

## Lecture Supplement #56, Premature Rupture of Membranes (PROM), Pre-term Labor (PTL), Pre-term Birth

### • Premature Rupture of the Membranes

- Overview
  - Definition = Rupture of chorioamniotic membranes (ROM) that occurs before the onset of labor
  - ROM results in loss of functions of the amniotic fluid (AF), i.e.:
    - Protection against infection
    - Protection against trauma
    - Allowing free movement
    - Protection against cord compression
  - Spontaneous premature rupture of membranes (PROM) is thought to often occur as a result of infection (chorioamnionitis) which could be subclinical and either weaken membranes or induce contractions.
  - PROM has an incidence of 10-15% and represents a major source of perinatal morbidity and mortality 2° to the risk of pre-term labor and delivery and/or the risk of chorioamnionitis
    - Relationship between premature rupture of membranes (PROM) and pre-term labor (PTL) is unclear.
    - Contractions result in cervical dilation resulting in infection resulting in spontaneous rupture
    - Chorioamnionitis:
      - Major threat to mother and fetus
      - Usual initial presentation is maternal and fetal tachycardia and uterine tenderness.
      - WBC's of limited value due to normal rise.
      - Treatment is parenteral antibiotics and delivery.
    - The interval between ROM and the spontaneous onset of labor is called the latent period and varies inversely with the length of gestation.
    - When PROM occurs prior to 37 weeks gestation it is called pre-term PROM (PPROM)
    - PPRM at <26 weeks gestation places fetus at risk for pulmonary hypoplasia and amniotic band syndrome.
- Diagnosis
  - **The single best test to confirm the diagnosis is direct observation of amniotic fluid in the vaginal vault.**
  - History (correct 90% of the time)
  - Avoid digital exam in the absence of labor
  - Sterile speculum exam may be performed to:
    - Confirm the diagnosis
    - Note the appearance of the cervix
    - Perform cultures
    - R/O cord prolapse
  - Diagnosis is confirmed by
    - "Pooling" of amniotic fluid
    - Alkaline pH

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- Sterile swab from posterior fornix.
- Turns nitrazine paper from yellow to blue
- False positives from alkaline urine, blood, semen, and some vaginitides
- Ferning
  - Sterile swab from posterior fornix
  - Placed on clean glass slide
  - Allow 10 minutes to dry
- Demonstration of fetal fibronectin
- Ultrasonography
- Management
  - Hospitalization required for initial evaluation and management
  - The basic options for the patient with PPRM are expectant management or immediate delivery.
  - Gestation 36 weeks or more
    - Goal is delivery
    - Whether to induce immediately or await spontaneous labor in the absence of infection or distress is controversial
    - FHR is monitored for tachycardia (infection) or variable decel's (cord impingement), and a baseline CBC is obtained
    - The problem with immediate induction is increased C/S rate with no decrease in the incidence of fetal distress or infection
  - Gestation 26-35 weeks
    - If the gestational age is 32 weeks or more, and fetal lung maturity is confirmed, the risks of expectant management usually exceed the risks of delivery
    - At a gestational age is less than 32 weeks, the greatest threat to the fetus is preterm delivery,
    - Therefore, attempt is made to prolong gestation in the absence of infection, cord compression, or fetal distress
    - Sterile speculum exam
    - Culture for GC, beta-hemolytic strep, chlamydia
    - Cervix visualized for dilatation, flow of AF
    - NO INTRACERVICAL DIGITAL EXAM UNLESS AND UNTIL ACTIVE LABOR
    - Amniocentesis for gram stain and culture (?)
    - Confirmed intrauterine infection = antibiotics and delivery
    - Sonogram to confirm GA and fetal presentation
    - Daily BPP
    - No prophylactic antibiotics, but group B strep is treated with ampicillin
    - Tertiary Care Center
    - Corticosteroids (?) (see below)
    - Evaluate for lung maturity at 31-35 week range
  - Gestation under 25 weeks

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- Only 40% will achieve viability or deliver a surviving infant
- Survivors face hazards of pulmonary hypoplasia, facial and limb deformities, limb contractures (amniotic band syndrome)
- Termination of pregnancy (TOP) is a reasonable option
- Patients who opt for continuation of pregnancy may stay at home and avoid vaginal contamination
- **Preterm Labor and Delivery**
  - Overview
    - Preterm labor = regular contractions accompanied by cervical change occurring at less than 37 weeks gestation.
    - Preterm birth = any birth after 20 weeks, but before 37 weeks of gestation have been completed.
    - Preterm birth is the leading cause of neonatal mortality, and a substantial portion of all birth-related short and long term morbidity.
    - Spontaneous preterm labor accounts for 40 – 50% of all preterm deliveries, with the remainder resulting from PPRM (25 – 40%) and obstetrically indicated preterm deliveries (20 – 25%)
    - Incidence 8-10%, however, this 8 – 10% accounts for more than 50% of the non-anomalous fetal morbidity and mortality
    - PTL is not a variation of term labor, but a disease or syndrome with multiple etiologies
    - In 50% of cases, the cause is unknown
  - Risk factors associated with pre-term birth
    - Race
    - Multiple gestation
    - Prior PTL and/or delivery
    - DES exposure
    - Hydramnios
    - Uterine anomalies
    - Prior "cold-knife" conization biopsies
    - Multiple prior midtrimester abortions, both induced and spontaneous
    - Cervical change prior to 32 weeks
    - Excess pre-term uterine activity
    - Extremes of age
    - Intra or extrauterine infection
      - As much as 1/3 of spontaneous PTL may be complicated by intra or extrauterine infection
      - Many cases of PPRM, and perhaps 1/3 of idiopathic PTL, may be 2° to subclinical chorioamnionitis
  - Prevention
    - Prediction
      - Risk scoring systems
      - Cervico-vaginal fibronectin

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- Fetal fibronectin is typically absent from cervico-vaginal secretions from around the 20<sup>th</sup> week until near term.
- Specimens are obtained using a Dacron swab rolled over the ectocervix and dipped into the posterior fornix.
- When found in the vagina or cervix, it appears to be a marker of choriodecidual disruption.
- For clinical care, the most important characteristic of the fetal fibronectin test is its negative predictive value.
- Ultrasound exams of cervix for shortening and funneling
  - As labor approaches, the cervix tends to shorten, soften, rotate anteriorly, and then dilate.
  - In asymptomatic women, such cervical changes described by ultrasound appear to have a high predictive value for subsequent preterm birth.
- Early diagnosis
  - Prenatal care
  - Education of patients and health-care workers to recognize subtle signs of PTL
  - Home uterine activity monitoring (HUAM)
- Effective tocolysis
  - Parenteral
  - Oral
- Management
  - Goal is delay to either achieve maturity or allow use of corticosteroids (see below)
  - Difficulties with early diagnosis, i.e., "the more definite it is, the more difficult it is to stop"
  - One of the most difficult decisions an obstetrician has to make is the determination whether a woman presenting with symptoms of preterm labor (contractions, small amount of dilatation or effacement) is in preterm labor.
  - Evaluate for presence and frequency of contractions, cervical status, and re-evaluate gestational age (GA)
  - US to confirm GA, R/O anomalies, assess amount of amniotic fluid (AF)
  - Search for treatable risk factors, i.e., UTI's
  - Bed rest (no evidence to support use)
  - Hydration
    - Common initial therapy
    - Hydration does not appear to reduce preterm birth, and its routine use to treat preterm labor cannot be recommended.
    - Risk of fluid overload with if ritodrine (Yutopar) is employed subsequently.
  - Sedation = not supported by the literature
  - Tocolysis (see **handout for general contraindications and specific protocols**)

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- It has been said that the use of tocolytics was frequently unnecessary, often ineffective, and occasionally harmful.
- In spite of this, tocolytics remain the standard of care in obstetrics, primarily due to their ability to delay delivery buying time for glucocorticoids to be administered.
- Magnesium sulfate ( $\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$ )
  - Most popular, low cost, familiar to most OB/GYN's
  - Level can be monitored
  - Wide difference between therapeutic (6-8mg/dl) and toxic levels
  - Toxic effects of high magnesium levels can be rapidly reversed with the infusion of 1 g of calcium gluconate.
  - Does not have the same serious and life threatening adverse effects of other methods
- Betamimetics
  - Although some  $\beta$ -sympathomimetic have been proposed as  $\beta_2$  selective agents, at the dosages used, stimulation of all receptor types often occurs, resulting in many of the associated side effects
  - Ritodrine (Yutopar) and terbutaline (Breathine) have become the primary drugs of this class used to treat preterm labor.
  - Initially administered parenterally, then converted to oral administration when contractions cease
  - Pulmonary edema occurs in 2-5%
  - Hypotension, cardiac arrhythmias, myocardial ischemia
  - Hypokalemia, hyperglycemia
  - Fluid restriction and careful monitoring needed
  - Terbutaline pump (?)
- Prostaglandin synthetase inhibitors
  - Indomethacin (Indocin) is the most extensively studied of this class of drugs.
  - Adverse fetal effects, i.e., narrowing of ductus arteriosus and oligohydramnios
  - Since the effect on ductal constriction increases with fetal age and duration of administration, use after 32 weeks or more than 48 hours is not recommended.
- Calcium channel blockers
  - Most studies have used nifedipine (Procardia)
  - Decrease contractility by reducing intracellular  $\text{Ca}^{++}$ , but human data limited, and some adverse effects with animal studies
- Maternal corticosteroid therapy
  - Antenatal dexamethasone (Decadron) or betamethasone (Celestone) administration to mother decreases risk of respiratory distress syndrome (RDS), intraventricular hemorrhage (IVH), and mortality in pre-term infants
  - Indicated for all fetuses who are at risk for delivery between 24 and 34 weeks, and with PPRM from 30-32 weeks because of the high risk of IVH.
  - Doses

## **Lecture Supplement #56, Premature Rupture of Membranes (PROM), Pre-term Labor (PTL), Pre-term Birth**

- Betamethasone = 12mg IM repeat in 12 hr
- Dexamethasone = 6mgIM x 4 at 12 hr intervals
- Benefits begin in 24 hours and last seven days, and delivery should be planned accordingly.
- Repeat courses should not be used.
- Labor and delivery
  - The remarkable reduction in neonatal mortality in the past 20 years is mostly due to the widespread use of newborn intensive care.
  - Transfer of mother so that labor and delivery take place in a Level III center is preferable to post delivery transport of a pre-term neonate to a Level III NICU.
  - Continuous EFM is even more important than with term infants.
  - Liberal use of cesarean birth for ominous monitor patterns or malpresentations