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Premature Rupture of Membranes

This Practice Bulletin was developed by the ACOG Committee on Practice Bulletins—Obstetrics with the assistance of Brian Mercer, MD. The information is designed to aid practitioners in making decisions about appropriate obstetric and gynecologic care. These guidelines should not be construed as dictating an exclusive course of treatment or procedure. Variations in practice may be warranted based on the needs of the individual patient, resources, and limitations unique to the institution or type of practice.



Preterm delivery occurs in approximately 12% of all births in the United States and is a major factor contributing to perinatal morbidity and mortality (1, 2). Despite extensive research in this area, the rate of preterm birth has increased by 38% since 1981 (3). Premature rupture of membranes (PROM) is a complication in approximately one third of preterm births. It typically is associated with brief latency between membrane rupture and delivery, increased potential for perinatal infection, and in utero umbilical cord compression. Because of this, both PROM at and before term can lead to significant perinatal morbidity and mortality. There is some controversy over the optimal approaches to clinical assessment and treatment of women with term and preterm PROM. Management hinges on knowledge of gestational age and evaluation of the relative risks of preterm birth versus intrauterine infection, abruptio placentae, and cord accident that could occur with expectant management. The purpose of this document is to review the current understanding of this condition and to provide management guidelines that have been validated by appropriately conducted outcome-based research. Additional guidelines on the basis of consensus and expert opinion also are presented.

Background

The definition of PROM is rupture of membranes before the onset of labor. Membrane rupture that occurs before 37 weeks of gestation is referred to as preterm PROM. Although term PROM results from the normal physiologic process of progressive membrane weakening, preterm PROM can result from a wide array of pathologic mechanisms acting individually or in concert (4). The gestational age and fetal status at membrane rupture have significant implications in the etiology and consequences of PROM. Management may be dictat-

ed by the presence of overt intrauterine infection, advanced labor, or fetal compromise. When such factors are not present, especially with preterm PROM, obstetric management may have a significant impact on maternal and infant outcomes. An accurate assessment of gestational age and knowledge of the maternal, fetal, and neonatal risks are essential to appropriate evaluation, counseling, and care of patients with PROM.

Etiology

Membrane rupture may occur for a variety of reasons. At term, weakening of the membranes may result from physiologic changes combined with shearing forces created by uterine contractions (5–8). Intraamniotic infection has been shown to be commonly associated with preterm PROM, especially if preterm PROM occurs at earlier gestational ages (9). In addition, factors such as low socioeconomic status, second- and third-trimester bleeding, low body mass index (calculated as weight in kilograms divided by the square of height in meters) less than 19.8, nutritional deficiencies of copper and ascorbic acid, connective tissue disorders (eg, Ehlers–Danlos syndrome), maternal cigarette smoking, cervical conization or cerclage, pulmonary disease in pregnancy, uterine overdistention, and amniocentesis have been linked to the occurrence of preterm PROM (10–19). The risk of recurrence for preterm PROM is between 16% and 32% (20, 21). In addition, women with a previous preterm birth (especially if it is due to PROM), those with a short cervical length (less than 25 mm) in the second trimester, and women with preterm labor or symptomatic contractions in the current pregnancy are at increased risk for PROM (12, 22). Although each of these risk factors can act individually or in concert to cause PROM, in many cases PROM will occur in the absence of recognized risk factors. As a result, it has been difficult to identify effective treatment strategies for the prevention of PROM. Recent studies have suggested progesterone therapy to reduce the risk of recurrent spontaneous preterm birth resulting from preterm labor or PROM (23, 24). However, because most cases of PROM occur in women without identifiable risk factors, the mainstay of care has been treatment after membrane rupture occurs.

Term Premature Rupture of Membranes

At term, PROM complicates approximately 8% of pregnancies and generally is followed by the prompt onset of spontaneous labor and delivery. In a large randomized trial,

half of women with PROM who were managed expectantly gave birth within 5 hours, and 95% gave birth within 28 hours of membrane rupture (25). The most significant maternal risk of term PROM is intrauterine infection, a risk that increases with the duration of membrane rupture (25–29). Fetal risks associated with term PROM include umbilical cord compression and ascending infection.

Leakage of Fluid After Amniocentesis

When leakage of amniotic fluid occurs after amniocentesis, the outcome is better than after spontaneous preterm PROM. In studies involving women who had second-trimester amniocentesis for prenatal diagnosis of genetic disorders, the risk of PROM was 1–1.2%, and the attributable risk of pregnancy loss was 0.06% (30). In most patients, the membranes reseal with restoration of normal amniotic fluid volume (31, 32).

Preterm Premature Rupture of Membranes

Regardless of obstetric management or clinical presentation, birth within 1 week is the most likely outcome for any patient with preterm PROM in the absence of adjunctive treatments. The earlier in gestation that PROM occurs, the greater is the latency period. With expectant management, 2.8–13% of women can anticipate cessation of fluid leakage and possible restoration of normal amniotic fluid volume (28, 32).

Of women with preterm PROM, clinically evident intraamniotic infection occurs in 13–60%, and postpartum infection occurs in 2–13% (33–37). The incidence of infection increases with decreasing gestational age at membrane rupture (38, 39) and increases with digital vaginal examination (40). Fetal malpresentation is increased with preterm PROM. Abruptio placentae affects 4–12% of pregnancies with preterm PROM (41, 42). However, serious maternal sequelae are uncommon (35, 43).

The most significant risks to the fetus after preterm PROM are complications of prematurity. At all gestational ages before term, respiratory distress has been reported to be the most common complication of preterm birth (4, 44). Other serious forms of morbidity, including neonatal infections, intraventricular hemorrhage, and necrotizing enterocolitis, also are associated with prematurity, but these are less common nearer to term. Preterm PROM and exposure to intrauterine inflammation have been associated with an increased risk of neurodevelopmental impairment (9, 45). Early gestational age at mem-

brane rupture also has been associated with an increased risk of neonatal white matter damage ($P < .001$), after controlling for corticosteroid administration, latency interval, gestational age at delivery, and birth weight (46). However, no data exist that suggest immediate delivery after presentation with PROM will avert these risks. The presence of maternal infection poses the additional risk of neonatal infection. Infection, cord accident, and other factors contribute to the 1–2% risk of antenatal fetal demise after preterm PROM (43).

Previable Premature Rupture of Membranes

The fetal survival rate subsequent to PROM at 24–26 weeks of gestation has been reported to be approximately 57% (47). A recent systematic review of 201 cases from 11 studies revealed a 21% perinatal survival rate after expectant management of PROM before viability (48). Survival data may vary by institution. Most studies of second-trimester and previable PROM have been retrospective and have included only those patients appropriate for and accepting of expectant management, potentially exaggerating latency and improving apparent outcomes.

A small number of patients with previable PROM will have an extended latency period. In a review of 12 studies evaluating patients with second-trimester PROM, the mean latency period ranged from 10.6 to 21.5 days (47), with 57% of patients giving birth within 1 week and 22% remaining pregnant for 1 month or more. The incidence of stillbirth subsequent to PROM at 16–28 weeks of gestation ranges from 3.8% to 22% (11, 33, 49) compared with 0–2% at 30–36 weeks of gestation (50, 51). This increased rate of death may be explained by increased susceptibility of the umbilical cord to compression or of the fetus to hypoxia and intrauterine infection. Alternatively, this finding may reflect the lack of intervention for fetal compromise before viability.

Significant maternal complications occurring after second trimester and previable PROM have been reported to include intraamniotic infection, endometritis, abruptio placentae, retained placenta, and postpartum hemorrhage. Maternal sepsis is a rare but serious complication reported in approximately 1% of cases, and isolated maternal deaths due to infection have been reported in this setting (52). Outcomes of survivors of preterm PROM depend on the gestational age, presence of infection, length of latency, and other maternal and fetal complications.

A variety of conditions associated with fetal lung compression or oligohydramnios or both can result in

pulmonary hypoplasia. Reported risks of pulmonary hypoplasia after PROM at 16–26 weeks of gestation vary from less than 1% to 27% (37, 52). Lethal pulmonary hypoplasia rarely occurs with membrane rupture subsequent to 24 weeks of gestation, presumably because alveolar growth adequate to support postnatal development already has occurred (53, 54). Early second-trimester membrane rupture, severe oligohydramnios, and duration of membrane rupture longer than 14 days are primary determinants of the risk of pulmonary hypoplasia (55, 56). Prolonged oligohydramnios also is associated with in utero deformation, including abnormal facies (ie, low-set ears and epicanthal folds) and limb contractures and other positioning abnormalities.

Clinical Considerations and Recommendations

► *How is premature rupture of membranes diagnosed?*

Most cases of PROM can be diagnosed on the basis of the patient's history and physical examination. Examination should be performed in a manner that minimizes the risk of introducing infection, particularly before term. Because digital cervical examinations increase the risk of infection and add little information to that available with speculum examination, digital examinations should be avoided unless the patient is in active labor or imminent delivery is planned (40, 57–59). Sterile speculum examination provides an opportunity to inspect for cervicitis and umbilical cord or fetal prolapse, assess cervical dilatation and effacement, and obtain cultures as appropriate.

The diagnosis of membrane rupture is confirmed by the visualization of fluid passing from the cervical canal. If the diagnosis remains in question, the pH of the vaginal sidewalls or from fluid in the posterior vaginal fornix can be assessed. The pH of the vaginal secretions is generally 4.5–6.0, whereas amniotic fluid usually has a pH of 7.1–7.3. False-positive results may occur in the presence of blood or semen contamination, alkaline antiseptics, or bacterial vaginosis. Alternatively, false-negative results may occur with prolonged leakage and minimal residual fluid. Additional information can be obtained by swabbing the posterior fornix (avoiding cervical mucus) and allowing the vaginal fluid to dry on a microscope slide. The presence of arborization (ferning) under microscopic visualization further suggests membrane rupture.

Ultrasound examination of amniotic fluid volume may be a useful adjunct in documenting oligohydramnios, but is not diagnostic. When the clinical history or

physical examination is unclear, membrane rupture can be diagnosed unequivocally with ultrasonographically guided transabdominal instillation of indigo carmine dye (1 mL in 9 mL of sterile normal saline), followed by observation for passage of blue fluid from the vagina.

► ***What does the initial management involve once PROM has been confirmed?***

In all patients with PROM, gestational age, fetal presentation, and well-being should be determined. At any gestational age, a patient with evident intrauterine infection, abruptio placentae, or evidence of fetal compromise is best cared for by expeditious delivery. In the absence of an indication for immediate delivery, swabs for diagnosis of *Chlamydia trachomatis* and *Neisseria gonorrhoeae* may be obtained from the cervix, if appropriate. The need for group B streptococcal intrapartum prophylaxis should be determined if preterm PROM occurs (60).

In patients with preterm PROM, electronic fetal heart rate monitoring and uterine activity monitoring offer the opportunity to identify occult umbilical cord compression and to evaluate for asymptomatic contractions. In one study, variable decelerations occurred in 32% of women with preterm PROM (61). Biophysical profile test scores of 6 or less within 24 hours of delivery also have been demonstrated to correlate with positive amniotic fluid cultures and perinatal infection. At least eight studies have confirmed this association (62). Most of these studies have included daily fetal assessment after preterm PROM. An abnormal test result should lead to reassessment of the clinical circumstances and may lead to a decision to proceed to delivery. It is important to remember that heart rate testing at less than 32 weeks of gestation may not yield a reactive result in an immature but otherwise healthy fetus. However, once a reactive result has been achieved, a subsequently nonreactive test should be considered suspicious. Consensus has not been reached among experts on the optimal frequency of and modality of fetal testing in the face of PROM.

► ***What is the optimal method of initial management for a patient with PROM at term?***

Fetal heart rate monitoring should be used to assess fetal status. Dating criteria should be reviewed to assign gestational age because virtually all aspects of subsequent care will hinge on that information. Because optimal results are seen with 4 hours between group B streptococcal prophylaxis and birth, when the decision to deliver is made, group B streptococcal prophylaxis should be given based on prior culture results or risk factors if cultures have not been previously performed (60).

The largest randomized study to date found that oxytocin induction reduced the time interval between PROM and delivery as well as the frequencies of chorioamnionitis, postpartum febrile morbidity, and neonatal antibiotic treatments, without increasing cesarean deliveries or neonatal infections (25). These data suggest that for women with PROM at term, labor should be induced at the time of presentation, generally with oxytocin infusion, to reduce the risk of chorioamnionitis. An adequate time for the latent phase of labor to progress should be allowed.

► ***When is delivery recommended for the preterm fetus in the presence of premature rupture of membranes?***

The decision to deliver is based on gestational age and fetal status (Table 1), and the time considered optimal may vary among institutions. At 32–33 completed weeks of gestation, the risk of severe complications of prematurity is low if fetal pulmonary maturity is evident by amniotic fluid samples collected vaginally or by amniocentesis (51). Therefore, labor induction may be considered if pulmonary maturity has been documented. If pulmonary maturity cannot be established, expectant management may be beneficial. The efficacy of corticosteroid use at 32–33 completed weeks of gestation has not been specifically addressed for women with PROM but has been recommended by some experts.

Because of the increased risk of chorioamnionitis (63, 64), and because antenatal corticosteroids are not recommended after 34 weeks of gestation to accelerate fetal pulmonary maturity, delivery is recommended when PROM occurs at or beyond 34 weeks of gestation. 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 33 completed weeks of gestation. Prophylaxis using antibiotics to prolong latency and a single course of antenatal corticosteroids can help reduce the risks of infection and gestational age-dependent neonatal morbidity.

► ***What general approaches are used in cases of preterm PROM managed expectantly?***

Expectant management of preterm PROM generally consists of modified bed rest to enhance reaccumulation of amniotic fluid and complete pelvic rest. Patients should be assessed periodically for evidence of infection, abruptio placentae, umbilical cord compression, fetal well-being, and labor. There is no consensus on the frequency of assessment that is optimal, but an acceptable strategy would include periodic ultrasound monitoring of amniotic fluid volume and fetal heart rate monitoring. In a

Table 1. Management of Premature Rupture of Membranes Chronologically

Gestational Age	Management
Term (37 weeks or more)	<ul style="list-style-type: none"> • Proceed to delivery, usually by induction of labor • Group B streptococcal prophylaxis recommended
Near term (34 weeks to 36 completed weeks)	<ul style="list-style-type: none"> • Same as for term
Preterm (32 weeks to 33 completed weeks)	<ul style="list-style-type: none"> • Expectant management, unless fetal pulmonary maturity is documented • Group B streptococcal prophylaxis recommended • Corticosteroid—no consensus, but some experts recommend • Antibiotics recommended to prolong latency if there are no contraindications
Preterm (24 weeks to 31 completed weeks)	<ul style="list-style-type: none"> • Expectant management • Group B streptococcal prophylaxis recommended • Single-course corticosteroid use recommended • Tocolytics—no consensus • Antibiotics recommended to prolong latency if there are no contraindications
Less than 24 weeks*	<ul style="list-style-type: none"> • Patient counseling • Expectant management or induction of labor • Group B streptococcal prophylaxis is not recommended • Corticosteroids are not recommended • Antibiotics—there are incomplete data on use in prolonging latency

*The combination of birthweight, gestational age, and sex provide the best estimate of chances of survival and should be considered in individual cases.

patient with preterm PROM, a temperature exceeding 38.0°C (100.4°F) may indicate infection, although some investigators have suggested that fever, with additional factors such as uterine tenderness and maternal or fetal tachycardia, is a more accurate indicator of maternal infection (34, 65). Leukocyte counts are nonspecific when there is no clinical evidence of infection, especially if antenatal corticosteroids have been administered.

Low initial amniotic fluid volume (amniotic fluid index less than 5 cm or maximum vertical fluid pocket less than 2 cm) has been associated with shorter latency to delivery and an increased risk of neonatal morbidity, including respiratory distress syndrome (RDS), but not with increased maternal or neonatal infection after PROM (66). However, the predictive value of a low amniotic fluid volume for adverse outcomes is poor. Several investigators have evaluated the utility of endovaginal ultrasound assessment of cervical length for prediction of latency during expectant management of PROM remote from term. Some experts have suggested a short cervical length after PROM to be associated with shorter latency (67–69). In the most recent study, the likelihood of delivery within 7 days was 83% if the initial cervical length was 1–10 mm (versus 18% for cervical length more than 30 mm); however, the number of

women in these categories was small (N = 24 and 17, respectively) (67). Although the combination of clinical and ultrasound markers may yield improved predictive models in the future, initial amniotic fluid volume determination and cervical length generally should not be used in isolation to direct management of PROM.

► *Should tocolytics be considered for patients with preterm PROM?*

Use of prophylactic tocolysis after preterm PROM has been shown to prolong latency in the short term (70–72), whereas the use of therapeutic tocolysis (ie, instituting tocolysis only after contractions have ensued) has not been shown to prolong latency (73). A retrospective study compared the use of aggressive tocolysis (84% of antepartum days) with limited tocolysis as needed for contractions only during the first 48 hours (7% of antepartum days). Aggressive therapy was found not to be associated with significantly longer latency to delivery (3.8 versus 4.5 days, $P = .16$) (74). However, a recent retrospective study compared the prolonged use of tocolysis for longer than 48 hours plus antibiotics and steroids with gestational age-matched infants not treated for PROM. The investigators concluded that chorioamnioni-

tis and a latency of greater than 1 week achieved by prolonged use of tocolysis lessens the advantages of extended gestational age and decreased predischarge neonatal morbidity (75).

The effect of tocolysis to permit antibiotic and antenatal corticosteroid administration in the patient with preterm PROM who is having contractions has yet to be conclusively evaluated; therefore, specific recommendations for or against tocolysis administration cannot be made. As detailed as follows, use of both antibiotics and antenatal corticosteroids improves outcome in patients with preterm PROM who are being treated expectantly.

► ***Should antenatal corticosteroids be administered to patients with preterm PROM?***

The impact of antenatal corticosteroid administration after preterm PROM on neonatal outcomes has been evaluated in a number of clinical trials. Multivariate analysis of prospective observational trials also has suggested a benefit of antenatal corticosteroid use regardless of membrane rupture (76), and the National Institutes of Health Consensus Development Panel has recommended a single course of antenatal corticosteroids for women with PROM before 32 weeks of gestation in the absence of intraamniotic infection (77, 78). Several meta-analyses have addressed this issue (79–82). Early reviews resulted in conflicting conclusions regarding the impact of antenatal steroids on the occurrence of RDS. Two more recent meta-analyses suggest that steroid therapy significantly reduces the risks of RDS, intraventricular hemorrhage, and necrotizing enterocolitis without increasing the risks of maternal or neonatal infection regardless of gestational age (82, 83). The risk of infection from corticosteroid use at 32–33 completed weeks of gestation is unclear, but based on available evidence, their use has been recommended by some experts, particularly if pulmonary immaturity is documented. Studies of the combined use of corticosteroids and prophylactic antibiotics after preterm PROM suggest significant reductions in RDS, perinatal mortality, and other morbidities with no evident increase in perinatal infections after steroid administration (84, 85).

► ***Should antibiotics be administered to patients with preterm PROM?***

The issue of adjunctive antibiotic therapy to treat or prevent ascending decidual infection in order to prolong pregnancy and reduce neonatal infections and gestational age-dependent morbidity has been widely studied (43, 86, 87). In the most recent meta-analysis, investigators suggested prophylactic antibiotic administration to delay

delivery and reduce major markers of neonatal morbidity, but suggested that amoxicillin–clavulanic acid be avoided because of the increased risk of neonatal necrotizing enterocolitis (87).

Two large, multicenter clinical trials have adequate power to evaluate the utility of adjunctive antibiotics in this setting (65, 88). The National Institutes of Child Health and Human Development Maternal Fetal Medicine Research Units (NICHD-MFMU) Research Network found that the combination of initial intravenous therapy (48 hours) with ampicillin and erythromycin, followed by oral therapy of limited duration (5 days) with amoxicillin and enteric-coated erythromycin-base at 24–32 weeks of gestation, decreased the likelihood of chorioamnionitis and delivery for up to 3 weeks, as well as the number of infants with one or more major morbidities (defined as death, RDS, early sepsis, severe intraventricular hemorrhage, or severe necrotizing enterocolitis) (65). In addition, therapy reduced the likelihood of individual gestational age–dependent morbidities, including RDS, stage 3–4 necrotizing enterocolitis, patent ductus arteriosus, and chronic lung disease. Neonatal sepsis and pneumonia were less frequent in the antibiotic group for those who were not carriers of group B streptococci. (Group B streptococci carriers in both study arms received ampicillin for 1 week and then again during labor.)

A second large multicenter trial that examined the use of oral antibiotic therapy with erythromycin, amoxicillin–clavulanic acid, or both for up to 10 days after preterm PROM before 37 weeks of gestation found that oral erythromycin therapy 1) prolonged pregnancy only briefly (not significant at 7 days), 2) reduced the need for supplemental oxygen, and 3) reduced the frequency of positive blood cultures with no improvement in the primary outcome (one or more outcomes of death, chronic lung disease, or major cerebral abnormality on ultrasonography) (88). Oral amoxicillin–clavulanic acid reduced delivery within 7 days and reduced the need for supplemental oxygen but was associated with an increased risk of necrotizing enterocolitis (1.9% versus 0.5%, $P = .001$) without preventing other neonatal morbidities. The finding of increased necrotizing enterocolitis with oral amoxicillin–clavulanic acid differs from the NICHD-MFMU trial finding of reduced stage 2 or 3 necrotizing enterocolitis with amoxicillin–erythromycin therapy in a higher risk population, and review of the current literature does not reveal a consistent pattern regarding an increased risk with broad-spectrum antibiotic therapy. Several recent studies have attempted to determine whether a shorter duration of antibiotic therapy is adequate after preterm PROM, but these studies are of inadequate size and power to demonstrate equivalent effectiveness against infant morbidity (89, 90).

Based on available information, a 7-day course of parenteral and oral therapy with ampicillin or amoxicillin and erythromycin is recommended during expectant management of preterm PROM remote from term to prolong pregnancy and to reduce infectious and gestational age-dependent neonatal morbidity. Use of the combination of oral erythromycin and extended-spectrum ampicillin-clavulanic acid in women near term does not appear to be beneficial, may be harmful, and is not recommended. Antibiotic administration to prolong latency must be distinguished from well-established protocols directed at prevention of group B streptococcal infection in term and preterm patients (60). The prophylactic antibiotic regimen would appropriately treat group B streptococcal infections during expectant management of preterm PROM remote from term. However, women with PROM and a viable fetus, who are known carriers of group B streptococci and those who give birth before carrier status can be delineated, should receive intrapartum prophylaxis to prevent vertical transmission regardless of earlier treatments.

► ***Can preterm PROM be managed with home care?***

Generally, hospitalization for bed rest and pelvic rest is indicated after preterm PROM once viability is reached. Recognizing that latency is frequently brief, that intrauterine and fetal infection may occur suddenly, and that the fetus is at risk for umbilical cord compression, ongoing surveillance of both the woman and her fetus is recommended once the limit of potential viability has been reached.

For a woman with preterm PROM and a viable fetus, the safety of expectant management at home has not been established. One clinical trial of discharge after preterm PROM suggested that relatively few patients will be eligible for discharge to home care (91). Only 67 of 349 women (18%) were eligible for antepartum home care after 72 hours (negative cervical cultures and no evident labor, intrauterine infection, or fetal compromise). There were no identifiable differences in latency or in the incidences of intraamniotic infection, variable decelerations, or cesarean delivery. Infant outcomes were similar, but the power of this study to identify differences in these outcomes was low. Although the potential for a reduction in health care costs with antepartum discharge is enticing, it is important to ensure that such management will not be associated with increased risks and costs related to perinatal morbidity and mortality. Any cost savings from antenatal discharge may be rapidly lost with a small increase in the stay in the neonatal intensive care unit.

► ***How should a patient with preterm PROM and a cervical cerclage be treated?***

There are no prospective studies available with which to guide the care of women with preterm PROM and a cervical cerclage in situ. Retrospective studies have found that removal of cerclage after PROM is associated with similar pregnancy outcomes to those with PROM but no cerclage (92, 93). Cerclage retention after preterm PROM has been associated with trends toward increased maternal infectious morbidity (94–96), reaching statistical significance in one evaluation (97), and with only brief pregnancy prolongation. One study found increased infant mortality and sepsis-related death when the cerclage was left in place after PROM (94). One study found significant pregnancy prolongation with cerclage retention by comparing differing practices at two institutions; however, this could reflect population or practice differences at these institutions (95). Because the available studies are small and nonrandomized, the optimal timing of cerclage removal is unclear. However, no controlled study has found cerclage retention after PROM to improve neonatal outcomes. The risks and benefits of short-term cerclage retention pending completion of antenatal corticosteroid therapy to enhance fetal maturation have not been evaluated.

► ***What is the optimal treatment for a patient with preterm PROM and herpes simplex virus infection?***

Neonatal herpes simplex virus infection usually results from maternal–fetal transmission during the delivery process. Neonatal infection occurs in 34–80% of infants delivered in the setting of primary maternal infection, and in 1–5% with secondary infections (98, 99). Based on a small case series of women with active genital herpes infection in 1971, totaling just 36 patients, it has been believed that latency of more than 4–6 hours after membrane rupture is associated with an increased risk of neonatal infection (100, 101). However, a more recent case series of 29 women treated expectantly with active recurrent herpes simplex virus lesions and PROM before 32 weeks of gestation found none of the infants developed neonatal herpes infection (102). Latency from membrane rupture to delivery ranged from 1 to 35 days, and cesarean delivery was performed if active lesions were present at the time of delivery. These data suggest that the risk of prematurity should be weighed against the potential risk of neonatal herpes simplex virus in considering expectant management of PROM complicated by recurrent maternal herpes simplex virus infection. Prophylactic treatment with antiviral agents (eg, acyclovir) may be considered.

► ***How does care differ for patients with PROM that occurs before the threshold of potential neonatal viability?***

Women presenting with PROM before potential viability should be counseled regarding the impact of immediate delivery and the potential risks and benefits of expectant management. Counseling should include a realistic appraisal of neonatal outcomes, including the availability of obstetric monitoring and neonatal intensive care facilities. Because of advances in perinatal care, morbidity and mortality rates continue to improve rapidly (43, 44, 103). An attempt should be made to provide parents with the most up-to-date information possible.

Although no evidence or consensus of opinion exists regarding the benefit of an initial period of inpatient observation in these patients, this approach may include strict bed and pelvic rest to enhance the opportunity for resealing, as well as early identification of infection and abruptio placentae if expectant management is pursued. In addition to clinical follow-up, it may be useful to instruct patients to abstain from intercourse, limit their activities, and monitor their temperatures.

Typically, women with previable PROM who have been cared for as outpatients are readmitted to the hospital for bed rest and observation for infection, abruptio placentae, labor, and nonreassuring fetal heart rate patterns once the pregnancy has reached the limit of viability. Administration of antenatal corticosteroids for fetal maturation is appropriate at this time given that early delivery remains likely.

Summary of Recommendations and Conclusions

The following recommendations and conclusions are based on good and consistent scientific evidence (Level A):

- For women with PROM at term, labor should be induced at the time of presentation, generally with oxytocin infusion, to reduce the risk chorioamnionitis.
- Patients with PROM before 32 weeks of gestation should be cared for expectantly until 33 completed weeks of gestation if no maternal or fetal contraindications exist.

- A 48-hour course of intravenous ampicillin and erythromycin followed by 5 days of amoxicillin and erythromycin is recommended during expectant management of preterm PROM remote from term to prolong pregnancy and to reduce infectious and gestational age-dependent neonatal morbidity.
- All women with PROM and a viable fetus, including those known to be carriers of group B streptococci and those who give birth before carrier status can be delineated, should receive intrapartum chemoprophylaxis to prevent vertical transmission of group B streptococci regardless of earlier treatments.
- A single course of antenatal corticosteroids should be administered to women with PROM before 32 weeks of gestation to reduce the risks of RDS, perinatal mortality, and other morbidities.

The following recommendations and conclusions are based on limited and inconsistent scientific evidence (Level B):

- Delivery is recommended when PROM occurs at or beyond 34 weeks of gestation.
- With PROM at 32–33 completed weeks of gestation, labor induction may be considered if fetal pulmonary maturity has been documented.
- Digital cervical examinations should be avoided in patients with PROM unless they are in active labor or imminent delivery is anticipated.

The following recommendations and conclusions are based primarily on consensus and expert opinion (Level C):

- A specific recommendation for or against tocolysis administration cannot be made.
- The efficacy of corticosteroid use at 32–33 completed weeks is unclear based on available evidence, but treatment may be beneficial particularly if pulmonary immaturity is documented.
- For a woman with preterm PROM and a viable fetus, the safety of expectant management at home has not been established.

Proposed Performance Measure

The percentage of patients with PROM and a viable fetus who are known group B streptococci carriers or whose status as a carrier is unknown who receive intrapartum group B streptococcal prophylaxis

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The MEDLINE database, the Cochrane Library, and ACOG's own internal resources and documents were used to conduct a literature search to locate relevant articles published between January 1985 and November 2006. The search was restricted to articles published in the English language. Priority was given to articles reporting results of original research, although review articles and commentaries also were consulted. Abstracts of research presented at symposia and scientific conferences were not considered adequate for inclusion in this document. Guidelines published by organizations or institutions such as the National Institutes of Health and the American College of Obstetricians and Gynecologists were reviewed, and additional studies were located by reviewing bibliographies of identified articles. When reliable research was not available, expert opinions from obstetrician–gynecologists were used. Studies were reviewed and evaluated for quality according to the method outlined by the U.S. Preventive Services Task Force:

- I Evidence obtained from at least one properly designed randomized controlled trial.
- II-1 Evidence obtained from well-designed controlled trials without randomization.
- II-2 Evidence obtained from well-designed cohort or case–control analytic studies, preferably from more than one center or research group.
- II-3 Evidence obtained from multiple time series with or without the intervention. Dramatic results in uncontrolled experiments also could be regarded as this type of evidence.
- III Opinions of respected authorities, based on clinical experience, descriptive studies, or reports of expert committees.

Based on the highest level of evidence found in the data, recommendations are provided and graded according to the following categories:

Level A—Recommendations are based on good and consistent scientific evidence.

Level B—Recommendations are based on limited or inconsistent scientific evidence.

Level C—Recommendations are based primarily on consensus and expert opinion.

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