KEY POINTS

1. Premature rupture of membranes (PROM) is defined as rupture prior to the onset of labor.
2. Preterm premature rupture of membranes (PPROM) is defined as PROM occurring prior to 37 weeks gestation.
3. Rupture of membranes is followed by onset of labor within 24 hours in 90% of term patients and 50% of preterm patients.
4. PROM is associated with an increased risk of ascending infection. This risk increases with duration of rupture.

BACKGROUND

For most women, the pattern of labor is predictable. In general, women first note the onset of contractions that are relatively mild and irregular. As labor progresses, the contractions become stronger, more regular, and of increased duration. Spontaneous rupture of membranes generally follows the development of a regular contraction pattern as cervical dilation progresses. In approximately 10% of cases, however, spontaneous rupture of membranes occurs prior to the onset of labor. This is defined as premature rupture of membranes (PROM).

Premature, in this case, does not refer to gestational age but to labor. If rupture of membranes precedes labor and is prior to 37 weeks gestation, the condition is referred to as preterm premature rupture of membranes (PPROM). Rupture of membranes is generally followed by onset of labor within 24 hours.
Ninety percent of patients at term and 50% of preterm patients will begin labor within 24 hours of spontaneous rupture of membranes. For term patients, PROM will generally mark impending labor and management can be expectant. PPROM often marks the onset of preterm labor and patients should be managed appropriately for their degree of prematurity.

A number of factors have been associated with PROM including infectious, anatomic, and pregnancy-related factors (see Table 1). A considerable number of cases, however, are idiopathic. Trichomonas, bacterial vaginosis, urinary tract infection (UTI), gonorrhea, chlamydia, and group B strep are among the infectious agents known or suspected to be associated with PROM. Women with documented cervical incompetence are also at increased risk for PROM. Amniocentesis is associated with an increased risk of PROM. This risk may be, in part, related to the experience of the provider performing the procedure. For this reason, patients requiring amniocentesis should be referred to providers with considerable experience. Placental abruption is occasionally associated with PROM and should be considered in the evaluation of patients with PROM.

**DIAGNOSIS**

**History**

Patients with PROM will often report discharge or “leaking” per vagina. This fluid leak may be subtle (e.g., increased wetness noted on undergarments or pants) or may be substantial (e.g., a “gush” of fluid). A careful history should be obtained to distinguish the causes of discharge such as cervical infection, physiological mucus production (or loss of the mucus plug), urinary incontinence, or UTI. Although each of these requires evaluation and diagnosis, management varies considerably from that for PROM.

Patients with PROM have, by definition, ruptured the membranes that serve to protect the infant from ascending infection. Patients with PROM are, therefore, at increased risk for perinatal transmission of genital infection and/or vaginal flora such as group B strep. This risk increases with the duration of rupture. For this reason, the best possible estimate of the time of rupture is an important part of the history.

Patients may also present with reported “urinary” symptoms such as urinary incontinence or urinary frequency. Such symptoms are both common and challenging. Anatomic changes associated with pregnancy such as increased uterine and fetal size increase urinary incontinence. Physiological changes associated with pregnancy such as relative outflow obstruction and urinary stasis increase the likelihood of urinary tract infection. For this reason, such urinary symptoms should be carefully detailed to identify other symptoms consistent with UTI such as urgency, dysuria, hematuria, abdominal pain, fever chills, nausea, vomiting, or back/costoverterbral angle pain. As a general rule, evaluation of PROM
should include assessment for UTI and evaluation of UTI should include assessment for PROM.

In addition to assessment for symptoms of urinary pathology, history should include information concerning bleeding per vagina and symptoms consistent with early or impending labor such as contractions, abdominal pain/cramps, back pain, or mucus plug loss. When symptoms that might be suggestive of more serious pathology are discovered, such as fever, bleeding, or severe pain, the history should be further expanded to include symptoms consistent with abruptio placenta, placenta previa, or infection/sepsis.

In addition to obtaining the history associated with the leakage of fluid, a brief review of the prenatal course is important. In particular, attention should be paid to prior infections, previous episodes of contractions or preterm labor, prior episodes of bleeding or multiple gestation. Review of the gestational dating, estimated date of delivery, and the data used to calculate these is also critical.

**Physical Examination**

If the history is consistent with possible PROM, providers should assume that the membranes have ruptured until this is ruled out. The primary concern under such circumstances is to minimize the possibility of ascending infection. Manual examinations should be minimized. Sterile speculum examination should be performed and assessment should include testing for common infectious agents.

Vital signs should be documented and should include temperature, pulse, and blood pressure. Note should be made of patient discomfort or pain. Abdominal examination should include documentation of fundal height, abdominal tenderness, and fetal position (via Leopold’s maneuvers; see Table 2). The external genitalia should be examined for evidence of infection (such as herpes), discharge, and trauma. On sterile speculum examination, note should be made of blood, fluid, or discharge in the vaginal vault or at the cervical os. Samples should be obtained for gonorrhea, chlamydia, group B strep, herpes (if characteristic or suspicious lesions are noted), yeast, and trichomonas/bacterial vaginoses.

Fetal heart rate should be documented including rate and variability. Uterine contractions should be noted on tocometer.

<table>
<thead>
<tr>
<th>Table 1 Risk Factors for PROM</th>
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<td>Infection</td>
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<td>Hydramnios</td>
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<td>Incompetent cervix</td>
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<tr>
<td>Placental abruption</td>
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<td>Amniocentesis</td>
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As noted previously, laboratory studies may include evaluation for gonorrhea, chlamydia, group B strep, herpes, trichomonas, and bacterial vaginosis. Although gonorrhea, chlamydia, group B strep, and herpes will not be immediately available, evaluation for yeast, trichomonas, and bacterial vaginosis can be performed quickly and accurately in the office. A microscopic examination of discharge/fluid may reveal clue cells (bacterial vaginosis), flagellated organisms (trichomonas), or fungal elements (yeast). A more comprehensive review of these conditions can be found in Chapter 13. A urine sample should be obtained for urinalysis, culture, and microscopic evaluation.

PROM is most accurately diagnosed via laboratory evidence of amniotic fluid in the vaginal vault. The two most common tests for rupture of membranes are nitrazine testing and “ferning.” A sample of amniotic fluid placed on nitrazine paper will turn the paper blue. False-positives may occur in the presence of blood, semen, or infection. A sample of the fluid should also be spread thinly on a microscope slide and allowed to air dry. The dried sample should show characteristic fern-shaped crystalline pattern on microscopic examination.

Occasionally, suspected PROM may represent other more serious prenatal complications such as pyelonephritis, abruption, or pre-eclampsia. If these conditions are suspected on the basis of history or physical examination, additional laboratory studies will be necessary. Evaluation for these conditions should be reviewed in the appropriate chapters for each.

**MANAGEMENT**

The initial step in managing PROM is to distinguish PROM from PPROM. For this reason accurate gestational dating is critical. Figure 1 outlines the general management of PROM.

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**Table 2**

**Leopold’s Maneuvers**

<table>
<thead>
<tr>
<th>First maneuver</th>
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<tr>
<td>Identify fetal head, fetal body, and fundal height</td>
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<th>Second maneuver</th>
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<tr>
<td>Palpate fetal body to determine position of the back (smooth and uninterrupted) and front (palpable fetal arms and legs)</td>
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<th>Third maneuver</th>
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<tr>
<td>Move body side to side. Resistance to movement suggests fetal engagement.</td>
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<tr>
<th>Fourth maneuver</th>
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<tr>
<td>Identify cephalic prominence</td>
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Chapter 8 / PROM

For patients determined to be at term (>37 weeks gestation), management is similar to that for term labor. As the majority of these patients will begin labor within 24 hours, no additional intervention will be necessary for many. Because

Fig. 1. Management of PROM.

Management at Term

For patients determined to be at term (>37 weeks gestation), management is similar to that for term labor. As the majority of these patients will begin labor within 24 hours, no additional intervention will be necessary for many. Because
the risk of infection increases as the duration of rupture increases, induction of labor may be necessary at 12 hours or with signs/symptoms of fetal stress or infection (tachycardia, fetal tachycardia, fever).

**Preterm Management**

Management of PPROM is considerably more complicated than for PROM. In addition to the considerations associated with the management of ruptured membranes, providers must also manage the impending preterm labor. (A complete discussion of preterm labor management can be found in Chapter 7.)

Patients with PPROM should be admitted with appropriate monitoring of fetal heart rate and uterine contractions. Baseline evaluation should include a history, physical examination, and laboratory studies, as noted previously.

Because delay in delivery is often desirable in preterm patients, particular attention should be paid to evaluation and management of possible infection. In addition to the studies previously mentioned, additional studies might include amniocentesis for culture and Gram stain, complete blood count, and blood and urine cultures. Patients should be closely monitored for uterine tenderness, fever, or discharge or bleeding per vagina.

Antibiotics are indicated for patients with evidence of infection. Suspected chorioamnionitis should be treated with an appropriate broad-spectrum regimen such as ampicillin and gentamicin (e.g., 2 g intravenous ampicillin every 4 hours and 2 mg/kg of gentamicin loading dose then 1.5 mg/kg every 8 hours). For patients with evidence of group B strep, penicillin or ampicillin is indicated (e.g., 2 g intravenous ampicillin loading dose then 1 g intravenously every 4 hours).

Of patients with PPROM, 50% will begin labor within 24 hours. For this reason, providers should consider the use of steroids to decrease neonatal pulmonary complications of immaturity. One such regimen is two 12 mg doses of betamethasone 24 hours apart.

**SOURCES**


