MARROW

2024 NEET-SS

UPDATED PEDIATRICS NOTES

NEONATOLOGY

NEONATAL RESUSCITATION

Introduction :

- Spontaneous breathing in : 85%
- Initial steps required in : 10%
- Bag and mask ventilation required in : 5%
- Intubation required in : 1%
- Chest compressions required in : 1 to 2%
- Babies requiring only PPV : 3%.

Note : First step to be done in case of neonatal arrest is ventilation.

Events at birth

00:03:47

Pulmonary changes :

After the baby is born :

- Lungs get aerated.
- Placental circulation is terminated.
- Foramen ovale is closed.

These events initiate the pulmonary circulation in a neonate.

Changes in fetal circulation :

1. Ductus venosus :
    - Closes immediately.
    - Fibrosis starts at 3 days and completes by 3 months.
2. Ductus arteriosus :
    - Starts closing by 72 hours and will be complete by 2 weeks.
    - Can take upto 1 year in preterm babies.
3. Foramen ovale :
    - Immediate functional closure.
    - Full closure might take from 3 months to 3 years

Resuscitation algorithm

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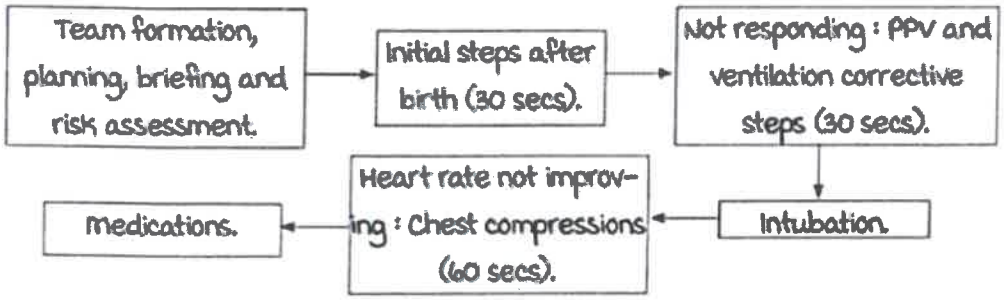
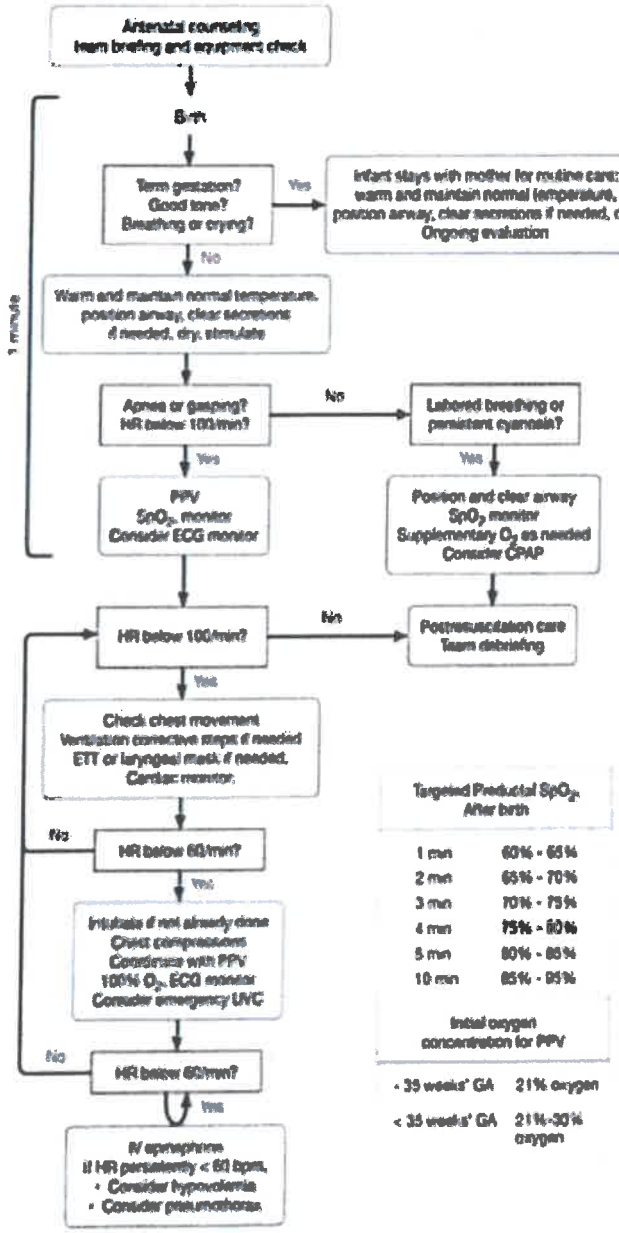
The recent algorithm is based on NRP 2020.





NRP algorithm for neonatal resuscitation.

Anticipation and planning :

Anticipation and planning is based on four factors :

- Expected gestational age.
- Amniotic fluid.
- Additional risk factors.
- Umbilical cord management plan.

The resuscitation team :

Number of personnels required:

- Low risk : 1 personnel
- High risk : 2 personnel, 1 should be able to do extensive resuscitation.
- Chest compression : 4 people.
- Complete resuscitation should be available.

Team briefing.

Team leader.

Closed loop communication.

Documentation.

Components of resuscitation 00:17:45

The steps involved are :

1. T : Temperature.
2. A : Airway.
3. B : Breathing.
4. C : Circulation.
5. D : Drugs.
6. E : Everything else.

1. Temperature :

- Room temperature : >25°C.
- Preheated warmer.
- Preheated towels.
- Caps.
- Plastic wraps and thermal warmers for <32 weeks of gestation.

Active space

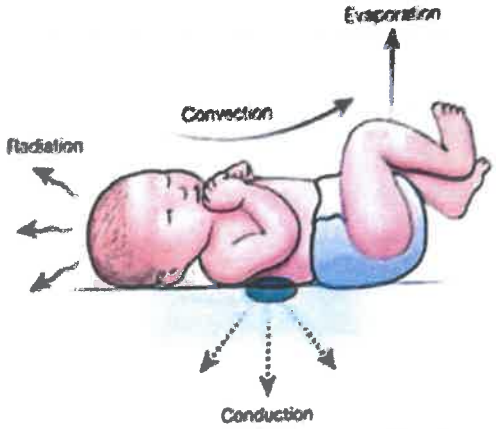
Modes of heat loss in a newborn :

- Evaporation (most important).
- Convection.
- Radiation.
- Conduction.

Rate of heat loss in a newborn :

0.1 to 0.3°C/minute.

In first 20 mins, babies' temperature can fall by 2 to 4°C.



Modes of heat loss in a newborn.

2. Airway :

- Suction : 10 and 12 F catheter.
- Pressure : 80 to 100 mmHg.
- Shoulder roll.

3. Breathing :

- Flow meter: 10L/min.
- Blender :
  - For term : 21% FiO2.
  - For preterm : 30% FiO2.
- Oxygen tubes, compressed oxygen source.
- PPV device : T piece resuscitator/self inflating bag and flow inflating bag.
- 8F orogastric tube.
- Pulseoximeter.
- Appropriate size mask.
- Laryngoscope .
- ET tubes.

4. Circulation :

- Stethoscope.
- Cardiac monitors.

5. Drugs :

Adrenaline :

- 1 in 10,000.
- 0.2 ml/kg IV.
- 1 ml/kg for intra tracheal dose.

UVC catheters : 3.5 or 5 size.

Feedback

Syringes.
Normal saline.

6. Everything else :

- Tapes.
- Ties.
- Name tags.
- Cord clamp.
- Gloves.

Resuscitation steps 00:33:24

Initial steps :

- Provide warmth.
- Dry.
- Stimulate.
- Position.
- Suction : Mouth before nose.
- Drying is not required in less than 32 weeks.
- Plastic bags are used in <32 weeks and in <1.5 Kg babies.

Respiratory support :

- No breathing : PPV.
- Breathing but distressed : CPAP.
- Breathing, no distress but cyanosed : Free flow oygen → Not improving → Then CPAP.

PPV :

Indications :

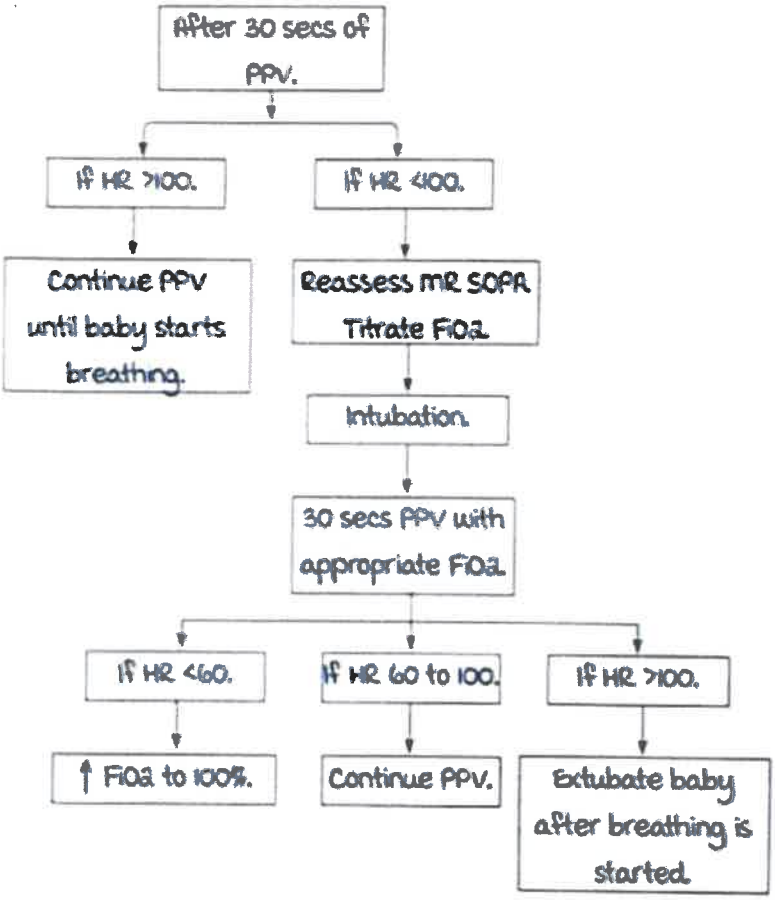
- Apnea.
- HR <100.
- The quickest and accurate method of measuring heart rate is auscultation.

Initial pressure of 20 to 25 cm H2O.
Rate is 40 to 60 breaths/minute.
The initial PEEP is 5 cm H2O.

Active space

After PPV is started :

- Tie pulse oximeter probe, check heart rate.
- For term, FiO2 is 21% and 30% for preterm neonate (<35 weeks).
- After 15 seconds, recheck heart rate.
- If no increase in heart rate, do MR SOPA → maximum pressure is 40cm for term and 30 cm for preterm baby.
- After chest rise → Continue PPV for 30 secs.



Intubation :

- Done always before chest compression
- Alternate airway.
- Prolonged ventilation.
- Congenital Diaphragmatic hernia : Intubatubation is started immediately.
- Best measure for ET tube insertion : Nasotragal length + 1 cm.
- One attempt should be over with 30 seconds.

Feedback

Active space

Signs of correct intubation :

- Mist in the tube.
- Increase in the heart rate.
- Chest rise.
- ETCo2.

Chest compressions :

One third of the anteroposterior diameter.

Rhythm : One and two and three and breathe.

Numbers :

- PPV alone : 40 to 60 breaths per minute.
- PPV with chest compressions.
    g. 3:1 ratio.
    h. 90 chest compressions, 30 breaths : Total 120 events per minute.

Adrenaline :

- Dose : 0.2 ml/kg as iv push
- First dose can be given ET : 1 ml/kg.
- Followed by 3 ml flush.
- Normal saline bolus 10 ml/kg if there is evidence of volume loss.

If no response to resuscitation :

Look for CARDIO.

- Chest Raise.
- Airway secured.
- Rate : Rhythm.
- Depth of compression.
- Inspired Oxygen.
- Stopping resuscitation: 20 minutes.

Naloxone :

If mother has received opiates during delivery.

Better to give CPAP and respiratory support rather than naloxone.

Feedback

Active space

Cord clamping :

Timing of cord clamping : Atleast 30 to 60 seconds.

Benefits :

- Decreased need of vasopressor for preterm neonates.
- Fewer blood transfusions.
- Improved hematological status.
- Improved survival and neurological outcomes.
- Increases risk of jaundice requiring phototherapy.

Indications for early cord clamping :

- Fetal blood loss : Abruptio placenta, placenta previa, vasa previa, cord avulsion.
- Fetal growth restriction.
- Twins.
- Rh negative pregnancy.

Note :

Prematurity is not a contraindication for delayed cord clamping.

Uncomplicated delivery :

Baby placed on skin to skin with mother : Golden one hour.

Couplet care : For babies >35 weeks and >2 Kgs.

Vitamin KI :

- Dose : 1 mg.
- For <1 Kg : 0.5 mg.

Hepatitis B before 12 hours.

BCG and OPV before discharge.

TcB : Done between 24 to 48 hours or atleast before discharge.

Newborn screening.

Hearing screening.

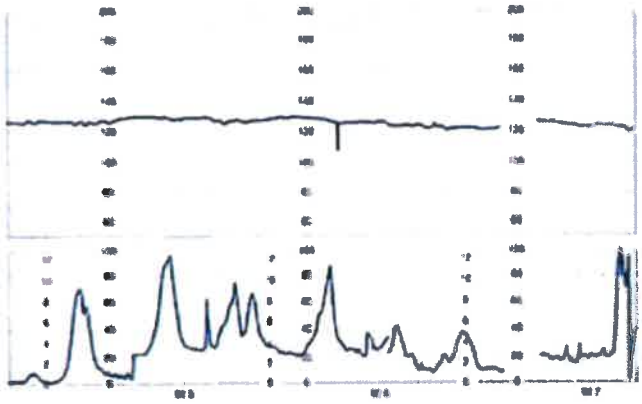
Pulse ox screening within 24 hours of discharge.

Feedback

PERINATAL ASPHYXIA

Perinatal asphyxia case scenario :

37 weeks pregnant woman → ↓Fetal movements for 2 days → In labor → Fetal arthrogryposis with significant polyhydraminos → Fetal BPP was 4/10 → CTG shown below → Delivers vaginally → HR <60 @ 1 minute and >100/min @ 5 minutes → No spontaneous breaths/tone or movement @ 10 minutes.



CTG of the patient.

Causes of perinatal ashpyxia 00:08:54

Perinatal asphyxia has 3 components :

- Maternal component.
- Peripartum component.
- Neonatal component.

ACOG Guidelines :

Criteria for perinatal asphyxia :

- APGAR score ≤5 at 5 mins, 10 mins.
- Fetal umbilical artery acidosis with pH ≤7 and base excess ≥12.
  Some definitions include lactate >10 mmol/L
- Neuroimaging evidence of acute brain injury seen on brain MRI or MR spectroscopy.
- Presence of multisystem organ failure consistent with HIE-renal injury, hepatic injury, hematological abnormalities, cardiac and GI disturbances.

Active space

Negative associations :

- If APGAR score is ≥ at 5 minutes : Less risk of cerebral palsy.
- If cord pH>7.2, unlikely to be a peripartum event.
- If MRI between 24 – 96 hours is normal : No evidence of HIE.

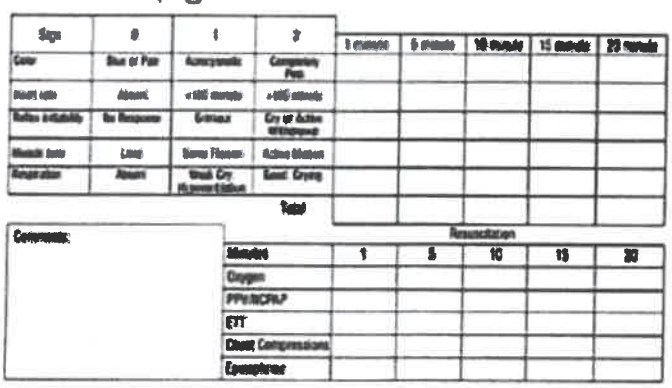
APGAR Score

00:11:18

	Indicator.	0 Points.	1 Point.	2 Points.
A	Appearance (Skin colour).	Blue/pale.	Pink body, blue extremities.	Pink.
P	Pulse.	Absent.	<100 bpm.	>100 bpm.
G	Grimace (Reflex irritability).	No response.	minimal response to stimulation.	Cough/sneeze when stimulated.
A	Activity (muscle tone).	Floppy.	Some flexion.	Well flexed.
R	Respiratory efforts.	Absent.	Slow and irregular.	Strong cry.

Features of APGAR score :

- Useful for conveying information about the newborn infant's overall status and response to resuscitation.
- Resuscitation must be initiated before the 1-minute score is assigned.
- Not used to determine the need for initial resuscitation, what resuscitation steps are necessary, or when to use them.
- Scoring in APGAR score :
  - i. 0 – 3 : Severe.
  - ii. 4 – 6 : moderate.
  - iii. 7 – 10 : Mild asphyxia.



APGAR chart by American academy of paediatrics.

Feedback

False positive APGARS :

Falsely low APGARS : Low APGAR in asphyxia.

- Maternal sedation or anesthesia.
- Birth trauma.
- Congenital heart blocks.
- Infection.
- Pulmonary disorders.
- Neuromuscular and central nervous system disorders.
- Gestational age.

Peripartum causes

00:23:53

Sentinel event :

- Ruptured uterus.
- Severe abruptio placenta.
- Amniotic fluid embolism.
- Cord prolapse.
- Maternal cardiovascular collapse.
- Fetal exsanguination.

These sentinel events cause abrupt obstruction in blood flow and oxygen supply to the fetus.

Delivery events :

- CPD.
- Shoulder dystocia.
- Breech delivery/malpresentations.
- Obstructed labor.
- Miforceps delivery.
- Precipitate delivery.
- Malpresentation.
- Prolonged labor.

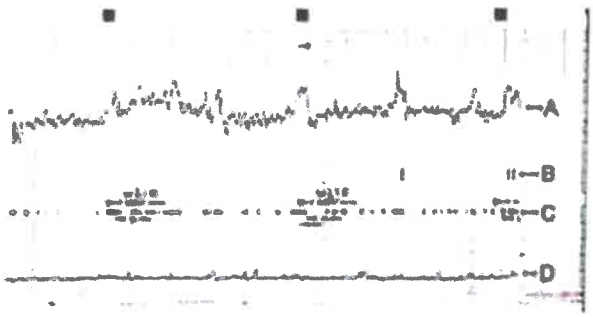
In case of any problem during labour there is severe vasospasm leading to hypoxia in the fetus → when uterus contracts there is hypoxia in the fetus → Partial prolonged hypoxia.

Feedback

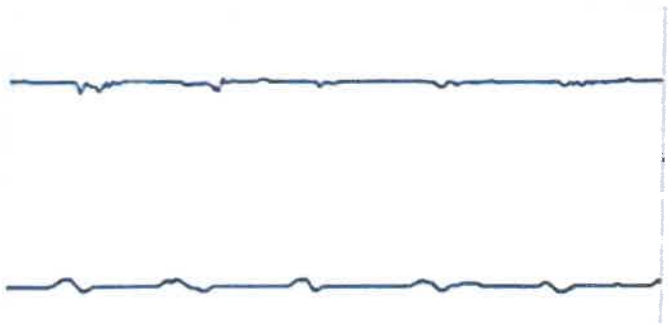
Active space

Peripartum monitoring – CTG :

- Baseline heart rate.
- Variability (Slight variability in FHR at rest of 5 – 25bpm).
- Accelerations.
- Decelerations.



Normal CTG.



Absent variability.

Absent variability is very dangerous for fetus.

Increased variability.

FHR variabilities :

- FHR >25 bpm : marked variability.
- FHR <5 bpm : minimal variability.
- FHR 5–25 bpm : moderate variability.

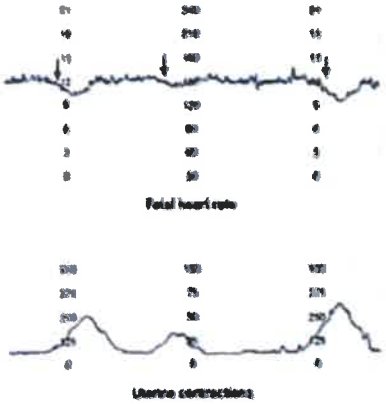
Feedback

Early deceleration :

As the uterus starts contracting the fetal heart rate starts decreasing.

Peak of fetal heart rate dip corresponds to peak of uterine contraction.

Shallow curve in CTG.



Early deceleration.

It occurs due to compression of fetal during uterine contraction and causes a vagal response.

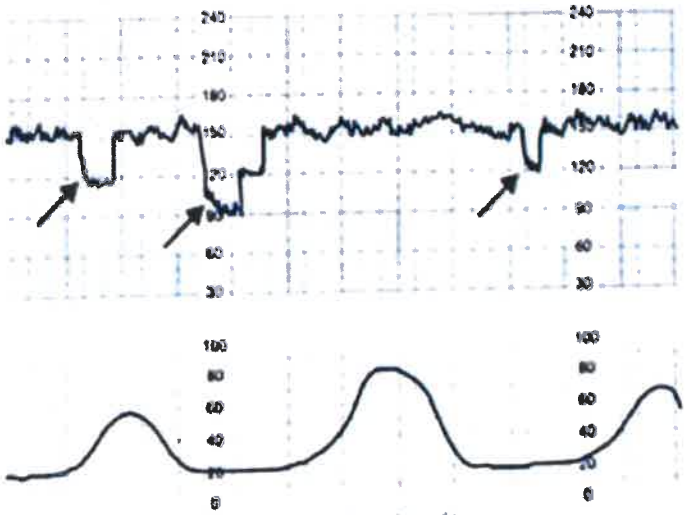
It is not dangerous to the fetus.

Variable deceleration :

There is no link between uterine contraction and fetal head compression.

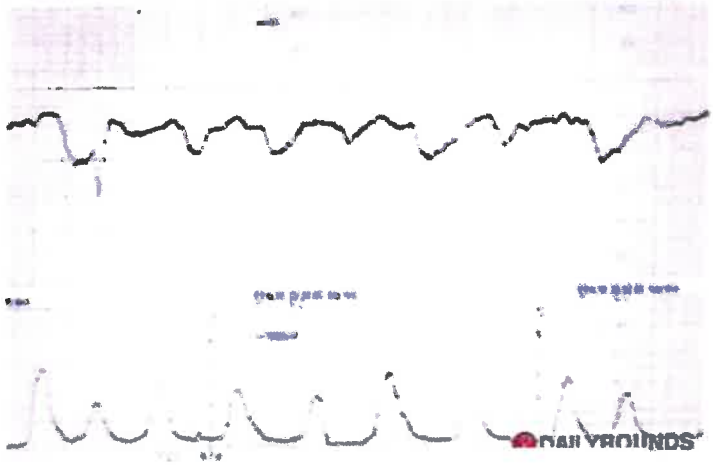
It is either 'u' or 'v' shaped.

It is seen in cord compression.



Variable deceleration.

Late deceleration :

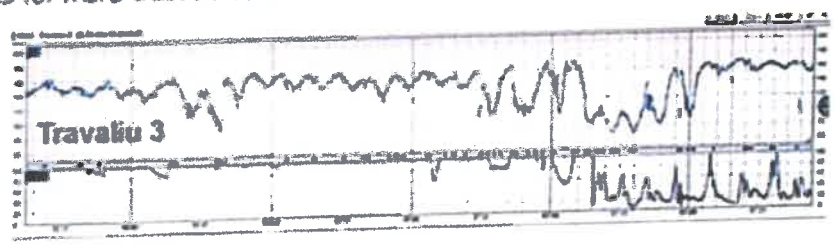


Late deceleration

- Beginning of deceleration happens at the peak of uterine contraction
- It is pathological
- Usually in last 10 minutes of delivery late deceleration is acceptable.

Prolonged deceleration :

Lasts for more than 30 seconds.



Prolonged deceleration

Classification of CTG :

Category I.	Baseline rate : 110–160 bpm
	Baseline variability : moderate.
	Late or variable decelerations : Absent.
	Accelerations : Present or absent.
Category II.	Includes all tracings not categorised as I or III.
Category III.	Absent baseline FHR variability & any of the following • Recurrent late decelerations. • Recurrent variable decelerations. • Bradycardia.
	Sinusoidal pattern.

Category I : Reassurance.
Category III : Immediate delivery.

Antenatal causes

00:39:03

Antepartum fetal monitoring :

- Fetal growth status.
- Dopplers.
- NST.
- BPP.

Antenatal fetal dopplers :

- most common fetal doppler done is umbilical artery doppler.
- It has 3 forms :
  - Normal form.
  - Absent end diastolic flow.
  - Reverse end diastolic flow.
- Aortic isthmus doppler is also used sometimes.
- MCA doppler is used to determine the resistance index.
- Ductus venosus doppler matches with fetal acid base status.

Fetal doppler.

NST :

- Reactive atleast 2 accelerations lasting for atleast 15 seconds and rising atleast 15bpm in a 20 minute period.
- NST can be done from 26 weeks gestation.
- Reactive NST is seen only from 32 weeks gestation.

BPP :

Fetal heart rate.	2 or more acclerations of 15bpm lasting more than 15 seconds in a thirty minute record.	1 or no acceleration in a thirty minute period.
Fetal muscle tone.	1 or more episodes of active extension and return to flexion in 30 mins.	Slow extension and return to partial or no flexion, no movement in 30 mins.
Fetal body movements.	3 or more in 30 minutes.	2 or less in 30 minutes.

Feedback

Active space

Fetal breathing movements.	One or more episodes of FBm of >30 seconds in 30 minutes.	Absent or no episodes of FBm in a 30 minute period.
Amniotic fluid volume.	1 or more pockets of fluid measuring >2 cm in vertical axis.	No or largest pocket <2 cm.

BPP scoring :

- Score of 8 – 10 : Reassurance.
- Score of 1 – 4 : Abnormal
- Score of 5 – 7 : Grey zone.

Feedback

BIRTH INJURIES

Incidence & risk factors 00:03:32

Incidence :

0.2% (a per thousand deliveries).

more common in normal vaginal deliveries.

Risk factors :

Breech delivery :

- Biggest risk factor.
- Can cause fractures in humerus, clavicle and mandible, gluteal hematomas, genital lacerations, spinal injuries and intracranial injuries.

Other risk factors are :

- Forceps.
- Vacuum delivery.
- Macrosomia.
- Abnormal presentation.
- Precipitous delivery.
- Maternal factors : Primigravida, CPD and short stature.

Note : GDM is not a risk factor

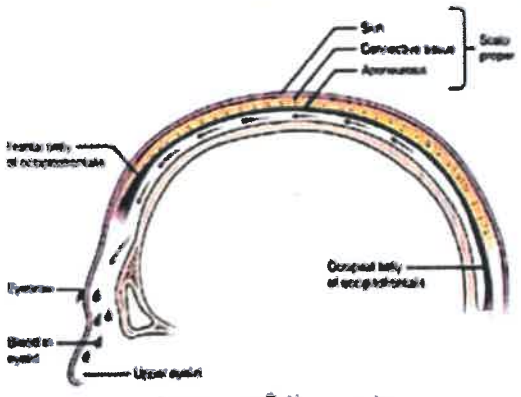
Common injury sites :

- Cranium : most common.
- Nerves, bones and soft tissues around cranium.

Extracranial bleeding 00:03:32

Layers of the scalp :

- Skin.
- Connective tissue.
- Aponeurosis.
- Loose areolar tissue.
- Periosteum.
- Bone.



Layers of the scalp.

Feedback

Active space

Injuries :
Between skin and connective tissue : Caput (Less severe).
Between aponeurosis and loose areolar tissue : Subgaleal bleed.
Between periosteum and bone : Cephalhematoma (more severe).

Cephalhematoma :
m/c site : Parietal region.
U/L > B/L.
Usually and enclosed space.
Complications :
- Jaundice (m/c).
- Abscess.
- Underlying depressed skull.
- Anaemia.
- Fractures (5 to 10%) : CT to be done if suspected.

Resolution : Starts calcifying by 2 weeks & disappears completely by 8 weeks.

Subgaleal hemorrhage :
Risk factors :
- Vacuum/forceps delivery.
- Hemphilia A.
- Acquired early vitamin K deficiency disorders.

Occurs in cephalic presentation.

Types :
1. Acute onset :
- Immediately after delivery.
- Baby taken to NICU Fluid resuscitation.

2. Gradual onset :
- Baby slowly becomes dull, anaemic and develops respiratory failure.
- HC monitoring : Every hrly for first three hours; every 6 hrly for 24 hours and then every 24 hours for 3 days.
- Monitor Hb values.

Feedback

Complications :

- DIC due to consumptive coagulopathy.
- Tight cap can cause scalp necrosis.

Note :

- Around 240 ml of blood can collect in subgaleal space.
- The volume of blood loss to be assumes with every cm increase in HC subgaleal hemorrhage is 40 ml.

Skull and facial fractures

00:11:51

Linear fractures :

- more common than depressed fracture.
- Asymptomatic.
- Occurs in parietal region.
- Can be associated with subdural/subarachnoid bleeding.

Depressed fracture :

- Occurs in parietal region with circumferential fractures.
- Can have seizures.

Note :

- m/c intracranial bleeding in a term neonate : SDH.
- m/c intracranial bleeding in a preterm neonate : Intraventricular hemorrhage.

Nerve injuries

00:13:55

The common nerve injuies are :

- Facial nerve injury (m/c).
- Brachial plexus injury.
- Phrenic nerve injury.
- Recurrent laryngeal nerve injury.

Feedback