PROM AND PPROM

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Objectives

- Define premature rupture of the membranes (PROM) and preterm PROM (PPROM).
- Describe clinical presentation of patients with PROM.
- List the diagnostic tests to confirm PROM.
- Describe the etiology and risk factors for PROM.
- Compare the risks and benefits of conservative expectant management and immediate delivery.
- Describe the methods used for maternal and fetal monitoring during expectant management.
- Discuss the drugs used in the management of PPROM in terms of indications, contraindications and side effects (antibiotics, tocolytics, and glucocorticoids).
- Describe the management of chorioamnionitis.

Introduction

- Amniotic fluid starts to be continuously produced approximately 16 weeks gestation. it is primarily dependant on fetal urine production.
- Amniotic fluid allows for fetal movement and breathing which are important for fetal skeletal, lung and chest development.
- Decrease or absent amniotic fluid can lead to compression of the umbilical cord and decrease placental flow.
- Disruption of the fetal membranes leads to a loss of these protective effects and the developmental roles of amniotic fluid.

Definitions

- ***Premature ROM*** (PROM) **:** Amniorrhexis Prior to the onset of labor at any gestation
- ***Preterm ROM*** *(*PPROM)*:* PROM prior to 37 weeks gestation
- ***Latency Period***: time interval between ROM and onset of labor
- ***Expectant management***: management of patients with the goal of prolonging gestation ("watchful waiting" until delivery indication arises)

Premature rupture of the membranes (PROM) and preterm PROM (PPROM)

PROM

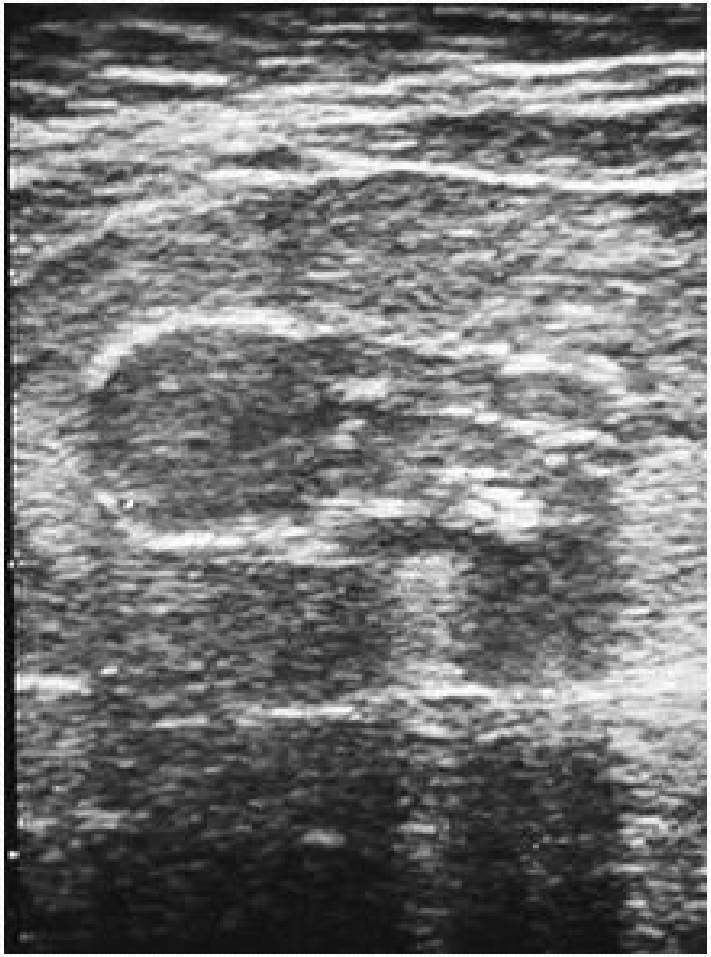
Premature rapture of membranes before the onset of labor

PPROM

Preterm premature rapture of membranes occurring before 37 weeks estimated gestational age

labor is defined as progressive dilation and effacement of the cervix in response to regular uterine contractions that occurs at least every 5 minutes and last 30 to 60 seconds.

Incidence-Preterm ROM



- 8 % of pregnancies for PROM
- 3 % for PPROM
- 30-40% of Preterm births
- PPROM ~25% cases of all PROM

The Etiology and risk factors for PROM

- The etiology of PROM remains unclear.
- The risk factors for PROM (anything that weakens the strength of the choreo amniotic membrane) including:
  - vaginal and cervical infections (An ascending infection from the vagina will weaken these membranes so sexually transmitted infections and other lower genital tract infections such as bacterial vaginosis play a role as risk factors).
  - A short cervix or an incompetent cervix.
- The risk for PROM is doubled for women who smoke.
- A history of prior PROM.
- Abnormal membrane physiology.
- Polyhydraminios and multiple gestations will basically descend the choreo amniotic membranes.
- Other risk factors are similar risk factors for preterm delivery including a prior preterm delivery, bleeding during pregnancy, low socioeconomic status and low body mass index.

Risk Factors

- Chorioamnionitis
- Vaginal infections
- Cervical abnormalities : cervical insufficiency, cervical conization.
- Vascular pathology (incl. abruptio)
- Smoking
- 1st, 2nd, 3rd, or multiple trimester bleeding
- Amniocentesis
- Previous preterm delivery (PPROM)
- AA ethnicity
- Low BMI
- Acquired or congenital connective tissue disorder
- Nutritional deficiencies (Vit.C, copper, zinc)
- Low socioeconomic status
- Illicit drug use
- Pulmonary disease in pregnancy

Diagnosis

- Clinical picture:
  1) Vaginal discharge
  2) Gush of fluid
  3) Leaking of fluid
  4) Oligo/Anhydramnios
  5) Cramping
  6) Contractions
  7) Back pain

- The classic clinical presentation of PPROM is a sudden "gush" of clear or pale yellow fluid from the vagina. However, many women describe intermittent or constant leaking of small amounts of fluid or just a sensation of wetness within the vagina or on the perineum.
- It can be confusing during pregnancy because there are many fluids that can mimic amniotic fluid (e.g. urine, normal vaginal secretions of pregnancy, increase cervical discharge, semen or perineal sweat).

- Diagnosis of PROM is based on the history of vaginal loss of fluid and confirmation of amniotic fluid in the vagina.
- Sterile Speculum exam (Pooling): A sterile speculum examination should be performed to visually assess the cervix and swab for cervical gonorrhea and Chlamydia. A group B strep culture should be obtained as well. On examination Pooling of amniotic fluid can be seen (pooling refers to the filling of the speculum with amniotic fluid).
- *Minimize digital examination to decrease the risk of infection*
- Nitrazine testing
- Microscopic Fern testing
- Fetal Fibronectin
- AmniSure
- Ultrasonography should be performed to assess fetal position as well as to assess the amount of amniotic fluid.
- Transabdominal Indigocarmine dye injection

Sterile Speculum Exam

- Sterile
- No lubricating jelly
- Pooling of fluid in posterior fornix
- Free flow of fluid from cervix
- Cervical dilation
- Nitrazine
- Collect slide for fern (dry 10 mins)

Consider need to collect other cervical tests/cultures such fetal fibronectin while doing the SSE.

Why not do a digital vaginal exam?

- Digital exams are associated with an increased risk of infection and add little information to that available with speculum examination.
- Digital cervical examinations should be avoided unless the patient appears to be in active labor or imminent delivery is planned.

Nitrazine paper testing

- Amniotic fluid has a ph greater than 7.1 while vaginal secretions have a ph between 4.5 to 6). Vaginal pH (3.5-4.5)
- Turns blue in presence of alkaline Amniotic fluid
- 93.3% sensitivity
- False positive (1-17%) for urine, blood, semen, BV, Trichomonas, cervical mucus, antiseptic solutions

Fern slide

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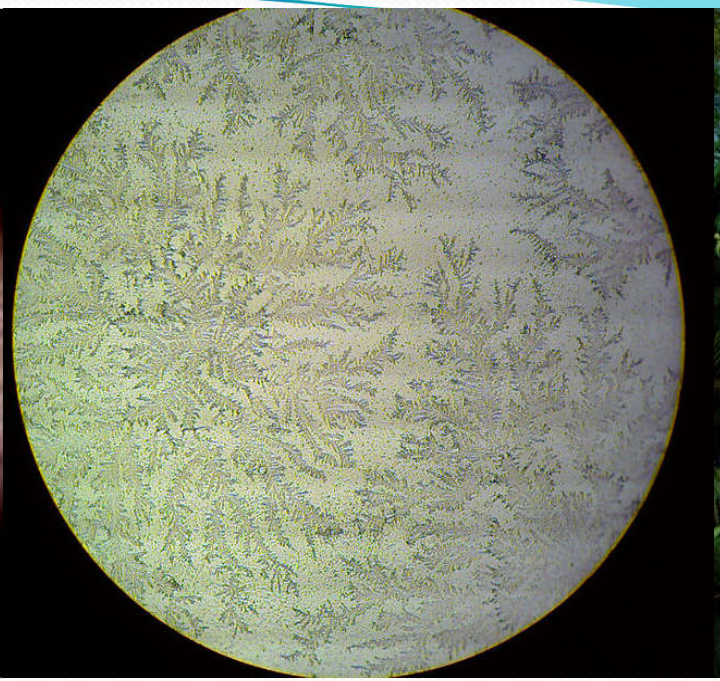
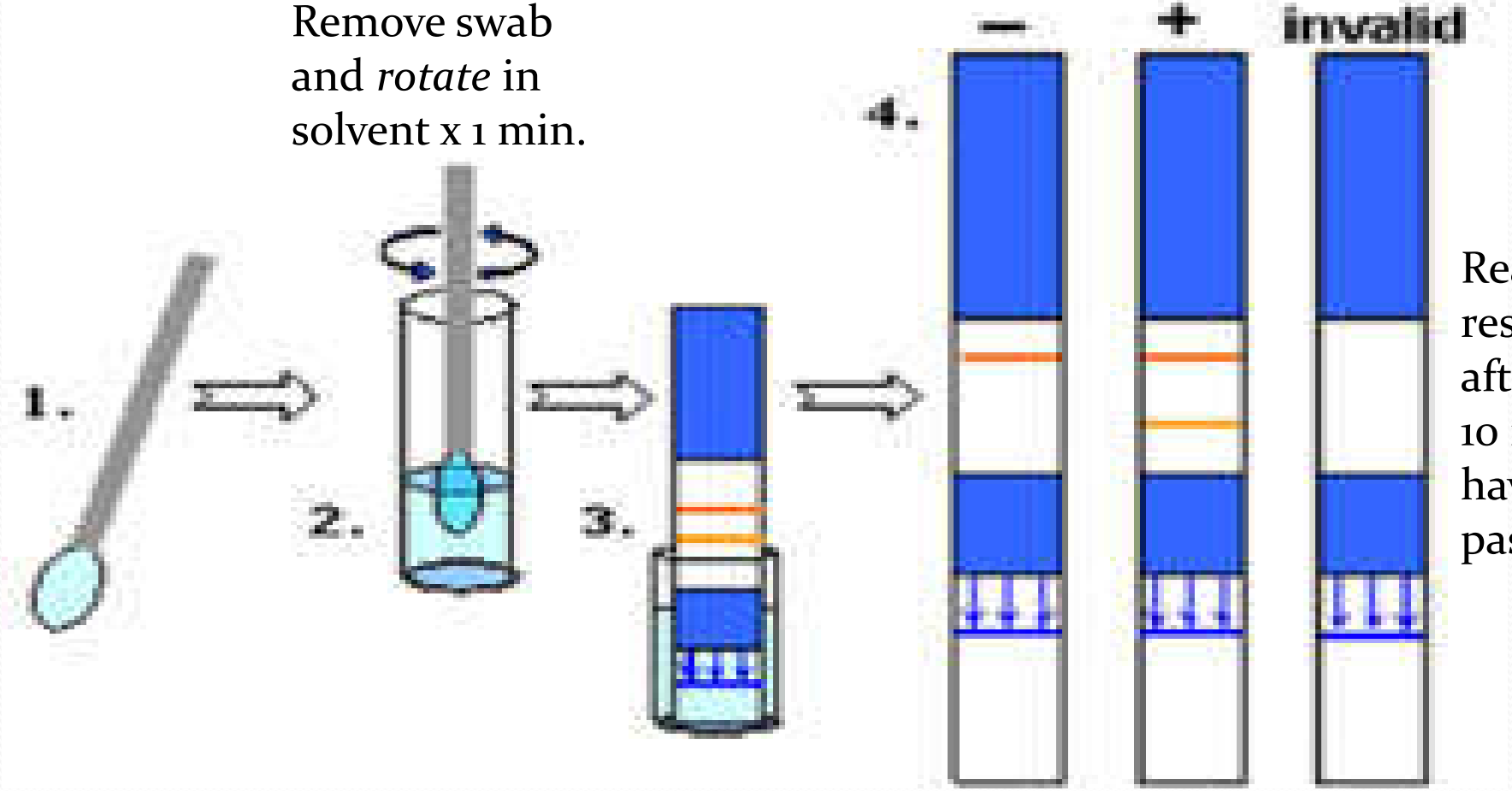


- **Ferning** which refers to the pattern of arborization when amniotic fluid is placed on a slide and is allowed to dry (branching fern leaf pattern caused by sodium chloride precipitates from amniotic fluid).
- Must allow slide to dry *thoroughly* prior to examination under microscope. Assess for arborization of fluid.
- Cervical mucous has broad, ferning pattern that is different than the fern of amniotic fluid.

AmniSure

- Newer test
- Point of Care test
- Cost-up to $50 each
- Sensitivity-98.7-98.9%
- Specificity-87.5-100%
- Awaiting further testing prior to recommendations

Remove swab and *rotate* in solvent x 1 min.

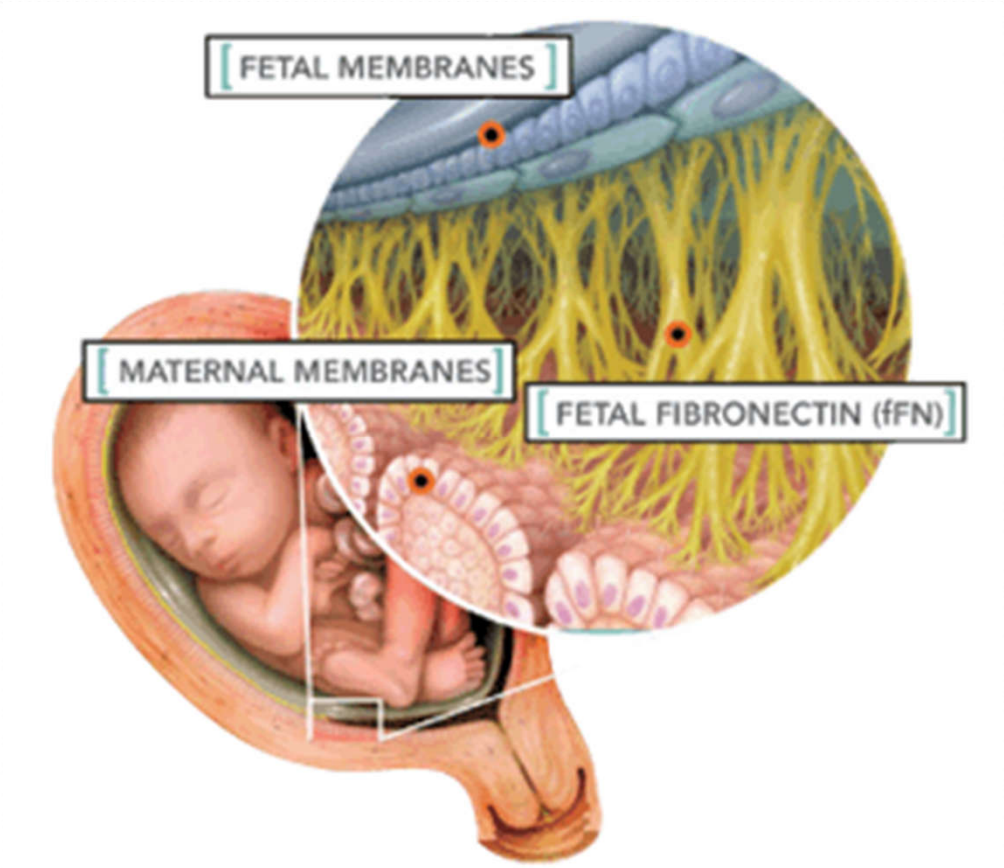


Read results after 5-10 mins have passed.

Place Swab 2-3 in. into vaginal canal x 1 min.

Discard swab and place test stick into solvent.

Fetal Fibronectin

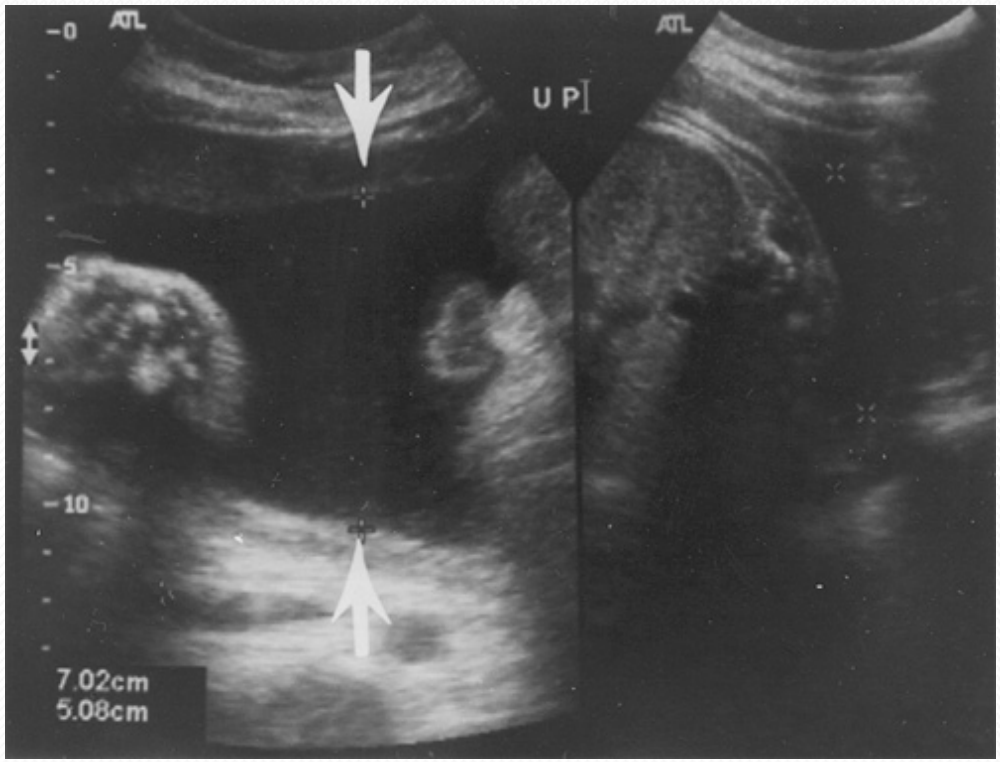


- fFn present in cervical secretions <22 wks, >34 wks
- Used for assessment of potential preterm birth.
- Positive result (>50 ng/dl) may be indicative of PROM and represents disruption of decidua-chorionic interface

In PPROM, Sensitivity-98.2%, Specificity-26.8%.

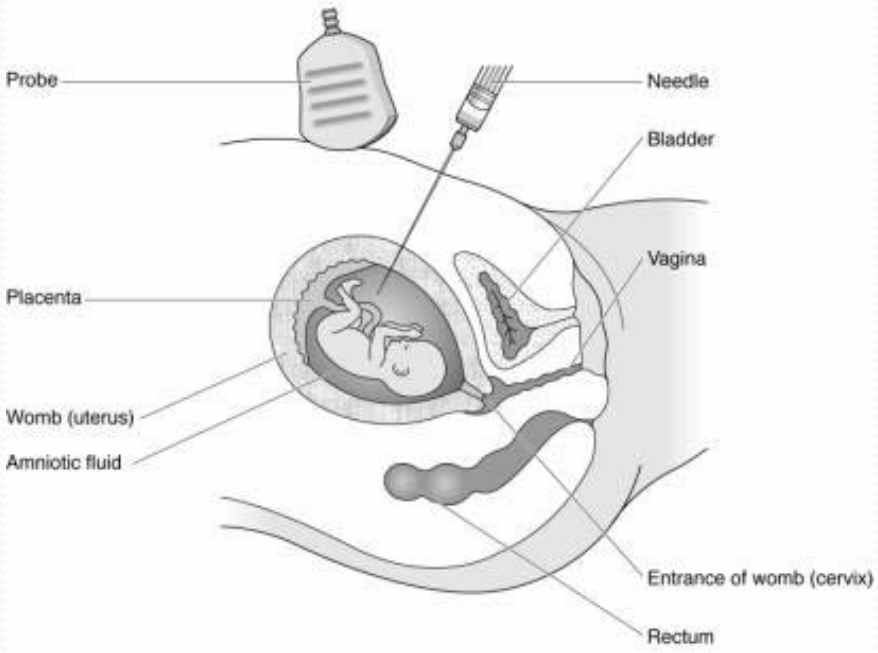
Ultrasonography

- 50-70% of women with PPROM have low AFV on US
- Mild reduction requires further investigation
- Rule out other causes (Renal agenesis, utero-placental insufficiency, obstructive uropathy)
- Measure for pockets of fluid and quantitate AFV into AFI



Ultrasound showing 7 cm pocket of fluid

Transabdominal Injection of Dye



- Amniocentesis
- Collect Fluid samples
- Inject dye (Indigo Carmine)
- Tampon placed in vagina and checked for blue staining 30-60 mins after procedure

Risks (complications) associated with preterm PROM

- **Maternal risks:**
  - Chorioamnionitis
  - Cesarean delivery for malpresentation and failed induction
  - Abruption
- **Fetal risks:**
  - Cord prolapse
  - Respiratory Distress Syndrome
  - Necrotizing Enterocolitis (NEC)
  - Infection (sepsis)
  - Intraventricular hemorrhage- The risk for this varies with gestational age.
  - Pulmonary hypoplasia especially if < 19 weeks when PROM occurs (rare after 26 weeks gestation)
  - Skeletal deformities

Management of PROM patient

It depends on:

- Gestational age
- Availability of NICU
- Fetal presentation
- FHR pattern
- Active distress (maternal/fetal)
- Is she in labor?
- Cervical assessment

How we decide an expectant management versus immediate delivery. The patient's gestational age, presence of clinical infection, placental abruption, labor and fetal status all have to be taken into account.

If the patient is term > 37 weeks :

- Approximately 90% of patient will go into spontaneous labor within 24 hours. labor should be induced either at the time of presentation or the patient can be expected managed .induction of labor reduces the time of delivery and the rates of chorioamnionitis and metritis and admission to the neonatal intensive care unit. If the patient does not go into spontaneous labor on her own then labor induction should be performed with oxytocin.

late preterm patients from 34 to 36 weeks and six days EGA

- The management is the same as term for the risks of infection outweigh the risks of prematurity .An induction of labor has started for these patients once rupture of membranes is confirmed. If the fetus is breach then a cesarean section will have to be performed.

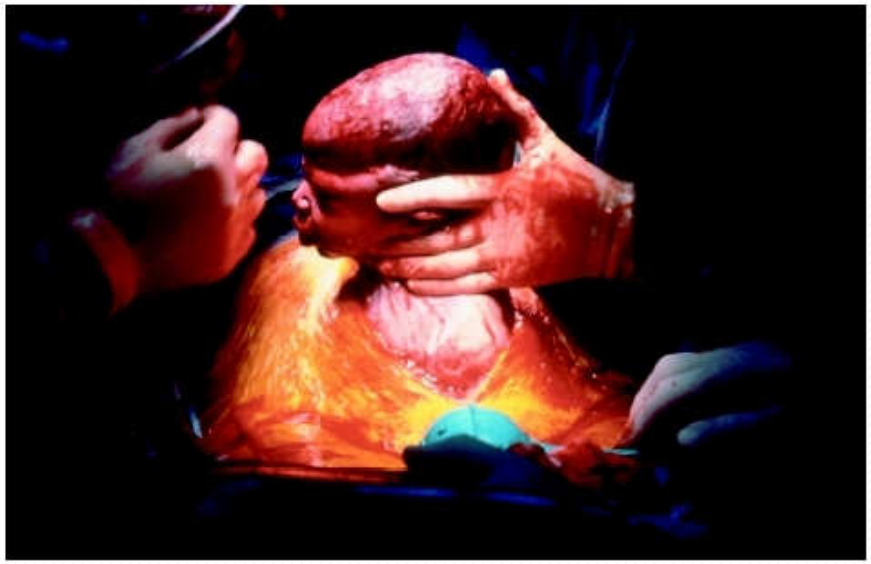
- If PPROM occurs between 24 weeks and 33 and 6 days, the risk of fetal lung maturity from prematurity is very high.
- Preterm fetuses without chorioamnionitis should be treated with :
  - Corticosteroids which enhance fetal pulmonary maturity.
  - Tocolytics to decrease contraction.
  - Antibiotics to increase the latency period
- Note that antibiotics are administered because they have been shown to increase the amount of time before spontaneous labor, the antibiotics are not to treat an infection.
- If there is an infection present diagnosed by uterine tenderness, fever and /or increased WBCs, then delivery needs to be initiated.
- If there is no evidence of uterine infection, a patient with PPROM from 24 to 33 and 6 days should be admitted and ultrasounds to assess amniotic fluid volume and antepartum testing such as non-stress test are done.
- Delivery will be induced between 32 and 34 weeks, however if the patient develops evidence of uterine infection then delivery will be immediately initiated.

Pre-viable PPROM

- Pre-viable PPROM is premature rupture of membranes before the limit of viability (<24 weeks' gestation).
- It occurs in less than 1% of pregnancies.
- There are important risks of prematurity to discuss with this population:
  - Pulmonary hypoplasia rates are approximately 10-20 % .
  - Prolonged oligohydraminos can cause fetal deformations and limb contractures because the fetus cannot move freely within the amniotic sac.
  - Neonatal death and morbidity rated decrease with a longer latency period and advancing gestational age.
  - There are significant maternal complications that can occur with prolonged rupture of membranes with increased risks of systemic infections.
- The management for patient with Pre-viable PPROM involves patient counseling and expectant management or induction of labor.
- Antibiotics and corticosteroids are not recommended before viability.

Delivery Indication

- Maternal-Fetal Distress
- Infection
- Abruption
- Cord Prolapse



Expectant Management

Risks

- Abruption
- Chorioamnionitis
- Cord Prolapse
- Pulmonary Hypoplasia (<19 weeks PPROM
- Skeletal Deformities
- Endometritis (1/3)

Benefits

- Mature lung profile
- Advancing GA
- Reducing risks associated with PTB AS:
  - NEC
  - IVH
  - RDS
  - Cesarean Delivery
  - Endometritis (1/3)

Expectant Management

- Typical for GA 32 weeks or less (32 weeks, document FLM)
- Steroids
- Tocolysis if indicated for lung maturity
- Antibiotics (Ampicillin/EES-Azithro)
- Fetal Surveillance
- Majority Inpatient Observation
- Assess for Chorioamnionitis

Goal: Mature Lung Profile, reduction of PTB risks!

Chorioamnionitis

- It is an infection of the fetal amnion and chorion membranes.
- The characteristic clinical signs and symptoms of chorioamnionitis include the following:
  - Maternal fever (intrapartum temperature >100.4°F or >37.8°C)
  - Significant maternal tachycardia (>120 beats/min)
  - Fetal tachycardia (>160-180 beats/min)
  - Purulent or foul-smelling amniotic fluid or vaginal discharge
  - Uterine tenderness
  - Maternal leukocytosis (total blood leukocyte count >15,000-18,000 cells/µL)
- Management:
  - includes cervical cultures, supportive care, early delivery, and IV antibiotics administration (ampicillin and gentamicin in combination are the drugs of choice).

SCHEME FOR MANAGEMENT OF PROM

- Maternal health assessment
- Fetal: Gestational age, weight, pulmonary maturity

- Septic work up (Cervical swab, urine culture)
- Non-stress test (NST p. 108)
- Biophysical profile (p. 109)

To monitor maternal pulse, temperature, fetal heart rate and to start prophylactic broad spectrum antibiotics

Amnionitis, placental abruption, fetal death/distress or labor process

ABSENT

PRESENT

Pregnancy < 34 weeks

Expectant management to continue for fetal maturity. Hospitals with limited resources —to transfer the patient with 'fetus in utero' to an center equipped with NICU

Pregnancy ≥ 34 weeks and < 37 weeks

to wait for spontaneous onset of labor for 24-48 hours

Fails

Induction of labor with oxytocin (CS for non-cephalic presentations)

Pregnancy ≥ 37 weeks

to wait for spontaneous onset of labor for 24 hours

Fails

Induction of labor with oxytocin (CS for obstetric reasons)

Expeditious delivery

Intrapartum antibiotics (broad spectrum)

NICU

Summary of Management

- If uterine contractions occur, tocolysis is contraindicated.
- If chorioamnionitis is present, obtain cervical cultures, start broad-spectrum therapeutic IV antibiotics, and initiate prompt delivery.
- If no infection is present, management will be based on gestational age as follows:
  - Before viability (<24 weeks), outcome is dismal. Either induce labor or manage patient with bed rest at home. Risk of fetal pulmonary hypoplasia is high.
  - With preterm viability (24–33 weeks), conservative management, hospitalize the patient, bed rest, administer IM betamethasone to enhance fetal lung maturity
  - if <32 weeks, obtain cervical cultures, and start a 7-day course of prophylactic ampicillin and erythromycin.
  - At term (≥34 weeks), initiate prompt delivery. If vaginal delivery is expected, use oxytocin or prostaglandins as indicated. Otherwise, perform cesarean delivery.

Conclusions

- PPROM is a leading cause of neonatal morbidity and mortality and is associated with 30% of preterm deliveries.
- The consequences of PPROM depend on the gestational age at the time of occurrence, persistent oligohydraminos at less than 22 weeks estimated gestational age leads to:
  - Incomplete fetal alveolar development.
  - Development of pulmonary hypoplasia (infants cannot be adequately ventilated).
- When PPROM occurs between 24 and 26 weeks, there is likely to be survival, however there will be possible substantial morbidities from extreme prematurity.

THANK YOU