Some Babies Are Born Well Before Their Time

Objectives

• Define Preterm Labor and Preterm Birth.
• Discuss the current preventive approaches to Preterm Labor.
• List the warning signs/symptoms of Preterm Labor.
• Describe the importance of patient education and early intervention as it relates to Preterm Birth Prevention.
Objectives (cont.)

• Describe the contraindications for tocolytic therapy.
• List the tocolytic drugs utilized to inhibit labor.
• Define Preterm PROM and the risks/benefits of conservative management.

Definitions

• Preterm Birth (PTB)- Delivery prior to 37 completed weeks gestation & after 23+ weeks gestation.

• Preterm Labor (PTL)- Regular uterine contractions, occurring > 6/hr; < 37 weeks and > 23+ weeks gestation; with cervical change

Significance

STATISTICS

• Incidence of PTB is 6-20% in USA
• PTB accounts for 75% of newborn M&M
• 50-80% with PTL will have PTB
• 50% with PTL have no risk factors
• Recurrence risk is 17-70%
LABOR is…
the process by which the products of conception are expelled from the uterus. The exact mechanisms that cause labor are not known but it has been hypothesized that there are multiple factors involved.

Significance
ETIOLOGY/THEORIES

Initiation of Term Labor
• ↑ Estrogen and ↓ Progesterone
• Oxytocin Production
• Release of Prostaglandins
• Change in Uterine Blood Flow
• ↑ in Uterine Size

Pathophysiology of Preterm Labor
• Choriodecidual Abnormalities
• Changes in Tissue Hormone Levels
Pathophysiology of PTL

Choriodecidual Abnormalities (Hemorrhage, Infection, Hypoxia)

Changes In Tissue Hormonal Levels (Estrogen, Progesterone, Oxytocin)

- Phospholipids
- Arachidonic acid
- Prostaglandins

Prostaglandins

Phospholipase

Prostaglandin synthetase

Altered Collagen Structure

Altered Intracellular Calcium Concentration

Prostaglandins

Cervical Effacement & Dilatation

Uterine Contraction

LABOR

Significance

PRETERM INFANT COMPLICATIONS

Physiological
- RDS
- IVH
- NEC
- Temp Instability
- Hypoglycemia

Developmental
- CP
- Suck, Swallow, Breathe
- Hyper/Hypotonicity
- Mental Retardation
- Learning Disabilities
Neonatal Survival Statistics

<table>
<thead>
<tr>
<th>Weeks of Gestation</th>
<th>Survival %</th>
<th>Weight</th>
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</thead>
<tbody>
<tr>
<td>24-25 weeks</td>
<td>17%</td>
<td>1lb, 4oz</td>
</tr>
<tr>
<td>26-27 weeks</td>
<td>51%</td>
<td>2lbs</td>
</tr>
<tr>
<td>28-29 weeks</td>
<td>75%</td>
<td>2lbs, 8oz</td>
</tr>
<tr>
<td>29-31 weeks</td>
<td>87%</td>
<td>3lbs, 1oz</td>
</tr>
<tr>
<td>31-32 weeks</td>
<td>95%</td>
<td>3lbs, 14oz</td>
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<tr>
<td>33-34 weeks</td>
<td>98%</td>
<td>4lbs, 14oz</td>
</tr>
<tr>
<td>35-36 weeks</td>
<td>99%+</td>
<td>5lbs, 12oz</td>
</tr>
<tr>
<td>37-38 weeks</td>
<td>FT</td>
<td>6lbs, 2oz</td>
</tr>
</tbody>
</table>

Significance

PRETERM INFANT COMPLICATIONS

- The severity of the problem depends on the weight and maturity at birth
- Special care and hospitalization may be required
- Tx Goal: Support bodily functions until maturity occurs
Management Goals

Preterm Birth Prevention

- Ongoing Risk Assessment
- Education
- Close Prenatal Follow-up
- Early/Immediate Intervention

PTBP Management Goals:

Ongoing Risk Assessment

- Screening Tools
  - Creasy & Modified Creasy Tools
  - Major & Minor Risk Factor Tool
  - Fetal Fibronectin Test
Ongoing Risk Assessment
SCREENING TOOLS

CREASY TOOL
- Socioeconomic Status
- Past History
- Daily Habits
- Current Pregnancy
- Point System:
  0-5 = Low Risk; 6-9 = Medium Risk; >10 = High Risk

RISK FACTORS
- Major Factors (one or more = High Risk)
  - Previous preterm delivery
  - Multiple gestation
  - Cervical changes (dilation or effacement)
- Minor Factors (two or more = High Risk)
  - Hx of Pyelonephritis this pregnancy
  - Cigarette smoking (>10/day)

FETAL FIBRONECTIN TEST
- What is it?
  Glycoprotein found in cervico-vaginal secretions early in pregnancy; low to absent levels between 24 –36 weeks.
- How is it collected?
  Women 24-35 weeks, MIT, <3cms, s/s of PTL have a cervical specimen obtained with a Dacron swab; results within 2-24 hours (Lab dependent)
- How accurate are the results?
  99% Neg predictive value for delivery in 2 weeks of a Neg screen; 29% Pos predictive value -- repeat/ tx??
Management Goals

Preterm Birth Prevention

- Ongoing Risk Assessment
- Education
- Close Prenatal Follow-up
- Early/Immediate Intervention

PTBP Management Goals:

Patient Education

- Early Warning S/S of Preterm Labor
- Self Palpation for Uterine Contractions
- Prevention Measures

Patient Education

Early Warning S/S of Preterm Labor

- Menstrual-like cramps
- Low, dull, or sharp backache
- Pelvic pressure
- Abdominal cramping
- ↑ or change in vaginal discharge
- Leaking “fluid”
- Painless "tightening" or “balling up” of abdomen
- Feeling “Lousy” (Flu-like)
Patient Education

**Self Palpation**
(Feel for uterine contractions twice every day for about one hour)

- Urinate then drink 8oz water
- Lie slightly tilted to the side
- Using fingertips, gently press into abdomen
  - Relaxed – Little resistance
  - Contraction- Tight or hard over most of the surface
- Measure the frequency of contractions

Patient Education

**Preventive Measures**

- Increase Rest Periods
- Decrease Strenuous Activity
- ? Employment Changes 😊
- ? Sexual Activity Changes 😊
- Decrease Stress
- Keep lines of Communication open

Management Goals

**Preterm Birth Prevention**

- Ongoing Risk Assessment
- Education
- Close Prenatal Follow-up
- Early/Immediate Intervention
PTBP Management Goals:
Close Prenatal Follow-up

- MD/CNM office or clinic visits
- Home care visits

Management Goals

Preterm Birth Prevention
- Ongoing Risk Assessment
- Education
- Close Prenatal Follow-up
- Early/Immediate Intervention

PTBP Management Goals:
Early/Immediate Intervention
*Home Management*

- Modified Bedrest
- Activity Level
- Work (inside/outside home)
- Bathroom Privileges
- Childcare
- Physical Exercise
- Sexual Relations
- Monitoring Uterine Contractions
- Self Palpation
- Home Uterine Activity Monitoring
PTBP Management Goals:

**Early/Immediate Intervention**

*Hospitalization*

- Continuous Electronic Fetal Monitoring
- Modified Bedrest
- Cervical Exam
- Medication Administration
  - Steroids (Betamethasone or Dexamethasone)
  - Tocolysis ??

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**Suppression/Inhibition of PTL**

*Contraindications*

- Intrauterine Demise (IUFD)
- Fetal anomaly
- Fetal Distress
- Hemorrhage
- Severe Pre-eclampsia
- “Excessive” cervical dilatation ??
- < 20 weeks gestation ??
- **Preterm PROM ??**

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**Preterm PROM**

*Definitions*

- PROM – Premature Rupture Of fetal Membranes prior to the onset of labor, regardless of gestational age;
- **PPROM** - Preterm PROM < 37 weeks gestation;
- Prolonged ROM – Rupture of fetal membranes > 24 hours
Preterm PROM

Risk Factors

- Maternal Age
- Prior surgical instrumentation to cervix
- Smoking
- Infection – Chorioamnionitis
- Recent Coitus ???

Preterm PROM

Incidence

- PROM: 6-12% of all deliveries
- 30% of Preterm Births
- High recurrence risk- 21% in one study
- Most common event leading to admission to NICU

Unfortunately, the etiology is usually unexplained

Preterm PROM

Pathophysiology

- Deficiency of Collagen or Abnormal Collagen in the membranes
- Localized Deficits Vs. Generalized Problem
Preterm PROM

Complications

- Oligohydramnios
  - Pulmonary Hyperplasia
  - Limb & Facial Deformities
  - Umbilical Cord Compression/ Prolapse
- Chorioamnionitis
  - Maternal O2 Consumption
  - ▼ O2 to the Fetus
- IUFD

Preterm PROM

Management

The Goal is to develop a plan that will yield a healthy neonate while having the least maternal complication

Conservative Approach

Aggressive Approach

Conservative Approach

“Observation”

BENEFIT vs. RISK

Increased Gestational Age

Maternal &/or Fetal Infection; Prematurity

It's a Balancing Act
Preterm PROM
Management
Aggressive Approach

• Pitocin Induction
• Cesarean Section Delivery

Preterm PROM
Plan of Care

• Document / Confirm ROM
• Document Gestational Age
• Determine Pathologic Bacterial Infection
• Determine Fetal Lung Maturity
• Detect (early) Developing Infection(s)
• Detect (early) Fetal Compromise

Preterm PROM
Assessments
(Amniotic Fluid Examination)

1. Confirmation of Diagnosis
   ♦ Nitrazine testing of vaginal fluid (ineffective)
     - amniotic fluid pH is neutral (6.5-7.5)
     - cervical mucous is slightly acidic (5.0-6.0)
     - Urine pH varies (4.5-8)
       - Blood near cervix is neutral (7.4)
   ♦ Pooling
   ♦ Ferning (very sensitive)
   ♦ Amnisure
2. Fetal Pulmonary Lung Maturity
   ♦ LS
   ♦ Presence or absence of PG
3. Bacteria (via amniocentesis)
   ♦ Gram Stain
   ♦ Culture
   ♦ C - Reactive Protein presence

Preterm PROM Assessments
(Amniotic Fluid Examination)

Preterm PROM Assessments
(Abdominal Examination)

Preterm PROM Assessments
(Fetal Monitoring)

AVOID DIGITAL EXAMS until delivery is imminent!!
Preterm PROM
Assessments
(Serial Ultrasound Exams)

- Gestational age, fetal viability, presentation, placenta location (initially)
- Amniotic Fluid volume
- Fetal size/weight
- Presentation
- Fetal Breathing
- Lower uterine segment funneling/cervical length

Preterm PROM
Expected Outcomes

...Depend on the clinical status of mother and gestational age/status of fetus

Nursing Care focus is to protect both mother and fetus from further harm through continuous assessment and communication with all healthcare team members.

Preterm PROM
Controversies

- Antibiotic Therapy
- Tocolysis
- Magnesium Sulfate- Neuroprophylaxis
- Steroid Administration
- Cesarean Section vs. Vaginal Delivery of a premature infant
Suppression/Inhibition of PTL

Contraindications

- Intrauterine Demise (IUFD)
- Fetal anomaly
- Fetal Distress
- Hemorrhage
- Severe Pre-eclampsia
- “Excessive” cervical dilatation ??
- < 20 weeks gestation ??
- Preterm PROM ??

Inhibition of Preterm Labor

Tocolysis

- Magnesium Sulfate
- Betasymptomimetics
  - Ritodrine (only FDA approved)
  - Terbutaline
- Calcium Channel Blockers
  - Nifedipine/ Procardia
- Prostaglandin Synthetase Inhibitors
  - Indomethacin/ Indocin

Inhibition of Preterm Labor

Tocolysis

- Magnesium Sulfate
  - Initial Bolus: 4-6 gm over 30 minutes
  - Maintenance: 1-3 gm/ hour
  - Action: Competitive inhibition of entry of free calcium into the cell; blocks Ca with Magnesium; solely excreted by Kidney
Inhibition of Preterm Labor

**Tocolysis**

**Magnesium Sulfate (cont.)**
- **Therapeutic Level:** 4-7 mg/dl
- **Mat/Fetal/Neo Effects:**
  - Lethargy
  - Respiratory Depression
- **Antidote:** Calcium Gluconate (1 gm over 1-2 minutes)
- **Nursing Assessment:** VS, DTR's, EFM, I&O, LOC, LABS - Magnesium level

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Inhibition of Preterm Labor

**Tocolysis**

**Terbutaline**
- **IV:** 0.01-0.08 mg/min; ↑ by 0.01 mg/min every 10 min; max dosage is 0.08 mg/min
- **IM/SQ:** 0.25 mg every 2-4 hours
- **SQ Pump**
  - Basal: 0.05-0.1 mg/hr
  - Bolus: 0.25 mg every 2-4 hours
- **PO:** 2.5-5.0 mg every 2-4 hours

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Inhibition of Preterm Labor

**Tocolysis**

**Terbutaline (cont)**
- **Action:** Stimulation of B2 receptors primarily causing ↓ vascular/smooth muscle tone, ↓ bronchial tone, ↓ myometrial contractility
- **Mat/Fetal/Neo Effects:**
  - Tachycardia
  - Transient Hyperglycemia
Terbutaline (cont)

• **Relative Contraindications:**
  - Cardiac Disease
  - Insulin Requiring Diabetes
  - Bleeding

• **Antidote:** Inderal (1 mg IV)

• **Nursing Assessment:** VS (✓ HR), EFM, I&O (watch for pulmonary edema). Labs – glucose, calcium

Nifedipine

• **PO:** Initially, 10 mg; repeat doses of 10 mg every 20 min. x 3 doses; then 10-20 mg every 4-6 hours (max dosage is 120 mg/24 hours)

• **Action:** Interferes with the entry of free calcium into the cell

Nifedipine (cont)

• **Contraindications:** CHF or Aortic Stenosis

• **Mat/Fetal/Neo Effects:**
  - Hypotension
  - Transient Tachycardia

• **Nursing Assessment:** VS (✓ HR & BP), EFM
Inhibition of Preterm Labor

Tocolysis

Indomethacin

• **PO**: Initially, 25-50 mg; then 25 mg every 6 hours for only 48-72 hours
• **Action**: Inhibits the conversion of arachidonic acid to prostaglandin F2 and E2

Indomethacin (cont)

• **Contraindications**: Asthmatic, > 34 weeks
• **Mat/Fetal/Neo Effects**:
  ♦ ↓ Amniotic Fluid
  ♦ Premature closure of Ductus Arteriosis
• **Nursing Assessment**: EFM (✓ for variable decelerations), US for AFV, GI upset

Implications of Long Term Therapy/ Bedrest

Hospitalization vs Home

• **Physical Demands**
  ✓ Constipation
  ✓ Insomnia
  ✓ Muscle Atrophy
• **Environment Changes**
  ✓ Rearrange household- furniture, telephone TV, stereo, ice chest/food at bedside, lights on timers, house key to friends/relatives, clothing
  ✓ Alter ADL's- housekeeping, child/pet care, no work
Inhibition of Preterm Labor
Implications of Long Term Therapy/Bedrest
Hospitalization vs Home (cont)

• Psychological Impact
  ➢ Feelings of guilt, ambivalence, dependence, fear, anger, anxiety, lack of control, depression
  ➢ Confined to hospital/home/bed
  ➢ Role change
  ➢ Boredom

• Survival Techniques
  ➢ Structure each day
  ➢ Create lists
  ➢ Plan to entertain
  ➢ Borrow a pet
  ➢ Be useful
Preterm Labor & the Management of the Patient on Tocolytics

References
March of Dimes, California Chapter & Sutter Medical Center. Preterm Labor Assessment Tool Kit. 2005.

The End

Let’s Prevent Preterm Birth