437 Team: Obstetrics and Gynecology

Preterm Labor

Objectives:

- Identify the modifiable and non-modifiable risk factors and causes for preterm labor.
- Describe the signs and symptoms of preterm labor.
- Describe the initial management of preterm labor.
- List indications and contraindications of medications used in preterm labor.
- List the adverse outcomes associated with preterm birth.
- Describe the counseling for reducing preterm birth risk.

References:

- Kaplan USMLE step 2 CK - Obstetrics and Gynecology
- Online Meded videos
- Team 435

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Color index: Important | Notes | Meded | Video-Case

Editing file link

Definition:

Delivery between 20-37 wks (Other references: 24-36 wks + 6 days) of EGA that include spontaneous (not iatrogenic) ≥3 **uterine contractions** in 30 min and **cervical dilation** at least 2 cm or changing.

- Preterm delivery is the most common cause of perinatal morbidity and mortality.
- The leading causes of morbidity and mortality in preterm labor are: **respiratory distress, Infection, and Intraventricular hemorrhage.**
- Overall, 12% of pregnancies deliver prematurely. Many patients will have preterm contractions but not be in preterm labor.

Risk factors:

- Prior preterm birth (PTB) the most important and highest risk
- Short transvaginal (TV) cervical length (<25 mm) - length assessed by US
- Premature rupture of membranes (PROM)
- Excessive uterine enlargement (Polyhydramnios, Multiple gestation)
- Placental abnormalities (abruptio placentae, Placenta previa)
- Incompetent cervix (e.g. Hx of surgery)
- Uterine anomaly, E.g. Septate, Didelphys, Bicornuate.. Etc
- Uterine Tumor, E.g. Leiomyoma (Fibroid)
- African American race
- Young patient
- Genitourinary Infections
- Others: low maternal pre-pregnancy weight, smoking, substance abuse, and short inter-pregnancy interval (<18 months) - any interval <2 years is considered a risk factor

Hazards of PTB:

Neonatal death	Respiratory distress syndrome (RDS)	Patent ductus arteriosus (PDA)	Intraventricular hemorrhage (IVH)
Necrotizing enterocolitis (NEC)	Retinopathy of prematurity (ROP)	Bronchopulmonary dysplasia (BPD)	Cerebral palsy (CP)

Prevention:

- All pregnant women should be screened for history of previous PTB on first prenatal visit and cervical length by sonogram prior to 24 weeks.

Evaluation

1. **Vaginal examination → cervical length, dilation, station, presentation.**
2. **Swap/Culture for presence of Group B strep.**
3. CBC, Random Blood Glucose, Serum electrolytes levels … etc.
4. Ultrasound → fetal weight, presentation, any congenital malformations, multifetal gestation, uterine anomalies.
5. Any underlying correctable conditions.
6. Put patient in lateral decubitus position.
7. Monitor uterine activity.

Diagnosis

Symptoms

- lower abdominal pain/pressure, lower back pain
- increased vaginal discharge, or bloody show.

Particularly in primigravidas symptoms may be present for a number of hours to days but are not recognized as contractions by the patient.

Criteria that need to be met to make a diagnosis include:

- Gestational age: >20 weeks but <37 weeks
- Uterine contractions: at least 3 contractions in 30 minutes
- Cervical exam: serial examinations show a change in dilation or effacement, or a single examination shows cervical dilation >2 cm

Fetal fibronectin (fFN) is a protein matrix produced by fetal cells which acts as a biological glue, binding the trophoblast to the maternal decidua. It "leaks" into the vagina if PTB is likely and can be measured with a rapid test using a vaginal swab.

- Prerequisites for testing: gestation 22–35 weeks, cervical dilation <3 cm, and membranes intact
- Interpretation: main value of test is a negative, since chance of PTB in the next 2 weeks is <1%; with a **positive result, likelihood of PTB is 50%**

Tocolytic Contraindications: Conditions under which stopping labor is either dangerous for the mother and baby or futile (makes no difference in outcome)

Obstetric	Fetal	Maternal
Severe abruptio placentae Ruptured membranes, chorioamnionitis	Lethal anomaly (anencephaly, renal agenesis) Fetal demise or jeopardy (repetitive late decelerations)	Eclampsia Severe preeclampsia Advanced cervical dilation

Management

Management of preterm labor involves several steps:

Step 1: Confirm labor using the three criteria listed earlier—gestational age, contraction frequency, cervical exam.

Step 2: Rule out contraindications to tocolysis. Do not try to prolong pregnancy if obstetric, fetal, maternal complications are present.

Step 3: **Start IV MgSO4 if <32 weeks for fetal neuroprotection of cerebral palsy.** Administer at least four hours before anticipated birth.

Step 4: Administer IM betamethasone if <34 weeks to stimulate fetal type II pneumocyte surfactant production. A 48-hr course is needed for full effect to take place.

Step 5: Start tocolytic therapy if <34 weeks to prolong pregnancy to allow for antenatal steroid effect. There is no benefit exceeding 48 hours . MgSO4, terbutaline, or nifedipine can be used up to 34 weeks. Indomethacin should not be used after 32 weeks due to concerns regarding in-utero closure of the PDA.

Step 6: Start IV penicillin G if <36 weeks for GBS sepsis prophylaxis (use vancomycin if allergic to penicillin G). First obtain recto-vaginal cultures.

Side effects & contraindications of tocolytics:

Beta Agonists

- Tachycardia, Hypokalemia, Hyperglycemia, Pulmonary edema.
- Contraindicated in cardiac disease, diabetes mellitus, uncontrolled hyperthyroidism.

Calcium Channel Blocker

- Tachycardia, Hypotension, Myocardial depression.
- Contraindicated in hypotension or pre-load dependant cardiac lesions eg.aortic insufficiency

Indomethacin

- Oligohydramnios, PDA closure in utero, Neonatal necrotizing enterocolitis.
- Contraindicated in gestational age ≥32 weeks as they may cause premature closure of the ductus arteriosus. Furthermore, they can inhibit uterine contractility.

Magnesium sulfate

- Muscle weakness, Respiratory depression and pulmonary edema.
- Contraindicated in renal insufficiency and myasthenia gravis.

General Tips:

- **Hydration and bed rest** can resolve uterine contractions in 20% of patients.
- If a patient doesn't respond to hydration and bed rest, give Tocolytic therapy.
- **Delivery in Preterm labor is usually vaginally** (normally or using outlet forceps), except for very low-birth fetuses (↓1500 g) where cesarean delivery is better, as in 28 wks. 23% of infants have breech presentation.
- **NICU can help within viability limits** (24 wks. or greater than 500 g).

Teaching case

An 18-year-old African-American, G2P0101(2 pregnancies, 0 term births, 1 preterm birth, 0 losses before 20 weeks, 1 living child) woman who is 12 weeks pregnant, presents to your prenatal clinic for a new patient visit. Before you walk into the room to see the patient, you look through her records and note that she delivered her last pregnancy just 12 months ago. Beginning at 24 weeks in her previous pregnancy, the patient presented numerous times to Labor and Delivery reporting contractions, and was sent home each time with a diagnosis of "Braxton-Hicks contractions." She eventually presented at 28 weeks gestation and was diagnosed with preterm labor. She delivered at 29 weeks. The neonate's course was complicated by intraventricular hemorrhage and respiratory distress syndrome. The child now appears to have cerebral palsy and chronic lung disease due to bronchopulmonary dysplasia.

Questions

1. What are the risk factors for preterm labor, and which ones does this patient have?

A. Risk factors of preterm labor:

- Prior preterm birth (PTB)
- Short transvaginal (TV) cervical length (<25 mm)
- PROM
- Multiple gestation
- Polyhydramnios
- Uterine anomaly
- Uterine Tumor
- African American race
- Young patient
- Genitourinary Infections
- Low maternal pre-pregnancy weight
- Smoking
- Substance abuse
- Short inter-pregnancy interval

B. Patient risk factors:

Young, African American, with prior preterm birth, and short inter-pregnancy interval.

2. What characteristics distinguish Braxton-Hicks contractions from true labor contractions?

Braxton-Hicks contractions	True Labor Contractions
Irregular and sporadic contractions	Regular intervals
Painless or mild intensity	Progressive ↑ in frequency and intensity
Not associated with progressive cervical dilation and effacement	Associated with cervical dilation
Relieved by rest, hydration, and/or sedation	Not relieved by sedation

3. What should you counsel the patient regarding the signs and symptoms of preterm labor?

Pain:

Contractions of labor (both True and Braxton-Hicks) are uterine in origin, mimic menstrual cycle, usually associated with low, dull backache and abdominal/pelvic pressure.

Vaginal Discharge:

Normal labor is associated with vaginal discharge. Once the cervix is dilated due to uterine contractions, a mucus plug is released, and hence, the discharge is mucoid, watery, and slightly stained with blood.

4. What recommendations, if any, would you discuss with this patient regarding prevention strategies to reduce the risk of preterm delivery in this pregnancy? To reduce the risk of neurodevelopmental disorders and other morbidity associated with preterm labor in this fetus should she experience preterm labor?

This is important!

A. Progesterone
Route: Vaginal or Intramuscular
Aim: Stop contractions and relax the uterus, preventing cervical dilatation (↓risk of preterm labor)
Time to Start: Second trimester (or earlier in case of prior history of PTB)

B. Magnesium Sulfate
Route: Intravenous
Aim: Reduce risk of cerebral palsy in surviving infants
Time to Start: Between 24-34 weeks

C. Antibiotics
Aim: prophylactic against Group-B Strep. sepsis in the neonate

D. Antenatal Steroids (Betamethasone or Dexamethasone)
Route: Intramuscular
Aim: Enhance fetal lung maturity, ↓Respiratory distress syndrome, Intracranial hemorrhage, Necrotizing enterocolitis, death, and risk of necrotizing fasciitis .
Use if the mother is diagnosed with PTB, has a prior history of PTB, or at risk of PTB

5. If the patient does experience PTL in this pregnancy, what recommendations would you make regarding treatment and management?

A. Assessment:
Fetal fibronectin testing (negative) and cervical length (greater than 2.5 cm) have good negative predictive value in deciding which patients do not require treatment for preterm labor

B. Administration:
Delay the delivery (buy more time) until steroids can take action with tocolytic medication (uterine relaxers) for a maximum period of 7 days

The risks of tocolytics include:

- Magnesium Sulfate:
  - Maternal Flushing
  - Decreased reflexes
  - Muscle weakness
  - Pulmonary edema
  - Fetal lethargy
  - Fetal hypotonia
  - Fetal respiratory distress (in large doses)
  - Fetal bone abnormalities (if used > 7 days)
- Nifedipine: Maternal hypotension
- Indomethacin:
  - Maternal nausea
  - Esophageal reflux
  - Gastritis
  - Platelet dysfunction
  - Fetal preterm closure of ductus arteriosus (with >48 hour use)
- Beta-mimetics (most commonly used agent):
  - Maternal tachycardia
  - Hypotension
  - Tremor
  - Shortness of breath
  - Chest discomfort
  - Pulmonary edema
  - Hypokalemia
  - Hyperglycemia
  - Fetal tachycardia (continuous CTG)

6. What are the potential adverse outcomes of preterm birth for the fetus?

- Respiratory distress syndrome (most common)
- Intraventricular hemorrhage
- Neurological impairment
- Sepsis
- Seizures
- Bronchopulmonary dysplasia
- Cerebral palsy
- Necrotizing enterocolitis