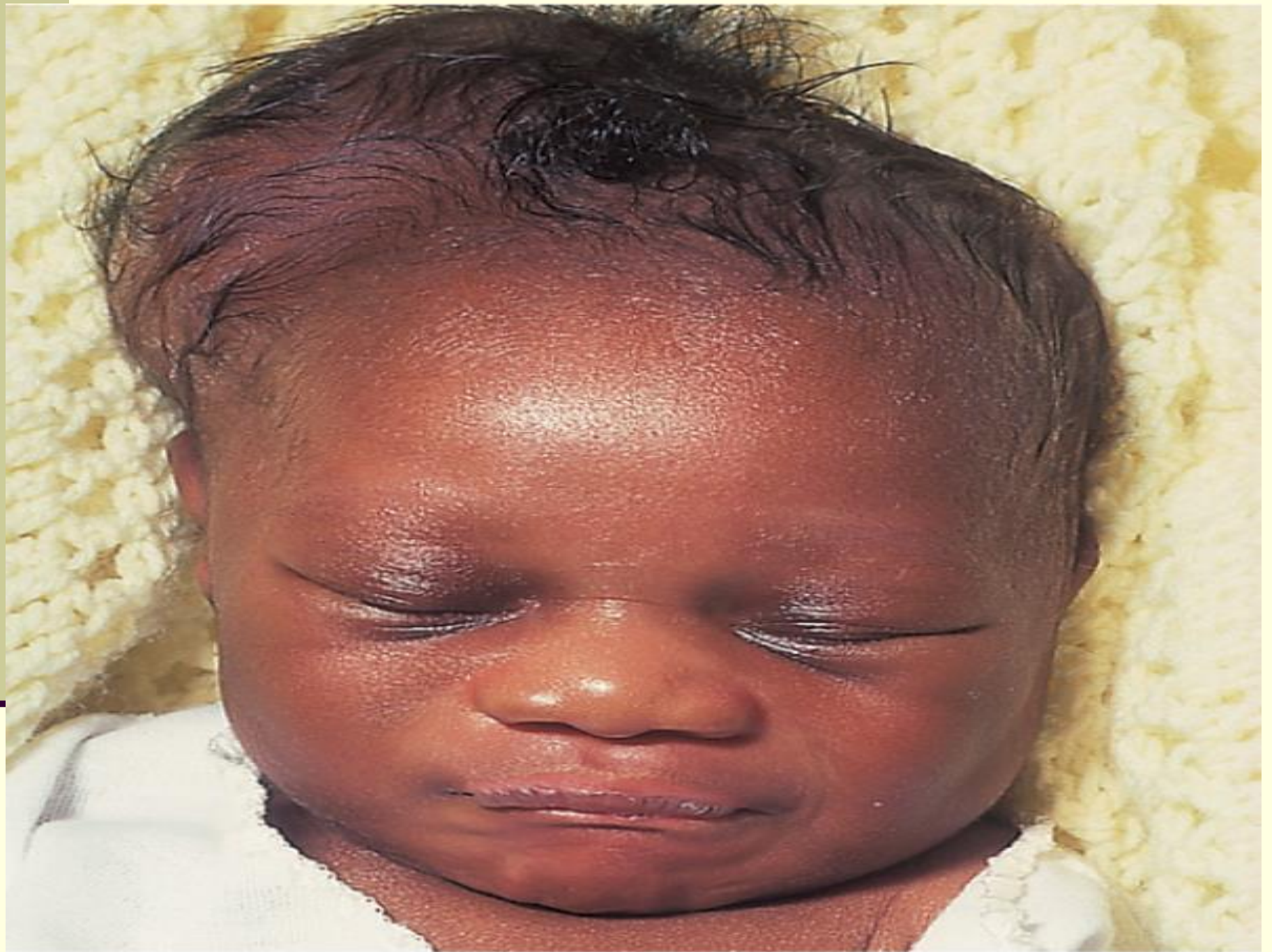
- ❑ Fractures:

- ✓ clavicle, humerus, femur

Soft tissue injuries

- **Caput succedaneum**- bruising and oedema of the presenting part extending beyond the margins of the skull bones; resolves in a few days.
- **Cephalhaematoma** - haematoma from bleeding below the periosteum, confined within the margins of the skull sutures. It usually involves the parietal bone. The centre of the haematoma feels soft. It resolves over several weeks. It is occasionally accompanied by a linear skull fracture.
- **Chignon** - oedema and bruising from Ventouse delivery.
- **Bruising** -to the face after a face presentation and to the genitalia and buttocks after breech delivery. Preterm infants bruise readily from even mild trauma.
- **Abrasions** to the skin from scalp electrodes applied during labour or from accidental scalpel incision at caesarean section.
- **Forceps marks** to face from pressure of blades - transient.
- **Subaponeurotic haemorrhage** (very uncommon) - diffuse, boggy swelling of scalp, may be accompanied by serious blood loss leading to hypovolaemic shock.





Nerve palsies

Brachial nerve palsy: results from traction to the brachial plexus nerve roots. They may occur at breech deliveries or with shoulder dystocia.

- **Erb's palsy:** Upper nerve root (C5 and C6) injury. The affected arm lies straight, limp and with the hand pronated and the fingers flexed (waiter's tip position). It may be accompanied by phrenic nerve palsy causing an elevated diaphragm.
- **Klumpke's palsy:** the lower roots are injured, resulting in weakness of the wrist extensors and intrinsic muscles of the hand.

Most palsies resolve completely, but should be referred to an orthopaedic surgeon if not resolved by 6 weeks. Ninety per cent recover by 2 years.

facial nerve palsy: compression of the facial nerve by forceps blades or against the mother's ischial spine. It is unilateral, and there is facial weakness on crying but the eye remains open.



Fractures

Clavicle:

Usually from shoulder dystocia. A snap may be heard at delivery or the infant may have reduced arm movement on the affected side, or a lump from callus formation may be noticed over the clavicle at several days of age. The prognosis is excellent.

Humerus/femur:

Usually mid-shaft, occurring at breech deliveries, or fracture of the humerus at shoulder dystocia. There is deformity, reduced movement of the limb and pain on movement. They heal rapidly with immobilization.