Prelabor rupture of membranes is the rupture of membranes (chorion and amnion) before the onset of labor. The most common cause is an ascending genital tract infection during pregnancy. Other causes are local membrane defects, smoking, polyhydramnios, multiple pregnancies, antepartum hemorrhage, placental abruption and idiopathic. Prelabor rupture of membranes can be pre-viability, pre-term or at-term and management is planned according to gestational age. It can be diagnosed easily by history and physical examination alone. Numerous maternal and fetal complications may occur, and the decision to deliver the fetus depends upon the risks of getting these complications.

Definition of Prelabor Rupture of Membranes

Prelabor rupture of membranes is the rupture of membranes (chorion and amnion) before the onset of labor. Membrane rupture before labor and before 37 weeks of gestation is known as preterm prelabor rupture of membranes.
The onset of labor can be confirmed by two criteria:

1. At least 3 uterine contractions in 30 minutes.
2. Serial examinations showing a change in dilation or effacement of the cervix or a single examination showing cervical dilation of at least 2 cm.

Classification of PROM

Prelabor rupture of membranes can be classified into the following:

**Term prelabor rupture of membranes (term PROM)**

It is the rupture of membranes before the onset of labor but when the pregnancy is at-term, i.e. during the gestational age of 37—42 weeks.

**Preterm prelabor rupture of membranes (preterm PROM)**

It is the rupture of membranes before the onset of labor but when the pregnancy is preterm, i.e. during the gestational age of 24—36 weeks.

**Pre-viable prelabor rupture of membranes (pre-viable PROM)**

It is the rupture of membranes before the onset of labor but when the pregnancy is less than 24 weeks (Some people argue it is less than 23 or less than 20 weeks). In such a case, the fetus is likely to get aborted.

Pathophysiology of PROM

Uterine contractions in labor cause the amnion and chorion to break, providing a way for the fetus to come out. However, in certain conditions, the membranes rupture before the onset of contractions.

PROM might happen because of a wide array of pathologic mechanisms. Intraamniotic infection is a common cause of preterm PROM. In other cases, it may be idiopathic or most commonly due to *ascending infection of the urinary tract*, commonly group B streptococcus. Local membrane defects and smoking are also important etiologies.

**Risk factors include:**

- Multiple pregnancy
- Polyhydramnios
- Antepartum hemorrhage
- Placental abruption

Whatever the cause, pre-labor rupture of membranes provides open access for infections to ascend to the fetus, therefore, prompt delivery is usually indicated.

However, if the fetus is preterm (< 34 weeks) its lungs are still developing and if it is delivered prematurely, the neonate will die from respiratory distress syndrome because of lack of surfactant production in the lungs.

On the other hand, if the fetus is left in the uterus for too long without the membranes protecting it, it can lead to an infection of the amnion and chorion called
chorioamnionitis.

Clinical Features of PROM

History

The history suggesting a ‘gush of amniotic fluid’ from the vagina followed by a continuous dribble is the most important diagnostic clinical feature. The fluid may be clear, meconium stained or blood tinged, which is all normal.

**Careful history as:**

This ‘gush of fluid’ should not be confused with a ‘leaking urine’ occurring due to a urinary tract infection or urinary incontinence. Ask questions regarding frequency, urgency, dysuria, and history of leaking urine to rule out these.

This ‘gush of fluid’ should also not be confused with a vaginal discharge occurring due to a vaginal infection or simply leukorrhoea which is the normal vaginal discharge that occurs during pregnancy due to overactive cervical glands.

Examination of PROM

General examination

A physical examination showing an increased pulse increased temperature and a flushed appearance is suggestive of infection.

Abdominal examination

Abdominal examination may reveal oligohydramnios which can be confirmed on an ultrasound. Uterine tenderness may be present if the infection had caused chorioamnionitis.

**Note:** Chorioamnionitis is diagnosed by the following criteria: maternal fever and uterine tenderness in the presence of confirmed premature rupture of membranes and in the absence of upper respiratory tract infection or urinary tract infection.

Speculum examination:

Speculum examination of the vagina after the patient is allowed to rest supine for 20—30 minutes and the vagina and cervix are visualized. The pooling of amniotic fluid in the posterior vagina is diagnostic in prelabor rupture of membranes.

One must also visualize the cervix for trickling of amniotic fluid and also to check for cervical dilation to ensure that labor has not begun.

In preterm PROM there may be decreased fetal movements. Occasionally the patient may complain of uterine irritability or uterine contractions due to prelabor rupture of membranes.
Investigations of PROM

Samples of the amniotic fluid should be taken to confirm whether it is amniotic fluid or not. For this, two tests are done, nitrazine test and ferning test.

Nitrazine test

Amniotic fluid is considered alkaline, while the vaginal secretions are acidic in nature. An elevated pH turns nitrazine stick black. Unfortunately, false positives may occur because sometimes the alkalinity of blood, semen or even urine can turn nitrazine stick black. However, with a negative nitrazine test, it is unlikely that membranes have ruptured, i.e. false negatives are unlikely.

Ferning test

Amniotic fluid, when visualized under the microscope, produces a ferning pattern. This is due to the sodium chloride crystals present in amniotic fluid.

Culture

Cervical or vaginal swabs should be taken to detect GBS and other infections.

Maternal monitoring

Maternal temperature, pulse and blood pressure should be monitored, because alterations in these can be a sign of infection and if the infection is detected early, it can be managed more efficiently. Serial white blood cell counts and C-reactive protein may also be done to detect early infection.

Fetal monitoring

After pre-term prelabor rupture of membranes, a serial antepartum cardiotocography is important for monitoring fetal well-being. A gradually increasing baseline heart rate or fetal tachycardia can be the first sign of intrauterine infection.

Ultrasound

Oligohydramnios (decreased amniotic fluid volume) is a valuable indicator of prelabor rupture of membranes. Also, there is a correlation between the amount of amniotic fluid and the time of delivery. The lower the amniotic fluid volume the earlier the delivery.

The measurement of amniotic fluid volume can, therefore, be important in pre-term prelabor rupture of membranes where the goal is to prolong delivery in order to allow lung maturation.

Amniocentesis

A sample of amniotic fluid can be taken and sent for Gram stain, microscopy, and culture. This can detect intrauterine infection.

Amniocentesis bears two cons. Firstly, one can trigger preterm labor by doing an invasive procedure like amniocentesis. Secondly, if in prelabor rupture of membranes there is very little amniotic fluid left in the uterine cavity, an amniocentesis will be very difficult to
Differential Diagnosis of PROM

<table>
<thead>
<tr>
<th>1. Urinary incontinence</th>
<th>Urinary leakage in urinary incontinence can be mistaken for amniotic fluid leakage. It is important to ask questions relating urinary incontinence like increased frequency, urgency, nocturia and urinary leakage.</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Urinary tract infection</td>
<td>Urinary tract infection can also cause urinary leakage. It is important to ask about dysuria, urgency and burning urination.</td>
</tr>
<tr>
<td>3. Vaginal infection</td>
<td>Bacterial vaginosis, candidiasis, trichomonas infection or a sexually transmitted infection can produce a vaginal discharge that can be confused with amniotic fluid leakage in prelabor rupture of membranes.</td>
</tr>
<tr>
<td>4. Leukorrhoea</td>
<td>The cervical glands often become overactive during pregnancy producing a vaginal discharge. Leukorrhoea can be confused with amniotic fluid leakage in prelabor rupture of membranes.</td>
</tr>
</tbody>
</table>

Management of PROM

The American College of Obstetricians and Gynecologists has published an updated guideline that summarizes the chronologic management of prelabor rupture of membranes:

**Early-term and Term (37 to 38 weeks of gestation for early term, or more for term)**

Initiated GBS prophylaxis as indicated. Ac cervical or vaginal swab for group B streptococcus should be taken. If the result is positive or the status of GBS carriage is unknown, ampicillin should be given and induction of labor should be initiated. If the result is negative, one can wait for contractions to start.

**Late Preterm (34 to 36 6/7 weeks of gestation)**

Same management plan as for early term and term PROM.

**Preterm (24 to 33 6/7 weeks of gestation)**

- Expectant management.
- Magnesium Sulfate is indicated for neuroprotection.
- Tocolytics recommended only if there are no uterine contractions.
- Single course corticosteroids. IM betamethasone is a good option.
- GBS prophylaxis as indicated. Seven days of ampicillin plus clarithromycin.

**In pre-viable rupture of membranes (< 24 weeks)**

- Patient counseling
- Expectant management or induction of labor.
- GBS prophylaxis is not recommended.
- Corticosteroids are not recommended.
- Tocolysis is not recommended
- Magnesium sulfate is not recommended.

**Note:** It is important to note that if uterine contractions start to occur in preterm PROM at any week gestation, it is contraindicated to stop labor by giving tocolytics.
Mode of delivery

In general, the mode of delivery depends upon the severity of the condition of the mother and fetus. You may need to induce labor by oxytocin or prostaglandins or, if the condition is severe do a cesarean section or, just wait for a normal vaginal delivery if contractions are about to start.

Since prompt delivery is not indicated in pre-term prelabor rupture of membranes (unless contractions begin on their own), this can lead to prolonged preterm prelabor rupture of membranes (PPROM). PPROM occurs when the duration of the rupture of membranes to the onset of uterine contractions exceed 18 hours. This can cause chorioamnionitis. If chorioamnionitis is present, take cervical cultures (vaginal cultures are useless since these organisms are normally present in the vagina), give broad-spectrum IV antibiotics to treat the infection and do prompt delivery.

The risks to the mother and fetus should be discussed with the mother and her family. Whatever management plan is devised, it should be clearly explained to the mother and her family.

The neonatal unit staff should also be instructed to be fully prepared for a pre-term neonate in the case of preterm PROM.

Complications of PROM

Neonatal complications if fetus remains in utero after PROM:

Infection and sepsis:

After PROM, since there is no protective barrier between the fetus and the normal vaginal flora, infection from the vaginal flora may ascend to the fetus and cause neonatal infection and sepsis.

Umbilical cord compression and deformations:

After PROM, the fetal cushion is reduced due to decreased amniotic fluid. The fetus can move about freely inside the uterus. This can cause umbilical cord compression and deformations.

Pulmonary hypoplasia:

Decreased amniotic fluid can cause pulmonary hypoplasia (decreased lung growth). The lungs of a fetus grow by the stretching of the lungs when amniotic fluid is inhaled inside.

Maternal complications if fetus remains in utero after PROM

Chorioamnionitis and sepsis:

Chorioamnionitis also occurs due to ascending infection from the normal vaginal flora. Chorioamnionitis (inflammation of the chorioamniotic membrane) can lead to maternal sepsis.

Deep venous thrombosis:
Deep venous thrombosis occurs due to prolonged bed rest, advised to a mother with preterm PROM. Also, in pregnancy coagulation factors get elevated (this elevation is a normal response to combat future post-partum hemorrhage), making the mother highly susceptible to deep venous thrombosis.

**Psychosocial separation:**

Psychosocial separation is seen in mothers with PROM due to fear and depression of fetal outcome.

**Neonatal complications of preterm delivery after preterm PROM**

**Respiratory distress syndrome:**

Respiratory distress syndrome is the most common neonatal complication of preterm PROM. This is due to a decreased production of surfactant from the lungs of preterm neonates since their lungs have not fully developed. Surfactant keeps alveoli open and lack of it causes a collapse of the alveoli leading to respiratory distress syndrome.

**Others:**

Patent ductus arteriosus, intraventricular hemorrhage, necrotizing enterocolitis, retinopathy, bronchopulmonary dysplasia and cerebral palsy may also occur in preterm neonates.

**References**

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