Premature rupture of Membrane
PROM

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Definition

Premature rupture of membranes (PROM) is an event that occurs during pregnancy when the sac containing the developing baby (fetus) and the amniotic fluid bursts or develops a hole prior to the start of labor.
The amniotic fluid is important for several reasons. It cushions and protects the fetus, allowing the fetus to move freely. The amniotic fluid also allows the umbilical cord to float, preventing it from being compressed and cutting off the fetus's supply of oxygen and nutrients.
The amniotic membrane contains the amniotic fluid and protects the fetal environment from the outside world. This barrier protects the fetus from organisms (like bacteria or viruses) that could travel up the vagina and potentially cause infection.
Membrane Structure

- Chorion (200 µm) cytотrophoblasts basement memb
- Amnion (50 µm) five layers: spongy layer (s) compact layer macrophages mesenchymal
There are two types of PROM.

1. First occurs at a point in pregnancy before normal labor and delivery should take place. This is called preterm PROM.

2. Second type of PROM occurs at 36-40 weeks of pregnancy.

The incidence of PROM is 10-15% in all delivery, 10% in term pregnancy. Only about 20% are preterm PROM.
Risk FACTORS AND SYMPTOMS

- History of PPROM/PTD

- Maternal age (<17 and >35yrs)
- African-American
- Low SES
- Multifetal pregnancy
- Unmarried
- Previous fetal or neonatal death
- 3+ spontaneous terminations
- Uterine abnormalities
- Shortened cervix (< 2.5 cm)
- Genetic predisposition

- Low pre-pregnant weight
- Obesity
- Infections
- Bleeding
- Anemia
- Major stress
- Lack of social supports
- Tobacco use
- Illicit drug use
- Alcohol abuse
- Conization
• Preterm delivery
• Chorioamnionitis (13-60%)
• Non-reassuring fetal status (8 %)
• Prolapsed cord
• Abruptio placenta (4%)
• Pulmonary hypoplasia
• Cesarean section
• IUFD
Triplets: Premature Rupture of the Fetal Membrane with Progressive Intrauterine Spread of Infection

- Placental attachment to uterine wall
- Umbilical cord
- Uterus
- Bacteria
- Premature rupture of the fetal membrane resulting in transfer of bacteria
- Intrauterine spread of bacteria

Anterior cut-away view
The **main symptom** of PROM is fluid leaking from the vagina. It may be a sudden, large gush of fluid, or it may be a slow, constant trickle of fluid
The complications that may follow PROM include

- premature labor and delivery of the fetus,
- infections of the mother and/or the fetus,
- compression of the umbilical cord (leading to oxygen deprivation in the fetus).
Affect of PROM on the mothers and infants

Mothers:
(1) Infection: intrauterine puerperal
(2) Placental abruption
(3) Preterm delivery

Infants:
(1) Preterm Baby and their Complications:
   (RDS / Fetal and Neurologic dysfunction
   Intracranial hemorrhage)
(2) Neonatal pneumonia, sepsis
(3) Pulmonary hypoplasia and fetal compression syndrome
(4) Prolapse or compression of umbilical cord
(5) Abruptio placenta
Labor almost always follows PROM, although the delay between PROM and the onset of labor varies.

- When PROM occurs at term, labor almost always begins within 24 hours.
- Earlier in pregnancy, labor can be delayed up to a week or more after PROM. The chance of infection increases as the time between PROM and labor increases.
The types of infections that can complicate PROM include

- **Amnionitis**: is an infection of the amniotic membrane
- **Endometritis**: is an infection of the innermost lining of the uterus

- Indications of infection include a fever in the mother, increased heart rate of the mother and/or the fetus, high white blood cell count in the mother, foul-smelling or pus-filled discharge from the vagina, and a tender uterus.
Figure 5: Potential routes of intrauterine infection
Inflammation and infection of the endometrium (the lining of the uterus)
Endometritis
Amnionitis occurs in 0.5-1% of all pregnancies. In the case of PROM at term, amnionitis complicates about 3-15% of pregnancies. About 15-23% of all cases of preterm PROM will be complicated by amnionitis.

The presence of amnionitis puts the fetus at great risk of developing an overwhelming infection (sepsis) circulating throughout its bloodstream.

Preterm babies are the most susceptible to this life-threatening infection. One type of bacteria responsible for overwhelming infections in newborn babies is called group B streptococci.
Neonatal Sepsis - PPROM
Diagnosis:

Depending on the amount of amniotic fluid leaking from the vagina, diagnosing PROM may be easy. Some doctors note that amniotic fluid has a very characteristic musty smell.

A pelvic exam using a sterile medical instrument (speculum) may reveal a trickle of amniotic fluid leaving the cervix, or a pool of amniotic fluid collected behind the cervix.
One of two easy tests can be performed to confirm that the liquid is amniotic fluid.

A drop of the fluid can be placed on nitrazine paper. Nitrazine paper is made so that it turns from yellowish green to dark blue when it comes in contact with amniotic fluid. The nitrazine test is designed only to confirm an alkaline pH in the cervicovaginal secretions (the pH of the vaginal secretions is generally 4.5–6.0, whereas amniotic fluid usually has a pH of 7.1–7.3).
Another test involves smearing a little of the fluid on a slide, allowing it to dry, and then viewing it under a microscope. When viewed under the microscope, dried amniotic fluid will be easy to identify because it will look "feathery" like a fern. ALSO do fetal well being, maternal well being, genital tract swabs, amniocentesis.
Once PROM has been diagnosed, efforts are made to accurately determine the age of the fetus and the maturity of its lungs. Premature babies are at great risk if they have immature lungs. These evaluations can be made using amniocentesis and ultrasound measurements of the fetus' size.
Search for New Protein Markers of ROM

- Since 1970s, multiple proteins of amniotic fluid were discovered
  - Placental Alpha Microglobulin-1 PAMG-1
  - Placental Alpha Microglobulin-2 PAMG-2
  - Alpha Feta Protein (AFP)
  - Prolactin (PL)
  - Placental Protein 12 (PP12, later called IGFBP-1)
  - Fetal Fibronectin (fFn)
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<tr>
<th>Test</th>
<th>Sensitivity</th>
<th>Specificity</th>
<th>PPV</th>
<th>NPV</th>
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<tr>
<td>Ferning/pooling(^1)</td>
<td>51-98%</td>
<td>70-88%</td>
<td>84-93%</td>
<td>87-97%</td>
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<tr>
<td>Nitrazine (pH)(^1)</td>
<td>90-97%</td>
<td>16-70%</td>
<td>63-75%</td>
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<tr>
<td>Vaginal fFN(^2,(^1)</td>
<td>91-98%</td>
<td>61-97%</td>
<td>54-93%</td>
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<tr>
<td>IGFBP-1(^1)</td>
<td>74-97%</td>
<td>74-97%</td>
<td>73-92%</td>
<td>56-87%</td>
</tr>
<tr>
<td>PAMG-1(^3)</td>
<td>98-99%</td>
<td>88-100%</td>
<td>98-100%</td>
<td>91-99%</td>
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Treatment
Initial assessment

1. Uterine activity
2. Ruptured of membrane
3. Vaginal bleeding
4. Presentation
5. Cervical changes
6. Station
7. GA.
Treatment of PROM depends on the stage of the patient's pregnancy. In PROM occurring at term,

- the mother and baby will be watched closely for the first 24 hours to see if labor will begin naturally.
- If no labor begins after 24 hours, most doctors will use medications to start labor. This is called inducing labor.

Labor is induced to avoid a prolonged gap between PROM and delivery because of the increased risk of infection.
Preterm PROM presents more difficult treatment decisions. The younger the fetus, the more likely it may die or suffer serious permanent damage if delivered prematurely.
Depending on the **age of the fetus and signs of infection**, the doctor must decide either to try to prevent labor and delivery until the fetus is more mature, or to induce labor and prepare to treat the complications of prematurity.

However, the baby will need to be delivered to avoid serious risks to both it and the mother if infection is present, regardless of the risks of prematurity.
A variety of medications may be used in PROM:

1) Medication to induce labor (oxytocin) may be used, either in the case of PROM occurring at term or in the case of preterm PROM and infection.

2) Tocolytics may be given to halt or prevent the start of labor. These may be used in the case of preterm PROM, Ritodrine, Terbutaline, MgSulphate, indomethacine.
3) Steroids may be used to help the fetus' lungs mature early, 2 injections 12-24 hr apart at 28-34 Ws and receive within 7d.

4) Antibiotics can be given to fight infections 10 day course of erythromycin improved prom.
**Prognosis:**

The prognosis in PROM varies. It depends in large part on the maturity of the fetus and the development of infection.
Prevention:

The only controllable factor associated with PROM is smoking. Cigarette smoking should always be discontinued during a pregnancy.
Other controllable measure:

- Cerclage in pts with known Hx of incompetent cervix
- Patient education for S&S of PTL
- Cervicitis screening at intake & again at 24-28 weeks
- Bed rest
- Decrease activity