Preterm Labor & Delivery Challenges and Progress

Elmar P. Sakala, MD, MA, MPH
Professor of Gynecology & Obstetrics
Loma Linda University School of Medicine

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OBJECTIVES

1. Define preterm labor and its pathophysiology
2. Explore trends in epidemiology of preterm birth
3. Review risk factors for and predictors of preterm birth
4. Outline diagnosis and treatment of preterm labor
5. Discuss screening and prevention of preterm birth

Definition of Preterm Birth

Modified from original courtesy of William Eagle, MD, Indiana University
© March of Dimes
Replace Phrase ‘Term Pregnancy’ with 4 Categories
ACOG/SMFM – November, 2013

<table>
<thead>
<tr>
<th>EARLY</th>
<th>FULL</th>
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37 38 39 40 41 42 43

...............Weeks of Pregnancy...............
Risk Factors for Preterm Birth

DO ANY OF THESE RISK FACTORS APPLY TO YOU?

☐ I had an **unexpected preterm birth** with a previous pregnancy
☐ I am pregnant with **more than one baby**
☐ I had a **baby less than 12 months ago**
☐ I have **high blood pressure**
☐ I am **under a lot of stress**
☐ I am **smoking, drinking alcohol, or using drugs while pregnant**
☐ My doctor told me I have a problem with my uterus, cervix, or vagina
☐ I have **African-American, or Black ancestry**
Predictors of Preterm Delivery

- Presence of Fetal Fibronectin
- Short Cervix
- Prior Spontaneous PTB
- Vaginal Bleeding
- Bacterial Vaginosis
- Body Mass Index <19.8
- African American Race
- Contractions
- Pelvic Infections

Relative Risk 0 2 4 6 8 10 12 14
Pathophysiology for Preterm Birth

Prevention of Preterm Birth
Screening
Interventions

Final Common Pathway

UTERUS Contractions
MEMBRANES Rupture
CERVIX Effacement Dilatation

PRETERM Delivery
SCREENING for Preterm Birth Risk
ALL pregnant women

History:
Previous Preterm Birth

Sonogram cervical length:
Prior to 24 weeks

Cervical Length
(Transvaginal sono)
**Measurement of the Cervix**

- **A** is the Funnel Length.
- **B** is the Cervical Length

**Record**
- **B** as \( T H E \) Cervical Length

**C** Ant lip should = \( C \) Post lip


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**Normal TV Sono**

**Cervical Length**
- 40-35 mm

**Preterm Birth Risk**

**Cervical Length**
- < 25 mm

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**Amnion**

**Chorion**

**Cervical length (15 mm)**
Prevention of Preterm Birth

**Interventions**

**INTERVENTIONS** prevent Preterm Birth
Selected pregnant women

- **17-OH-P:**
  - IM weekly

- **Progesterone:**
  - Vaginal daily suppositories

- **Cervical cerclage:**
  - Surgical procedure

**NO interventions if TWINS!**
Prenatal 17-OH progesterone supplement

History of previous Previous PTB

- Birth <34 weeks  down 70%
- Birth <37 weeks  down 45%
- Neonatal death  down 55%
- Assisted ventilation  down 60%
- NEC admissions  down 70%
- NICU admission  down 75%

2013 meta-analysis analyzed 39 randomized trials
IVH, neonatal sepsis & ROP retinopathy not statistically significant.

Treatment with vaginal progesterone

Sono finding of Short Cervical length

- Birth <28 wks  down 50%
- Birth <33 wks  down 40%
- Birth <35 wks  down 30%
- RD Syndrome  down 50%
- Neonatal M&M  down 43%
- Birth Weight <1500 g  down 45%
- NICU admission  down 25%
- Mechanical ventilation  down 34%

5 placebo-controlled randomized trials (n = 775 pregnancies)

Interventions to prevent Preterm Birth

- **NOTHING!!**  +  NORMAL  +  NO
- 17-OH-P  +  NORMAL  +  YES
- Cerclage + 17-OH-P  +  SHORT  +  YES
- Progesterone Daily vaginal suppository  +  SHORT  +  NO

NO interventions if TWINS!
The clinical findings of true labor are the same whether preterm or term labor. Early findings can be non-specific and can be present for many hours in women without cervical change:

- Menstrual-like cramping
- Mild, irregular contraction
- Low back ache
- Pressure sensation in vagina
- Vaginal mucus discharge

**Symptoms of PTL**

**Clinical Criteria**

- Gestational Age
- Uterine contractions
- Cervical Change
Clinical CRITERIA to diagnose PTL

- **Gestational Age:**
  - 20 to 36 weeks

- **Persistent uterine contractions:**
  - 4 in 20 minutes
  - 8 in 60 minutes
Classification of UTERINE CONTRACTIONS

A  Uterine irritability
B  Braxton Hicks
C  Preterm contractions
D  Preterm labor

Clinical CRITERIA to diagnose PTL

• Gestational Age:
  – 20 to 36 weeks
• Persistent uterine contractions:
  – 4 in 20 minutes
  – 8 in 60 minutes
• Digital cervical exam findings:
  – Cervical dilation >2 cm
  – Cervical effacement ≥ 80%
  – Change in effacement or dilation

Diagnosis of PTL
Cervical Exam

Uterus
Cervix
Vagina

not effaced, not dilated
fully effaced, 1 cm dilated
Fetal Fibronectin (fFN)

- **Trophoblast Glue**
  - Matrix that bonds Trophoblast to Decidua
  - Predictor of Preterm Delivery

Fetal Fibronectin (fFN)

- **Sensitivity & Specificity** (5 randomized trials)
  - Delivery within 7-10 days of testing: 77% & 83%
  - Delivery < 34 weeks gestation: 69% & 84%
  - Delivery < 37 weeks gestation: 61% & 82%

- **Positive** predictive value - 26%
- **Negative** predictive value - 2.4%
- **Negative** is more helpful than a **Positive**
Contraindications to tocolysis

Preterm labor may be a protective event to get the fetus out of a hostile environment.

Contraindications to tocolysis

Stopping labor may be either dangerous or futile to Mom or baby.
Contraindications to tocolysis

Conditions under which stopping labor is either dangerous to Mom/baby or futile.

**OBSTETRIC**
- Severe abruption
- Ruptured membranes
- Chorioamnionitis

**FETAL**
- Lethal anomaly
- Fetal demise
- Fetal jeopardy

**MATERNAL**
- Eclampsia
- Severe preeclampsia
- Advanced dilation

Speculum exam with wet non-lubricated speculum

- **Estimate cervical dilation:** > 3 cm supports diagnosis of PTL
- **Assess any bleeding:** abruptio vs placenta previa
- **Evaluate for PROM:** pooling, nitrazine, fern testing
- **Obtain fFN specimen:** rotate swab 10 sec in posterior vaginal fornix

Laboratory Evaluation

- **Group B strep culture:** (rectovaginal) if not done within the previous five weeks. Antibiotics may be started if needed.
- **Urine culture:** looking for asymptomatic bacteriuria
- **Urine drug screen:** in patients with substance abuse risk factors
- **Fetal fibronectin:** (fFN) vaginal swab
**Triage Management**

1. **Gestation WEEKS:**
   - ≥ 34; < 34
2. **Cervical DILATION:**
   - ≥ 3 cm; < 3 cm
3. **TV CERVICAL LENGTH:**
   - > 30 mm, 20-30 mm, < 20 mm
4. **Fetal FIBRONECTIN:**
   - positive, negative

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**Manage: > 34 wks - Cervix: irrelevant**

- **Perinatal M&M too low** to justify potential maternal/fetal complications & costs
- **Short term prolongation** of pregnancy does NOT significantly improve outcome
- **No benefit to steroids or tocolysis**
  - Observe for 4-6 hours to assess progressive cervical dilation and/or effacement
  - If no cervical change, discharge home

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**Manage: < 34 wks - Cervix ≥ 3 cm**

- **Perinatal M&M are high enough** to justify potential maternal & fetal complications/costs
- **Short term prolongation** of pregnancy may significantly **improve outcome**
  - **DIAGNOSIS** of Preterm Labor is **CONFIRMED**
  - No benefit to assess TV cervical length or fFN
  - Admit and initiate preterm labor interventions
  - Transfer to higher level care (if needed)
Manage: < 34 wks – Cervix < 3 cm
Diagnosis PTL UNCERTAIN – triage with sono cervical length

Cervical length > 30 mm:

– LOW risk of delivery within 7 days (< 5%) regardless of fFN results
– DIAGNOSIS of Preterm Labor is RULED OUT
– No fFN specimen to lab
– Observe 4-6 hours
  • NO cervical change – PTL ruled out – DISCHARGE
  • IF cervical change – PTL confirmed – ADMIT

Cervical length < 20 mm:

– HIGH risk of delivery within 7 days (> 25%) regardless of fFN results
– DIAGNOSIS of Preterm Labor is CONFIRMED
– Discard fFN specimen
– ADMIT and initiate preterm labor treatment
– TRANSFER to higher level care (if needed)

Cervical length 20-30 mm:

– MODERATE risk of delivery within 7 days but most will not deliver
– DIAGNOSIS Preterm Labor STILL UNCERTAIN
– Triage with Fetal Fibronectin (fFN) swab to lab
  • fFN negative: OBSERVE for 4-6 hrs;
    – NO cervical change – PTL ruled out – DISCHARGE
    – IF cervical change – PTL confirmed – ADMIT & TRANSFER prn
  • fFN positive: ADMIT & TRANSFER prn

Preterm Labor Treatment
INTERVENTIONS for fetal benefit

- **Magnesium sulfate** if < 32 weeks
  - Neonatal neuro-protection
- **Betamethasone** if < 34 weeks
  - Fetal surfactant stimulation
- **Tocolytic agents** if < 34 weeks
  - Time surfactant stimulation & transfer to NICU
- **Antibiotics** if < 36 weeks
  - GBS sepsis chemoprophylaxis

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**Intervention: Magnesium Sulfate**

Mechanism of action is **poorly understood**

- **Neonatal neuro-protection** (CP & death)
  - if gestation is 24 to 32 weeks
  - If **imminent** delivery anticipated (within 24 hr)
  - Infusion **duration**: > 4 hours but < 24 hours
  - Insufficient evidence for **repeated** infusions
- **Dosage**
  - 4 g IV loading dose with 1 g/hr maintenance
  - (6 g IV loading dose with 2 g/hr maintenance or)
  - (4 g IV loading dose with no maintenance)
**Antenatal Corticosteroid Therapy**

The *most effective* way to decrease Perinatal M&M

- **Agents and dose**
  - Betamethasone: 12 mg IM, 2 doses 24 hrs apart
  - Dexamethasone: 6 mg IM, 4 doses 12 hrs apart
- **Benefit primarily seen 23-34 weeks**
  - Alveoli need to be present in the lung (>22 wks)
- **Benefit if > 24 hr and < 7 days** after 1st dose
- **Give if high risk of delivery in next 7 days**
  - Clinical judgement

- **RDS (Mod-Severe)** down 45%  (21 studies; n=4000)
- **IVH** down 45%  (6 studies; n=1700)
- **NEC** down 55%  (8 studies; n=1700)
- **NNM** down 30%  (18 studies; n=4000)
- **Systemic Infection** down 45%  (5 studies; n=1300)

**Tocolytic Agents for PTL**

- **Avoid if contraindications** are present
  - Continuation of pregnancy is harmful to Mom or fetus
- **Give < 23 wks:** only if self-limited condition
  - Ruptured appendicitis or pyelonephritis
- **Avoid after 34 wks:** risks outweigh benefits
- **Goal:** 48 hr window for perinatal interventions
  - Steroid effect, MgSO4 & maternal transport
- **Agent selection:**
  - 24 to 32 wks: Indomethacin (1st) then nifedipine (2nd)
  - 32 to 34 wks: Nifedipine (1st) then terbutaline (2nd)

**TOCOLYTIC agents**

<table>
<thead>
<tr>
<th>Agent</th>
<th>Side Effects</th>
<th>Cochrane Review</th>
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<tbody>
<tr>
<td>MgSO4</td>
<td>Respiratory depression</td>
<td>No better than placebo</td>
</tr>
<tr>
<td>β-Adrenergic Agonists</td>
<td>↑ Glucose ↓ Potassium</td>
<td>No better than placebo</td>
</tr>
<tr>
<td>Ca++ channel blockers</td>
<td>Myocardial depression</td>
<td>Better than placebo to delay birth 48 hrs</td>
</tr>
<tr>
<td>PG synthetase inhibitors</td>
<td>Oligohydramios IU closure PDA</td>
<td>Insufficient evidence to base decision</td>
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Unproven Modalities for PTL

- Intravenous ethanol for tocolysis
- Maintenance tocolysis
- Prophylactic tocolysis
- Routine bed rest
- Home Uterine Contraction monitoring
- Avoiding sexual activity
- Prophylactic antibiotics (no PROM)

Can we reduce the preterm birth rate?

YES! We Can Do It!