



437 Team: Obstetrics and Gynecology

PROM

Objectives:

- List the history, physical findings and diagnostic methods to confirm rupture of the membranes.
- Identify risk factors for premature rupture of the membranes.
- Describe the risks and benefits of expectant management versus immediate delivery based on gestational age.
- Describe the methods to monitor maternal and fetal status during expectant management.

References:

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

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Premature rupture of membranes (PROM)

Premature rupture of membranes (PROM): is rupture of the fetal membranes before the onset of labor, whether at term or preterm.

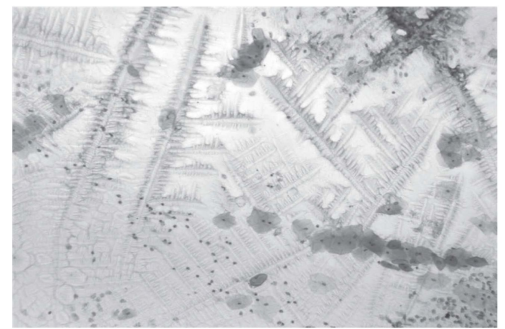
Risk factors: Ascending infection from the lower genital tract is the most common risk factor for PROM. Other risks factors are local membrane defects and cigarette smoking.

Clinical Presentation:

1. Typical history: is a sudden gush of copious vaginal fluid.
2. External examination: clear fluid is flowing out of the vagina.
3. Ultrasound examination: oligohydramnios is seen.

Diagnosis: is made by sterile speculum examination meeting the following criteria:

1. Pooling positive > clear, watery amniotic fluid in the posterior vaginal fornix.
2. Nitrazine positive > the fluid turns PH-sensitive paper blue.
3. Fern positive > the fluid displays a ferning pattern when allowed to air dry on a microscope glass slide.



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Figure 1-8-5. Ferning Pattern of Amniotic Fluid

Chorioamnionitis

Is diagnosed clinically with the following criteria:

maternal **fever** plus uterine **tenderness** in the presence of confirmed **PROM** in the **absence of a URI or UTI**.

Other signs and symptoms: baseline fetal tachycardia (earliest sign) , purulent fluid from cervical os and maternal leukocytosis and maternal tachycardia.

Ruptured Membranes	Chorioamnionitis
<ul style="list-style-type: none">● Posterior fornix pooling● Fluid is nitrazine (phenaphthazine)(+)● Glass slide drying: fern (+)	<ul style="list-style-type: none">● Ruptured membranes● Maternal fever● No UTI or URI

Management:

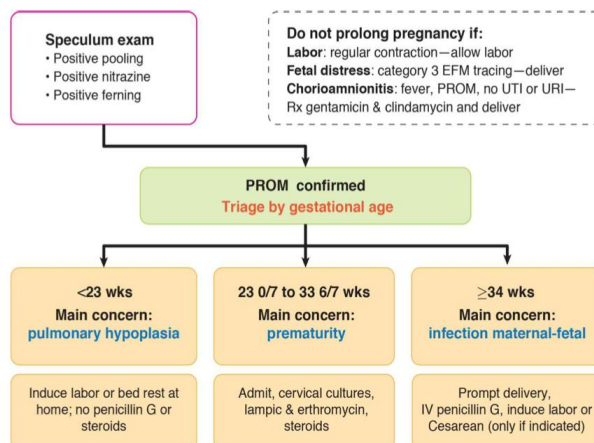
- If uterine contraction occur, tocolysis is contraindicated.
- If chorioamnionitis is present, obtain cervical cultures, start broad-spectrum therapeutic IV antibiotics, and initiate prompt delivery.
- If no infection is present, management will be based on gestational age as follows:
 - **1. Before viability** (<23 weeks), outcome is dismal. Either induce labor or manage patient with bed rest at home. Risk of fetal pulmonary hypoplasia is high.
 - **2. With preterm viability** (23 0/7 - 33 6/7 weeks), conservative management. Hospitalize the patient at bed rest, administer IM betamethasone to enhance fetal lung maturity if <34 weeks, obtain cervical cultures, and start a 7-day course of prophylactic ampicillin and erythromycin .
 - **3. At term** (>= 34 weeks), initiate prompt delivery. If vaginal delivery is expected, use oxytocin or prostaglandins as indicated. Otherwise, preform cesarean delivery.

Complications

Table I-8-3. Hazards Associated with PROM

If Fetus Remains In Utero	If Preterm Delivery Occurs
Neonatal conditions <ul style="list-style-type: none"> • Infection and sepsis • Deformations • Umbilical cord compression • Pulmonary hypoplasia 	Neonatal conditions <ul style="list-style-type: none"> • Respiratory distress syndrome (most common) • Patent ductus arteriosus • Intraventricular hemorrhage • Necrotizing enterocolitis • Retinopathy of prematurity • Bronchopulmonary dysplasia • Cerebral palsy
Maternal conditions <ul style="list-style-type: none"> • Chorioamnionitis, sepsis • Deep venous thrombosis (DVT) • Psychosocial separation 	

Summary



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Figure I-8-6. Diagnosis and Management for Premature Rupture Membranes

PROM

- Amniotic fluid starts to be continuously produced approximately 16 weeks gestation. primarily dependant on fetal urine production.
- Amniotic fluid allows for fetal movement and breathing which are important for fetal skeletal, lung and chest development, so decrement in amniotic fluid lead to deformities.
- Decreased/absence of amniotic fluid can lead to compression of the umbilical cord and decreased placental flow.
- Disruption of the fetal membranes leads to a loss of these protective effects and the developmental roles of amniotic fluid.

<i>Premature Rupture of Membranes (PROM) more common</i>	<i>Preterm Premature Rupture of Membranes (PPROM)</i>
Before the onset of labor	Before 37 weeks estimated gestational age

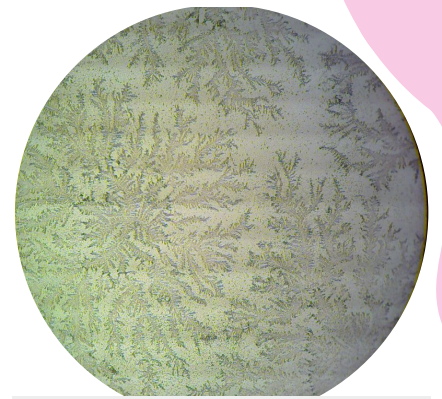
- PPRM is a leading cause of neonatal morbidity and mortality and is associated with 30% of preterm deliveries.
- The consequences of PPRM depend on **the gestational age at the time of occurrence.**
- Persistent oligohydramnios at **<22 weeks** estimated gestational age leads to:
 - Incomplete fetal alveolar development.
 - Pulmonary hypoplasia (inadequate ventilation).
- When PPRM occurs between 24 and 26 weeks there is likely to be survival, however there will be possible substantial morbidities from extreme prematurity.

Risk factors

- Ascending infections
- Short cervical length
- Smoking (the risk is doubled)
- History of PROM
- Polyhydramnios
- Multiple gestations
- Pulmonary disease in pregnancy (because coughing will increase intraabdominal pressure)
- Other risk factors are the same for preterm delivery
 - History of preterm delivery
 - Bleeding during pregnancy
 - Low socioeconomic state
 - Low BMI

Diagnosis

- Diagnosis of PROM is based on the **history of vaginal loss of fluid** and **confirmation of amniotic fluid in the vagina**. Patients can describe it as gush of fluid or steady leakage of small amount of fluid.
- **Physical examination:**
 - Sterile **speculum examination** (pooling test) should be performed to visually assess the cervix and swab for Gonorrhea and Chlamydia. A group B strep culture should be obtained.
 - An **U/S** should be performed to assess fetal position and the amount of amniotic fluid (oligohydramnios will be present).
 - Minimize digital cervical examination to decrease the risk of infection.
- **Diagnostic testing:**
 - **Nitrazine paper:** Will turn blue in the presence of alkaline amniotic fluid. **false + in presence of blood or semen**
 - **Ferning:** it's the pattern of arborization when amniotic fluid is placed on a slide and is allowed to dry (false + in presence of cervical mucus in sample)
 - **Pooling:** of amniotic fluid can be seen (most accurate)



Ferning

Management

- Expected management 'watchful waiting' OR immediate delivery.
- The choice depends on
 - Gestational age
 - Infection
 - Placental abruption
 - Labor
 - Fetal status.

If term (>37 weeks):

- 90% will go into spontaneous labor within 24hrs
- If no spontaneous labor → give oxytocin to induce labor
- Labor induction will reduce: time of delivery, admission to NICU, rate of chorioamnionitis and endometritis

If preterm (<37 weeks): Risk of uterine infection vs risk of prematurity need to weighed carefully to decide on the management.

Late preterm (34-36+6 days):

- 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 between (24-33+6 days)

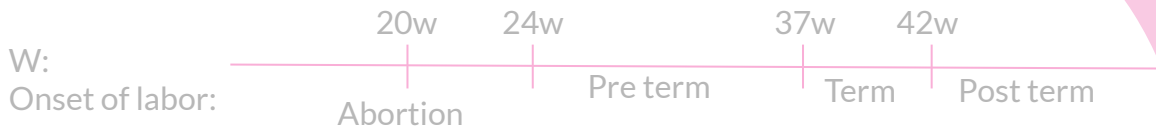
- Presence of uterine infection → Delivery needs to be initiated immediately.
- Absence of uterine infection → Steroids, Tocolytics, Antibiotics
 - **Inpatient:** Hospitalization with U/S to assess amniotic fluid volume and antepartum testing such as non-stress testing.
 - **Steroids (IM betamethasone)** are given to promote lung maturity.
 - **Antibiotics** are used to increase the latency period (which is the time between rupture of membranes and spontaneous labor)
 - Obtain cervical cultures and start 7 days course of ampicillin and erythromycin.
 - 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
 - **Tocolytics** to decrease contraction if indicated (either for transfer for NICU or for corticosteroid administration). **Usually for those with intact membranes**
 - **Delivery** will be induced between 32 and 34 weeks

Preivable PPRM (<23 weeks):

- Occurs in <1% of pregnancies.
- Poor outcome; either induce labor or manage patient with bed rest at home
- Important risks of prematurity to discuss: (counseling)
 - **Pulmonary hypoplasia** (very high) rates are approximately 10-20%.
 - **Prolonged oligohydramnios** can cause fetal **deformations** and limb **contractures** because the fetus cannot move freely within the amniotic sac.
 - Neonatal death and morbidity rates decrease with a longer latency period and advancing gestational age.
 - Significant maternal complications that can occur with prolonged rupture of membranes with increased risks of **systemic infections**.
- Tell her to come back immediately if contraction or fever develop. (infection)
- **Antibiotics and corticosteroids are not recommended before viability.**



OnlineMedEd



- ROM is only normal when fetus is **term** and there are **contractions**
- PROM depends on **onset of labor** + **presence of contractions**



- Duration from membranes rupture until delivery of baby has to be **less than 18 h**
- **Prolonged ROM:** if duration is **more than 18 h**
- Amniotic fluid: cushion of fluid that protects the baby when the mother moves and from ascending infections.
- As contractions begin, membranes rupture and fetus engages

ROM

Path: Spontaneously

Artificially (if not ruptured)

Pathologically (infection: GBS, vaginal flora, STI)

Pt: Rush of fluid (meconium, bloody, clear)

Dx: Speculum exam = Pooling

Nitralazine test= blue

Slide= ferning

US= Oligohydramnios

Tx: Delivery (can be done only if fetus is at term

If below the age of delivery > you also deliver
(abortion)

If in between > Risk/Benefit ratio of baby staying

Ascending
infection

Lung
maturity

Premature (PROM)

Path: Infection (GBS)

Pt: +ROM, +term, -contraction

Dx: Clinical= ROM

GBS status

Tx: Delivery depends on the severity of your patient

GBS + or unknown > ampicillin

GBS - > watch and wait

Preterm Premature (pPROM)

Path: Infection (GBS)

Pt: +ROM, -term, -contraction

Dx: Clinical= ROM

GBS status

Tx: >24w= deliver

<24w= abortion

In between= steroid for lung maturation

F/U: Prolonged ROM

Prolonged ROM

Path: entrance of vaginal flora into a mom
GBS status

Pt: Ruptured membranes and not deliver for >18 h

Dx: Clinical= insure ROM

Tx: Deliver

GBS + or unknown > ampicillin

GBS -> watch and wait

F/U: if you leave the uterus open for long time > Endometritis/ Chorioamnionitis

Endometritis/ Chorioamnionitis

Path: Baby out/ Baby in

Vaginal flora ascends into mom sterile uterus

Pt: Prolonged ROM + Mom Fever/Toxic

Dx: Rule out other infections by urinalysis,
Chest x-ray and blood culture

Tx: Treat vaginal flora, gram -ve and anaerobes

(Ampicillin + Gentamicin +/- Clindamycin)

Teaching case (video case)

A 26-year-old G2P0100 woman, who is 31 weeks gestation, presents to the labor unit complaining of leakage of fluid and she thinks that her “bag of water broke.” She has had increased vaginal discharge and intermittent lower back pain for the last two days. She reports a gush of fluid about 2 hours ago. The fluid ran down her leg and appeared clear with no noticeable odor. Her prior pregnancy was complicated by preterm labor and premature rupture of the membranes at 26 weeks gestation. The neonate’s course was complicated by necrotizing enterocolitis, respiratory distress, and death at 28 days of life.



1. What risk factors are associated with premature rupture of membranes (PROM)?

Slide 4 as well as the following:

- 2nd and 3rd trimester bleeding
- Cervical insufficiency
- Cervical conization/LEEP
- C.T disorders (Ehlers-Danlos Syndrome)
- Deficiencies of copper and ascorbic acid
- Uterine overdistension
- Amniocentesis

2. What should be the next step in this patient’s diagnosis?

- **Sterile speculum examination to confirm the diagnosis**
- Pooling of fluid per cervical os
- Fern – cervical mucus broad fern vs. amniotic fluid narrow fern
- pH (Nitrazine) – turns blue as the pH of amniotic fluid is usually 7.1-7.3 while vaginal discharge is normally acidic.
- False positive Nitrazine may occur due to:
 - Alkaline urine
 - Semen
 - Blood
 - Cervical Mucus
 - Antiseptic solutions
 - Bacterial vaginosis
- Ultrasound evaluation AFI in equivocal cases – not diagnostic
- Test kits for amniotic proteins - considered ancillary to standard methods of diagnosis

3. What should be the next step in management once PROM has been confirmed?

- **Assess fetal status:** continuous fetal monitoring, ultrasound to assess the estimated fetal weight (EFW), amniotic fluid volume and fetal presentation.
- **Rule out labor** (uterine activity monitoring)
- **Rule out intraamniotic infection:** This diagnosis may be made clinically. In some cases amniocentesis may be helpful to rule out an intraamniotic infection. Amniotic fluid may be sent for gram stain, aerobic and anaerobic cultures, glucose and cell count.
- Obtain swabs to **rule out Chlamydia trachomatis, Neisseria gonorrhoea and group B streptococcal infection.**
- **Digital cervical examinations should be avoided unless the patient appears to be in active labor or imminent delivery is planned.** Digital exams are associated with an increased risk of infection and add little information to that available with speculum examination.

- Once labor and intraamniotic infection have been ruled out, if patient is preterm (< 34 weeks) consider:
 - Antibiotics: Ampicillin and erythromycin to prolong the latency period.-
 - Steroids to enhance fetal lung maturation and decrease risk of RDS.
- Patients with preterm PROM at a viable gestational age should be observed closely in the hospital on modified bedrest. They should be assessed periodically for evidence of infection, placental abruption, umbilical cord compression, fetal well-being, and labor. There is no consensus on the optimal frequency and type of assessment that is optimal. An acceptable strategy would include periodic ultrasound monitoring of amniotic fluid volume and daily or twice-daily fetal heart rate monitoring
- The decision to deliver the fetus is based on gestational age and fetal status.
- If there is evidence of intraamniotic infection or evidence of fetal compromise at any gestational age, the fetus should be delivered.
- The timing of delivery may vary among institutions:
 - The patient who experiences PROM between 24 weeks and 31 completed weeks of gestation should be cared for expectantly if no maternal or fetal contraindications exist until approximately 34 weeks of gestation.
 - At 32–33 completed weeks of gestation, the risk of severe complications of prematurity is low if fetal pulmonary maturity is confirmed by amniotic fluid samples collected vaginally or by amniocentesis. Therefore, labor induction may be considered if pulmonary maturity has been documented. If pulmonary maturity cannot be established, expectant management may be beneficial.

4. What are the risks associated with preterm PROM?

Maternal risk	Fetal risk
<ul style="list-style-type: none"> ➤ Chorioamnionitis ➤ Cesarean delivery for malpresentation and failed induction ➤ Placental abruption 	<ul style="list-style-type: none"> ➤ Cord prolapse ➤ RDS ➤ Necrotizing Enterocolitis ➤ Intraventricular hemorrhage

5. What treatment can this patient be offered in a future pregnancy to decrease recurrence for preterm PROM and preterm delivery?

Studies suggest **progesterone therapy** to reduce the risk of recent spontaneous preterm birth resulting from preterm labor or PROM.