

# Maternal History and Risk Factors

# What to Know/Study

- **Effects of maternal medical complications**

- Hematologic
- Hypertension, Renal disease
- Infections

- **Problems associated with amniotic fluid & membranes**

- Amniotic bands
- Oligohydramnios, Polyhydramnios
- PROM & Chorioamnionitis

- **Significance of findings**

- AFP/Triple screen
- Biophysical profile
- Diagnostic ultrasound
- Lung maturation studies

- **Recognize neonatal significance of fetal heart rate patterns**

- Variability, Decelerations
- Tachycardia, bradycardia

- **Neonatal effects of maternal medications**

- Tocolytics, Analgesia, anesthesia

- **Problems in labor-impact on the neonate**

- Breech & other
- Malpresentation
- Maternal hemorrhage, Meconium

- **OB emergencies (impact on neonate)**

- Abruptio placenta, Cord prolapse
- Placenta previa

- **Impact of methods of delivery on the neonate (forceps, vacuum, C/S)**

# Maternal Hematologic Issues

## Anemia

- Low Hgb (<9mg/dL) associated with:
  - Decreased oxygen carrying capacity to fetus leading to:
    - Growth restriction
    - Prematurity
    - IUFD

## • Thrombocytopenia

- Most commonly from:
  - Preeclampsia
  - HeLLP
- Most worrisome when plts <50,000
- Effect on fetus/newborn
  - IUFD
  - Transient thrombocytopenia

# Maternal Preeclampsia/Hypertension

- Four categories
  - Preeclampsia/eclampsia
  - Chronic hypertension
  - Chronic hypertension with superimposed preeclampsia
  - Gestational hypertension

# Hypertensive Disorders: Pre-E, Eclampsia, HELLP

- Usual management:
  - Hospitalization if severe
  - Medication to lower blood pressure
  - Magnesium Sulfate for seizure prophylaxis
  - BMZ if premature
  - Close observation of fetal well-being
    - Fetal Heart Rate monitoring
    - Biophysical Profiles
    - Fetal Growth

# Potential Fetal/Neonatal Effects

- Fetal

- Decreased uterine blood flow
- Decreased placental perfusion
- IUGR
- Abruptio
- Intolerance of labor
- Intrauterine fetal demise

- Neonatal

- SGA
- Prematurity
- Emergent delivery
- Hypotonia
- Thrombocytopenia

# Maternal Renal Disease

## **Maternal risks**

- Superimposed preeclampsia
- UTIs
- Bacteremia
- Risks increase if dialysis or transplant patient

## **Fetal risks**

- Growth restriction
- Infection

## **Neonatal risks**

- Preterm delivery
- Hyperviscosity

# Intrauterine Infections

- TORCH(S)
  - Toxoplasmosis
  - **O**ther
  - **R**ubella
  - **CMV**
  - **HSV**
  - **Syphilis**
- Consider TORCH When a Baby Presents with:
  - IUGR
  - Hepatosplenomegaly
  - Microcephaly
  - Intracranial calcifications
  - Conjunctivitis
  - Hearing loss
  - Rash
  - Thrombocytophilia



# Intrauterine Infections

## Congenital Rubella

- Hearing loss 60%
- CHD: 45% (PDA, PPS)
- Cataracts 25%
- Microcephaly 27%
- IUGR (symmetric)
- Developmental delay
- Purpura “Blueberry muffin rash”

## Toxoplasmosis

- May be asymptomatic at birth
- Classic triad of sx:
  - Chorioretinitis
  - Hydrocephalus
  - Cranial calcifications



# CMV

- Primary exposure during pregnancy carries up to 50% chance of transmission to fetus
- CMV causes viral placentitis in turn causing uteroplacental insufficiency
- 5-20% newborns infected with CMV are symptomatic at birth
- Symptoms include: petechiae, jaundice, hepatosplenomegaly, microcephaly, IUGR, chorioretinitis, thrombocytopenia and anemia
- Long term sequelae include: hearing loss, vision problems, and psychomotor developmental delay

# Maternal Infections

## Intrauterine HSV-Rare



## Perinatally acquired HSV

- Sx may be non-specific as in early sepsis
- Lesions may be noted on Skin Eyes, Mouth (SEM)



- Infection progresses rapidly to hypotension, DIC, shock

<https://www.uptodate.com/contents/overview-of-torch-infections>

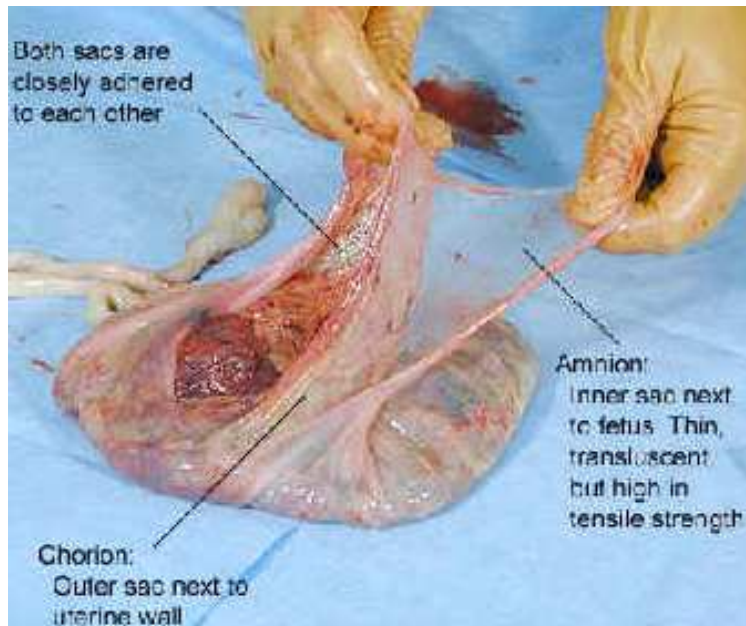
# Maternal Infections: Syphilis

- Stillbirth
- Preterm
- Low birth weight
- Non-immune hydrops
- Rhinitis “snuffles”
- Rashes
- Lymphadenopathy
- Radiographic bone abnormalities
- Hematologic issues



# Problems with Amniotic Fluid and Membranes

- Amniotic Band Sequence
- Not genetic



# Amniotic Fluid Index (AFI)

- Measurement total of the largest pockets of amniotic fluid in four different quadrants of the uterus
- If amniotic fluid index is less than 5 centimeters → oligohydramnios
- If it is  $\geq 25$  centimeters → polyhydramnios

# Problems with Amniotic Fluid and Membranes

**PROM:** Premature rupture of membranes

- Spontaneous rupture of membranes at term gestation prior to the onset of labor

**PPROM:** Preterm premature rupture of membranes

- Spontaneous rupture of membranes **before** 37 weeks gestation without onset of labor

# Problems with Amniotic Fluid and Membranes: Chorioamnionitis

- Dysfunctional labor
- Foul smelling vaginal discharge
- Maternal fever
- Uterine tetany
- Uterine irritability
- Hemorrhage
- Endometritis
- Sepsis





# Chorioamnionitis: Potential Fetal Effects

- Fetal tachycardia
- Fetal intolerance to labor
- Poor neurologic outcome, but why?
- Frequency highest in preterm deliveries with PROM
  - < 27 weeks (41%)
  - 28-36 weeks (15%)
  - Term (2%)

# Mechanisms of Hypoxia/Asphyxia

## **Acute**

- Placental abruption, vasa previa, maternal hemorrhage, uterine rupture

## **Intermittent**

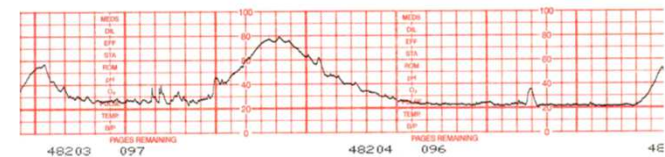
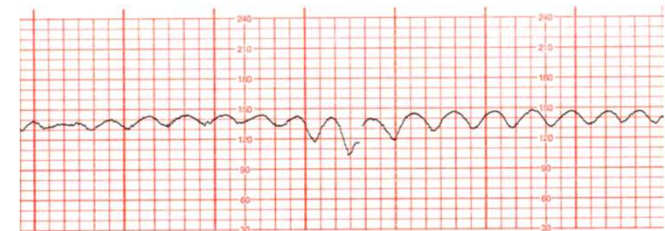
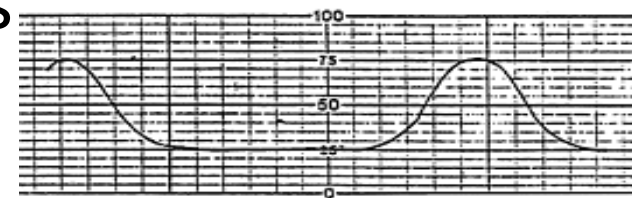
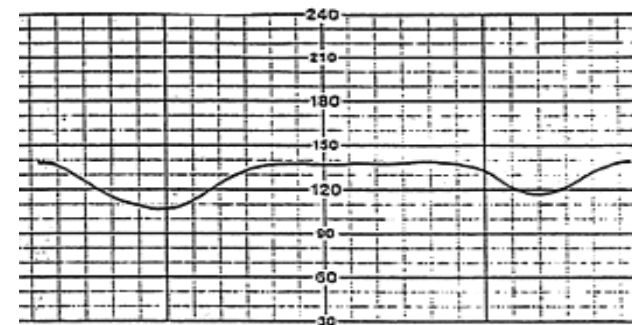
- Contraction, cord compression

## **Chronic**

- Maternal: hypertension, preeclampsia, asthma, diabetes, lupus, renal disease, pulmonary edema
- Fetal: anemia, infection

# FHR Patterns Consistently Associated with Newborn Acidemia

- Absent variability and
  - Recurrent late decelerations
  - Recurrent variable decelerations
- Absent variability and
  - Tachycardia
  - Bradycardia (< 80 bpm)
- Sinusoidal pattern



# VEAL CHOP and FHR

- **V**ariable deceleration
- **E**arly deceleration
- **A**cceleration
- **L**ate deceleration
- **C**ord Compression
- **H**ead Compression
- **O**K!
- **P**lacental Insufficiency

# Rh Isoimmunization

- Rh negative mother who has been exposed to Rh positive blood cells and now carrying Rh + fetus
- Fetal cells enter the maternal circulation, stimulating an antibody response
- Maternal antibodies cross the placenta and destroy fetal red blood cells
- Severity generally increases with subsequent affected pregnancies
  - First exposure (first pregnancy), usually not affected

# Rh Isoimmunization

## RhoGAM

- Coats the antigens of the fetal cells in the circulation
- Masks the Rh+ cells from the maternal immune system, preventing sensitization
- Given at 28 weeks gestation, at delivery, and for any event that may transfer cells (amniocentesis, miscarriage, abdominal trauma, etc.)

# Twins



Monochorionic/Monoamniotic



Monochorionic/Diamniotic

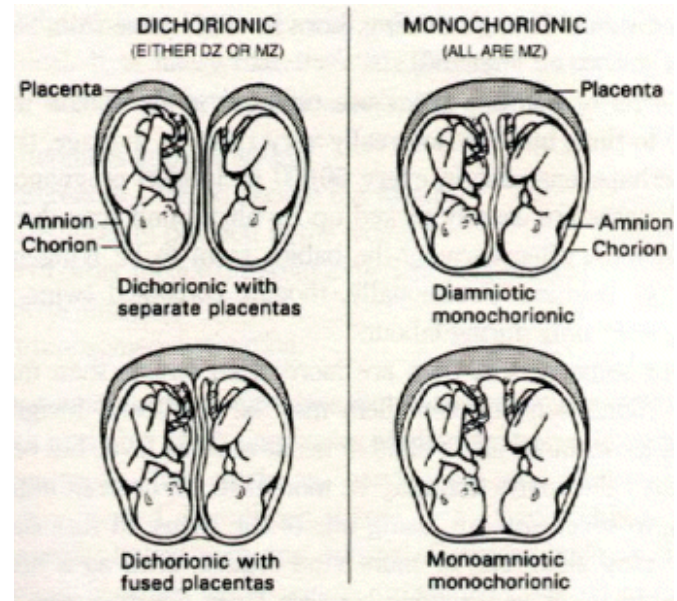


Dichorionic/Diamniotic  
(Fused Placenta)



Dichorionic/Diamniotic  
(Separate Placenta)

- Di/Di
- Mono/Di
- Mono/Mono



# Antenatal Testing: Triple and Quad Screen

## Triple Screen

- Measures presence of:
  - AFP
  - HCG
  - Estriol
- Done at 15-20 weeks gestation
- Screens for:
  - Trisomy 18, 21
  - Neural tube defects
  - Gastroschisis

## Quad screen

- Measures presence of:
  - AFP
  - HCG
  - Estriol
  - Inhibin A (more specific for Down's)
- Done at 15-20 weeks gestation
- Screens for:
  - Trisomy 18, 21
  - Neural tube defects



# Testing for Lung Maturity

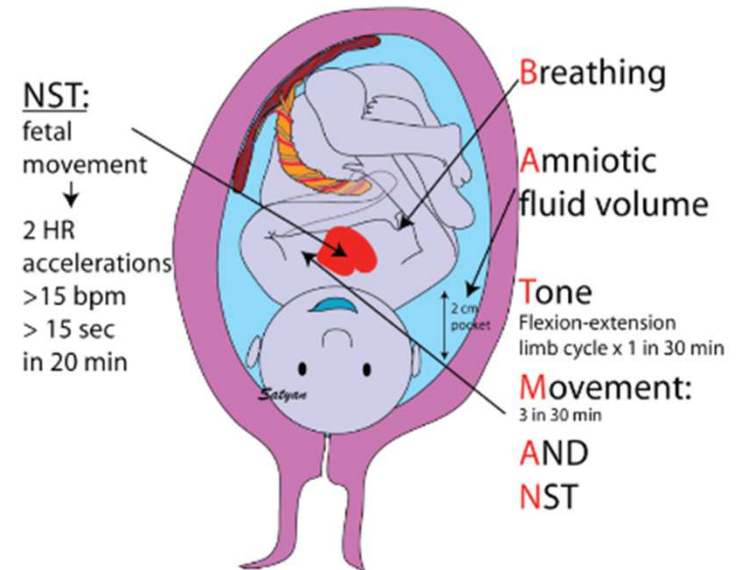
- **Lamellar body count**
  - Direct measure of surfactant production by Type II pneumocytes
  - >30,000-50,000 per microliter = maturity
- **Phosphatidylglycerol**
  - Produced at 35 wks
  - > 2% suggests maturity
- **L/S ratio (Lecithin/Sphingomyelin)**
  - Ratios equal at 32-33 weeks
  - “L” amt increases “S” doesn’t
  - Ratio 2:1 suggests maturity

# Antenatal Testing: Non-Stress Test (NST) and Biophysical Profile (BPP)

**NST** looks for presence of:

- 2 FHR accels >15 bpm lasting > 15 secs in 20 minute timeframe
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Biophysical Profile (BPP) - Composed of 5 categories with each scoring 2 or 0

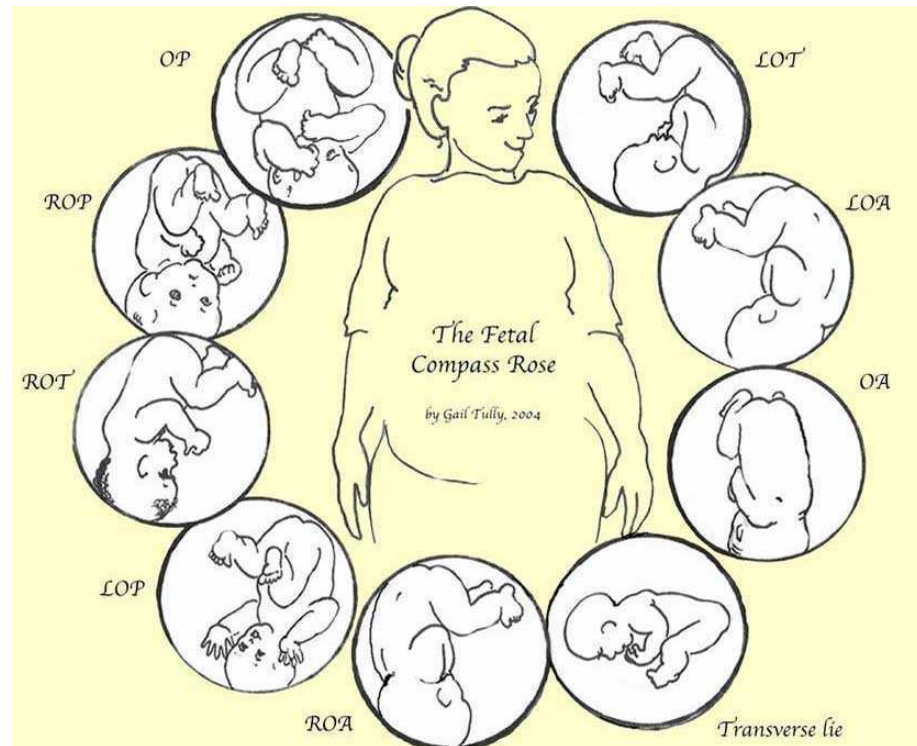


# Maternal Medications and Effect on Fetus

- **NSAIDS/Indomethacin**
  - Decreased AFI
  - Premature closure of the PDA in utero
- **Magnesium Sulfate**
  - Decreased FHR Variability
  - Decreased muscle tone
  - Decreased calcium
- **Betamethasone**
  - Decreased FHRV and BPP scores
- **Anesthesia/Analgesia**
  - Respiratory depression
  - Fetal bradycardia
  - CNS depression
- **Terbutaline**
  - Increased growth
  - Elevated HR

# Fetal Position and Risk

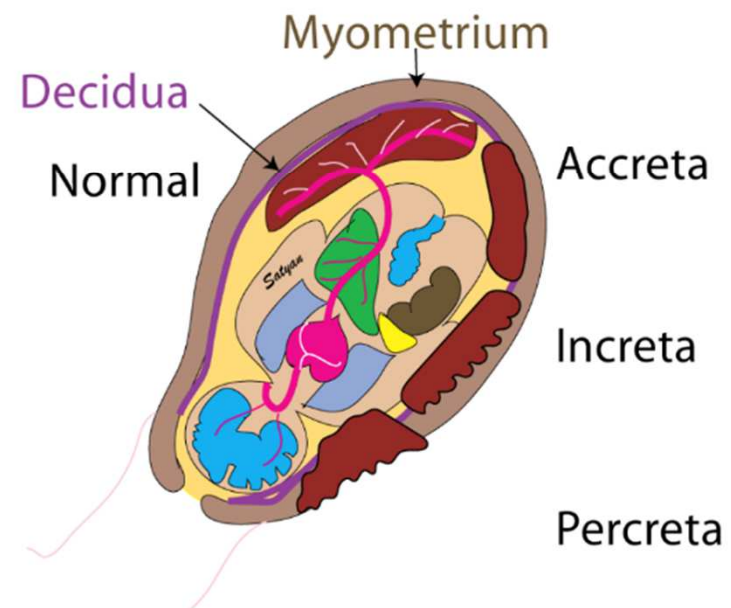
- Breech
  - Hypoxia
- Shoulder dystocia
  - HIE
  - Brachial plexus injury
  - Fractured clavicle



# Perinatal Emergencies

- Abnormal Placentation
  - Previa
  - Accreta
  - Percreta
  - Increta
- Uterine Rupture
- Abruptio

Abnormal Placental Adherence - Placenta adheres to Myometrium instead of Endometrium



# Abnormal Placentation: Previa

- 2nd and/or 3rd trimester bleeding
- Complete bedrest
- Possible hospitalization until delivery
- Cesarean for previa
- Anemia
- IUFD

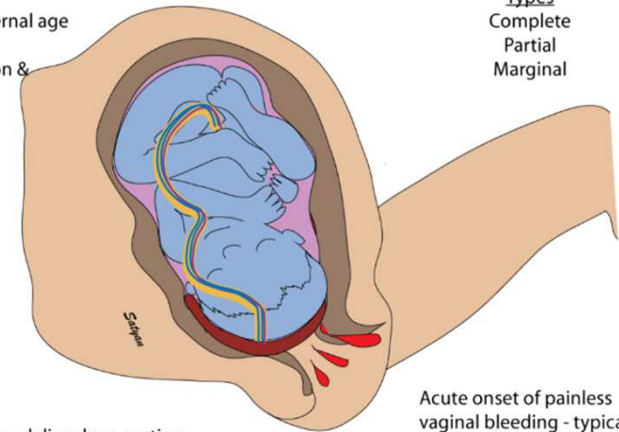
Placenta Previa - Abnormal implantation of Placenta Near or Over the Internal Cervical Os

Risk Factors:

Advancing maternal age  
Increased parity  
Previous abortion &  
C-section  
Smoking

Types

Complete  
Partial  
Marginal



Management

Severe bleeding - deliver by c-section  
Prematurity, no active bleeding - observation  
Mature - deliver by c-section  
Closely monitor fetus/infant for bleeding

Acute onset of painless vaginal bleeding - typically after 2nd trimester

# How Much Can She Bleed?

- No autoregulation of uterine blood flow, the vessels are maximally dilated during pregnancy
- Blood flow through the uterus/placenta is approximately 700 mL/min at term

# Uterine Rupture

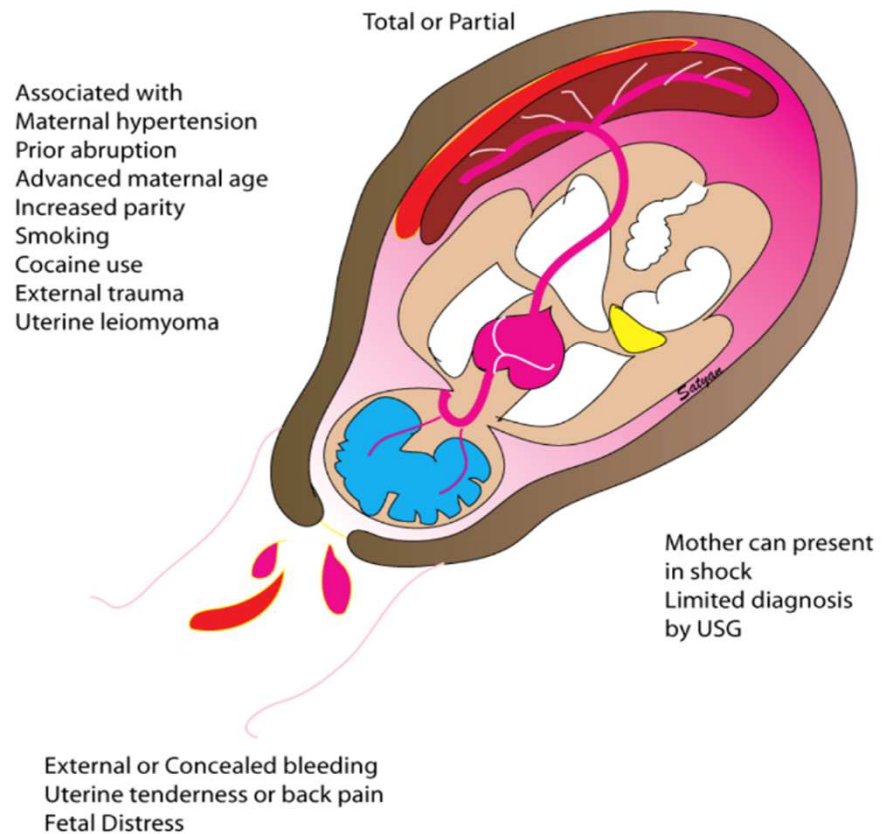
- Uterine rupture: complete disruption of all uterine layers, including the serosa
- Life-threatening for both mother and fetus with risk of:
  - Severe hemorrhage
  - Bladder laceration
  - Hysterectomy
  - Neonatal morbidity related to intrauterine hypoxia
- Uterine dehiscence: incomplete uterine scar separation where the serosa remains intact
  - Not usually associated with hemorrhage or adverse maternal or perinatal outcomes



# Abruption

- Occurs when the placenta prematurely separates from the wall of the uterus
- Can be complete or partial

Placental Abruption-Premature Separation of a Normally Implanted Placenta that can lead to Concealed or Apparent Hemorrhage



# Cord Prolapse

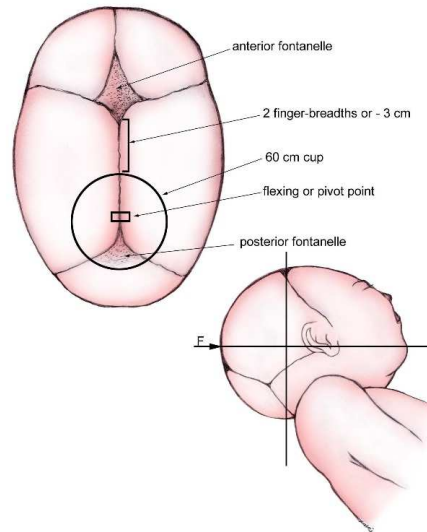
- Risk factors
  - Polyhydramnios
  - Malpresentation (esp footling breech)
- Risk to baby
  - Asphyxia
  - HIE



# Instrumentation and Effect on the Neonate

- Vacuum

- Scalp swellings
- Subgaleal hemorrhage
- Skin breakdown
- Neuro sequelae



- Forceps

- Skin breakdown
- Bruising
- Skull fracture
- Nerve injury

