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Premature Rupture of Membranes (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

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References: team 433, APGO video, kaplan lecture note 2018, kaplan video and doctors notes.

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, so decrement in amniotic fluid lead to deformities.
•Decrease in the 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.

Premature rupture of the membranes (PROM)	preterm PROM (PPROM)
Premature rupture of membranes **before the onset of labor**	Preterm premature rupture of membranes occurring **before 37** weeks estimated gestational age

•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 oligohydramnios at **less than 22 weeks** estimated gestational age leads to:
- Incomplete fetal **alveolar** development.
- Development of **pulmonary hypoplasia** (infant 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.

Risk factors of PROM

- **Ascending infections**
- **Short cervical length**
- **Smoking (the risk is doubled)**
- **History of PROM**
- **Polyhydramnios**
- **Multiple gestations**

Other risk factors are the same for preterm delivery :

- History of preterm delivery
- Bleeding during pregnancy
- Low socioeconomic state
- Low BMI

Diagnosis

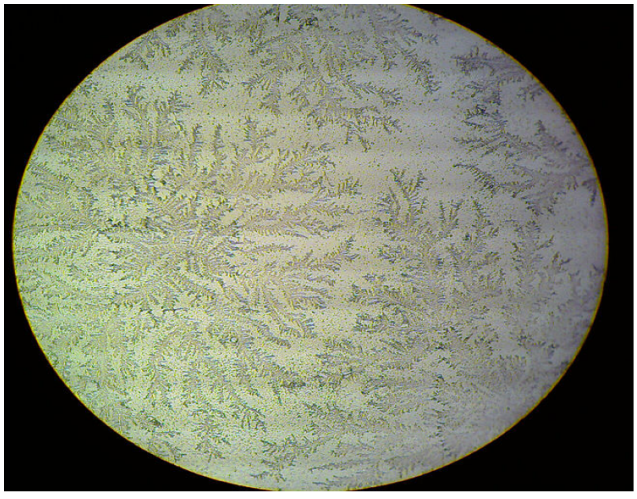
Diagnosis of PROM is based on the **history of vaginal loss of fluid** and **confirmation of amniotic fluid in the vagina**. Patients can describe it as **gush of fluid** or steady leakage of small amount of fluid

- **Physical examination:**

- A sterile **speculum examination** (pooling test) 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
- An **ultrasound** should be performed to assess fetal position as well as to assess the amount of amniotic fluid (oligohydramnios will be present).
- **Remember to minimize digital cervical examination to decrease the risk of infection**

- **Confirmatory testing:**

- Testing the fluid with **Nitrazine paper** which will turn blue in the presence of alkaline amniotic fluid false + in presence of blood or semen (amniotic fluid has a ph greater than 7.1 while vaginal secretions have a ph between 4.5 to 6).
- **Ferning** which refers to the pattern of arborization when amniotic fluid is placed on a slide and is allowed to dry false + in presence if cervical mucus in sample (branching fern leaf pattern caused by sodium chloride precipitates from amniotic fluid).
- **Pooling** of amniotic fluid can be seen most accurate (pooling refers to the filling of the speculum with amniotic fluid). If all 3 positive go ahead and diagnose.
- Sometimes we can not diagnose if these test negative so the doubt is resolve if US confirm oligohydramnios with suggestive history.



Ferning of amniotic fluid

Fern

- **Chorioamnionitis is diagnosed clinically with all the following criteria needed: Maternal fever and 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.

Management

How we decide an expectant management versus immediate delivery ?

1- The patient's **gestational age** 2- Presence of **clinical infection**

3- **Placental abruption labor** 4- **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 endometritis 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. So** use oxytocin or prostaglandins as indicated Otherwise, perform cesarean delivery.

In preterm patient the risk of uterine infection and prematurity need to be weight carefully :

- **late preterm patients from 34 to 36 weeks and six 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 the fetus is breach then a cesarean section will have to be performed**. **So management exactly same as term PROM.**

- **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** (**delivery needs to be initiated if present**) should be treated with conservative management:

  - **inpatient** hospitalization with ultrasounds to assess amniotic fluid volume and antepartum testing such as non-stress test
  - **Corticosteroids(**IM betamethasone) **which enhance fetal pulmonary maturity** if <32 weeks**.**
  - **Tocolytics to decrease contraction if indicated** (ethier for transfer for Neonatal ICU center or for corticosteroid administration).
  - **Antibiotics 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.
  - **Delivery will be induced between 32 and 34 weeks**

- **If previable PPROM occurs less than (< 23w of GA):**

- It occurs in less than 1% of pregnancies.
- outcome is dismal. **Either induce labor or manage patient with bed rest at home.**
- There are important risks of prematurity to discuss with this population:
    a- **Pulmonary hypoplasia (very high)** rates are approximately 10-20 % .
    b- Prolonged oligohydramnios can cause **fetal deformations and limb contractures** because the fetus cannot move freely within the amniotic sac.
    c- Neonatal death and morbidity rates decrease with a longer latency period and advancing gestational age.
    d- There are **significant maternal complications** that can occur with prolonged rupture of membranes with **increased risks of systemic infections.**
- tell her come back immediately if contraction or fever develop.
- So management involves patient counseling and expectant management or induction of labor. **Antibiotics and corticosteroids are not recommended before viability.**

Management highlights:

• **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 we mentioned previously.

Complications :

Table I-8-3. Hazards Associated with PROM

If Fetus Remains In Utero	If Preterm Delivery Occurs
Neonatal conditions • Infection and sepsis • Deformations • Umbilical cord compression • Pulmonary hypoplasia	**Neonatal conditions** • Respiratory distress syndrome (most common) • Patent ductus arteriosus • Intraventricular hemorrhage • Necrotizing enterocolitis • Retinopathy of prematurity • Bronchopulmonary dysplasia • Cerebral palsy
Maternal conditions • Chorioamnionitis, sepsis • Deep venous thrombosis (DVT) • Psychosocial separation	

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)?

• The definition of PROM is rupture of membranes before the onset of labor. Membrane rupture before labor
and before 37 weeks of gestation is referred to as preterm PROM.
• Risk factors for PROM include similar risks for preterm labor:

- Vaginal, cervical and intraamniotic infections
- Prior PROM
- Prior preterm delivery
- Low socioeconomic status
- Second and third-trimester bleeding
- Low body mass index
- Cervical insufficiency
- Cervical conization/LEEP
- Connective tissue disorders (Ehlers-Danlossyndrome)
- Nutritional deficiencies of copper and ascorbic acid
- Maternal cigarette smoking
- Illicit drug use
- Pulmonary disease in pregnancy
- Uterine overdistension
- Amniocentesis

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

• Confirmation of the diagnosis of PROM.
• 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.
• 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 prove 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 gonorrhea 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. Sterile speculum examination provides an opportunity to confirm the diagnosis of PROM, inspect for cervicitis and umbilical cord or fetal prolapse, assess cervical dilatation and effacement, and obtain cultures as appropriate.
•**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 risks:**
  - Chorioamnionitis
  - Cesarean delivery for malpresentation and failed induction
  - Placental Abruption(sudden decrease in pressure (release of fluid) will detach the placenta.

- **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

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

- Recent studies have suggested progesterone therapy to reduce the risk of recurrent spontaneous preterm birth resulting from preterm labor or PROM.

The End !