CHAPTER 16
PRE-LABOUR RUPTURE OF MEMBRANES

Learning Objectives
By the end of this chapter, the participant will:

1. Define prelabour rupture of membranes and discuss the possible etiology.
2. Describe how to diagnose of pre-labour rupture of membranes.
3. Describe the management of pre-labour rupture of membranes, depending on gestational age.

Discussion

Pre-labour rupture of the membranes (PROM) may occur when the fetus is ≥37 weeks gestation (term PROM) or before 37 weeks' gestation (preterm PROM). The risk to the pregnancy is increased after the occurrence of PROM, whether at or before term, primarily because of the increased risk of infection for both the woman and the fetus.

The **latent period** is the interval between the rupture of the membranes and the onset of labour. The duration of the latent period varies inversely with the gestational age. Almost 90% of women at term will be in spontaneous labour within 24 hours of membrane rupture. For the woman who is remote from term, the latent period will be longer. For example, at 28 to 34 weeks only, 50% will go into labour within 24 hours and 80% will go into labour within 1 week.

Maternal-to-child-transmission of HIV may increase when the membranes are ruptured. Once membranes are ruptured, induction of labour should be considered in the woman who is HIV positive to reduce exposure of the fetus to the HIV. Cesarean section once the membranes have ruptured no longer offers any protective factor. The woman should labour and deliver vaginally unless another indication for cesarean section surgery is present or arises during the course of the labour.

Incidence

Term PROM: 2% to 10% of pregnancies
Preterm PROM: 2% to 3% of pregnancies, but accounts for one-third of preterm delivery cases

Etiology

- Idiopathic
- Infections
- Polyhydramnios
- Cervical incompetence
- Uterine abnormality
- Following cervical cerclage or amniocentesis
- Trauma including motor vehicle accident or domestic violence
- Previous cervical surgery (conization or cone biopsy)
- Other:
  - Past obstetrical history (gestational age at delivery, including preterm PROM)
  - Race
  - Smoker
  - Use of illegal drugs
  - Lifestyle and stress
  - Nutrition

Bacterial vaginosis is a multi-agent infection caused by *Gardnerella vaginalis, mycoplasma hominis*, anaerobes, and coliforms. Where laboratory facilities exist, it may be detected if a vaginal culture is taken during pregnancy. Current evidence does not support screening and treating all pregnant women with asymptomatic bacterial vaginosis to prevent preterm birth and its consequences. For women with a previous preterm birth, there is little suggestion that its detection and treatment will prevent a further preterm birth, but it may reduce the risk of low birth weight and preterm PROM. (McDonald et al, 2005)

Diagnosis

Routine pelvic exam is not recommended because of the increased risk of ascending infection. However, sterile speculum examination for confirmation of PROM, assessment of cervical status, and exclusion of cord prolapse is appropriate. Although ultrasound is not diagnostic, the confirmation of the presence of a normal amount of amniotic fluid makes the diagnosis of PROM less likely.

History
- Take a careful history of vaginal fluid leakage, including amount, timing, odour, persistence, and colour.
- The vast majority of women with history of vaginal fluid leakage will have PROM (Parsons, 1999).

Speculum exam
- Fluid pooling in posterior fornix
- Free flow of fluid from cervix

Other testing
- **Ferning:** Ferning is assessed by obtaining a sample of fluid from the posterior fornix, placing it on a glass slide, and letting it air dry for 10 minutes. When observed under a microscope, the presence of characteristic arborization (ferning), caused by the crystallization of sodium chloride, suggests the presence of amniotic fluid (Bennett, 1999).
- **pH testing of fluid** (nitrazine paper): This test is non-specific. Nitrazine paper changes to a dark blue from yellow with a pH above 6.5. During pregnancy, normal vaginal pH is 4.5 to 6.0. Amniotic fluid pH is 7.1 to 7.3. False positive results can result from blood, vaginal infections, alkaline urine, and semen (Parsons, 1999).
- **Fluid in the vagina:** Fluid in the vagina may be collected to measure fetal lung maturity indices in preterm cases, if laboratory facilities exist.

Complications

Complications of term PROM
- Fetal or neonatal infection
- Maternal infection
- Umbilical cord compression or prolapse

Complications of preterm PROM
- Preterm labour and delivery
- Fetal or neonatal infection
- Maternal infection
- Umbilical cord compression or prolapse
- Increased cesarean-section rate
- With early, severe oligohydramnios
  - Pulmonary hypoplasia (<26 weeks)
  - Fetal deformation

Of the several complications of preterm PROM, the most significant is preterm birth and its consequences. The management strategy is, therefore, appropriately directed to minimizing this adverse outcome.

Management of PROM

Management of PROM when the woman is HIV positive

- If the woman has an undetectable viral load, treat her in the same way as an HIV negative woman, until labour starts. Then follow local guidelines to prevent vertical transmission of HIV.
- If the woman has a high viral load, prolonged rupture of membranes increases the risk of vertical transmission. One must weigh the risk of transmission with the risk of prematurity. It may be reasonable to give steroids and transfer to the most appropriate level of care, and then induce labour. There are no clear guidelines for women with intermediate viral loads.
- If the woman's viral load is unknown, she should be treated as if she has a high viral load with steroids, transfer, and induction of labour. If possible, following transfer and prior to delivery, determine her viral load **as** this may lead to treating her differently, i.e. if she has an undetectable viral load, she could be treated as if she was HIV negative until labour started and then treated according to local HIV treatment guidelines for the prevention of vertical transmission.
- If the pregnant woman has AIDS, she is at an increased risk for infection. Her risk must be weighed against the risk of delivering a premature infant. Induction of labour is likely the best course of action to reduce risks to the woman's health.

Management of PROM at any gestational age

- Confirm the diagnosis.
- Assess maternal and fetal well-being.
- Determine the presence of any associated condition that requires concurrent management or that may indicate that delivery is desirable at once.
- Avoid digital examination whenever possible. If expectant management is planned, the cervix can be assessed during the speculum exam. If the woman is in labour, digital cervical assessment is indicated.
- Determine the fetal presentation using ultrasound if abdominal assessment is inconclusive.

Management of term PROM (>37 weeks)

- Avoid digital cervical exam.
- Inform women of the benefits and risks of induction compared with expectant management.
- Care for the woman according to her preference, if she is known to be group B streptococcus (GBS) negative.
- Assess for infection: Monitor maternal pulse and temperature, fetal heart rate, presence of uterine tenderness or irritability, and changes in white blood cell counts, if indicated.
- Begin antibiotics for GBS prophylaxis, if indicated
- Consider induction of labour with intravenous oxytocin, if the woman is GBS positive or if her GBS status is unknown. Perform cesarean section if there is a contraindication to labour or vaginal delivery
- Administer appropriate antibiotics for chorioamnionitis, if present or if an infection develops. Induce labour in the presence of chorioamnionitis.

The management of PROM at term is based on the Term PROM Study (Hannah et al, 1996) and the recent Cochrane review.

- Induction with oxytocin or prostaglandin reduces the risk of chorioamnionitis (RR, 0.74; 95% CI, 0.56–0.97) and endometritis (RR, 0.30; 95% CI, 0.12–0.74) without increasing cesarean sections and operative vaginal births. Although there is no difference in neonatal infection (RR, 0.83; 95% CI, 0.61–1.12), fewer infants in the induction groups went to the neonatal intensive care unit compared with expectant management (RR, 0.72; 95% CI, 0.57–0.92; number needed to treat, 20) (Dare et al., 2006).

- Chorioamnionitis is reduced and maternal satisfaction is increased if labour is induced with intravenous oxytocin, compared with either inducing labour with prostaglandins (with or without the use of oxytocin) or expectant management (Mozurkewich et al., 1997).
- Neonatal infection is reduced among women who are GBS positive if labour is induced with intravenous oxytocin, compared with either inducing labour with prostaglandins (with or without the use of oxytocin) or expectant management (Money et al., 2004; Hannah et al., 1997).

Management of preterm PROM (34–36 weeks)

For this gestational age range, there is limited research evidence to guide clinical management. Induction or expectant management are acceptable management options depending on local resources. "When preterm PROM occurs at 34 to 36 weeks gestation, the risk of severe acute neonatal morbidity and mortality with expeditious delivery is low. Conversely, conservative management at 34 to 36 weeks has been associated with an eightfold increase in amnionitis (16% versus 2%, P=0.001) and only brief prolongation of latency and maternal hospitalization (5.2 days versus 2.6 days, P=0.006), without significant reduction in perinatal morbidity related to prematurity. Hence these women are best served by expeditious delivery with labor induction, in the absence of contraindication to labor or vaginal delivery." (Mercer, 2004, p. 769)

- **Avoid digital cervical exam**
- Inform women of the possible benefits and risks of induction of labour compared with expectant management.
- Care for the woman according to her preference, if she is known to be GBS negative.
- Assess for infection: Monitor maternal pulse and temperature, fetal heart rate, presence of uterine tenderness or irritability, and changes in white blood cell counts, if indicated.
- Begin antibiotics for GBS prophylaxis, if indicated
- Administer appropriate antibiotics for chorioamnionitis, if present or if an infection develops. Induce labour in the presence of chorioamnionitis.
- If appropriate, consider transfer to a higher-level centre

Management of preterm PROM (<34 weeks)

For women who have preterm PROM <34 weeks gestation, expectant management is usually preferred and attempts should be made to prolong the latent period. A meta-analysis in the Cochrane Library of antibiotic treatment with preterm PROM (involving over 6,000 women in 22 trials) found that the use of an antibiotic following preterm PROM reduced the risk of chorioamnionitis, prolonged the latency period, and reduced markers of neonatal morbidity (such as neonatal infection, use of surfactant, oxygen therapy, and abnormal cranial ultrasound). The choice of antibiotic is less clear but from the studies erythromycin seems to be a good choice. One recommended approach is "intravenous therapy (48 hours) with Ampicillin (2 g IV q 6 hours) and erythromycin (250 mg IV q 6 hours), followed by limited-duration oral therapy (five days) with amoxicillin (250 mg by mouth q 8 hours) and enteric-coated erythromycin base (333 mg by mouth q 8 hours)" (Mercer et al., 2004; 773).

Expectant management may be appropriate; administer steroids and assess and monitor for infection. On the other hand, if the woman is at high risk for chorioamnionitis, transfer to a facility with a neonatal intensive care centre and induction of labour following a course of steroids may be the best approach. If such facilities are not available, and the risk of infection is elevated, steroid treatment followed by induction of labour may be the best choice to protect the woman's life. Preparations should be made for care of the premature baby should it survive. "Kangaroo care" combined with cup feeding of expressed breast milk may be of benefit.

- **Avoid digital cervical exam.**
- Amniotic fluid may be collected from vagina to assess fetal lung maturity.
- Administer steroids to promote fetal lung maturity (betamethasone 12 mg IM q 24 hours x 2 doses).

- Assess for infection: Monitor maternal pulse and temperature, monitor fetal heart rate, assess for presence of uterine tenderness or irritability, do a complete blood count and a differential white blood cell count, and perform cultures, if indicated.
- Administer appropriate antibiotics for chorioamnionitis, if it develops, and induction to follow.
- Antepartum antibiotics as above: Ampicillin 1 to 2 gm IV q 4 to 6 hours x 48 hours, as well as erythromycin 250 mg IV q 6 hours x 48 hours, followed by both ampicillin and erythromycin orally for five days (clindamycin alone 600 mg TID for penicillin-allergic women).
- If available, perform an ultrasound assessment of fetal position, cervical status, and fluid volume,
- Restart GBS prophylaxis at the onset of labour, if indicated.
- If appropriate, consider transfer to a facility with neonatal intensive care.
- Expectant management, possibly as an outpatient, if transfer not possible.
- Expectant management may include monitoring of maternal vital signs, fetal heart tones, and uterine activity at specific intervals. No digital examinations should be performed.

Key Messages

1. PROM occurs for many different reasons and at any gestational age.
2. Management of PROM revolves around minimizing infection to the mother and her baby.

Suggestion for Applying the Sexual and Reproductive Rights Approach to this Chapter

When a woman presents with PROM, take time to explain to her what has happened, why PROM happens, what normally happens next (i.e. labour), and if labour doesn't start on its own what could potentially happen next (i.e. induction). Women need to know what the benefits and risks are of waiting for labour to happen (infection) versus the benefits and risks of inducing labour (increased interventions). This is an opportunity for you to offer evidence-based practice by providing women with choices about the management of their labour and control over their own bodies.

Resources:

- Bennett SL, Cullen JB, Sherer DM, Woods JR. The ferning and nitrazine tests of amniotic fluid between 12 and 41 weeks gestation. Am J Perinatol 1993;10(2):101-4.
- Dare MR, Middleton P, Crowther CA, Flenady VJ, Varatharaju B. Planned early birth versus expectant management (waiting) for prelabour rupture of membranes at term (37 weeks or more) [Cochrane review]. In: Cochrane Database of Systematic Reviews 2006 Issue 1. Chichester (UK): John Wiley & Sons, Ltd; 2006. DOI: 10.1002/14651858.D005302.pub2.
- Hannah ME, Ohlsson A, Farine D, Hewson SA, Hodnett ED, Myhr TL, et al. Induction of labor compared with expectant management for prelabor rupture of the membranes at term. TERMPROM Study Group. N Engl J Med 1996;334(16):1005-10.
- Hannah ME, Ohlsson A, Wang EE, Matlow A, Foster GA, Willan AR, et al. Maternal colonization with group B Streptococcus and prelabor rupture of membranes at term: the role of induction of labor. TermPROM Study Group. Am J Obstet Gynecol 1997;177(4):780-5.
- Kenyon S, Boulvain M, Neilson J. Antibiotics for preterm rupture of the membranes: a systematic review. Obstet Gynecol 2004;104(5 Pt 1):1051-7.
- Kenyon S, Boulvain M, Neilson J. Antibiotics for preterm rupture of membranes [Cochrane review]. In: Cochrane Database of Systematic Reviews 2003 Issue 2. Chichester (UK): John Wiley & Sons, Ltd; 2003. DOI: 10.1002/14651858.CD001058.

- Lewis DF, Major CA, Towers CV, Asrat T, Harding JA, Garite TJ. Effects of digital vaginal examinations on latency period in preterm premature rupture of membranes. Obstet Gynecol 1992;80(4):630-4.
- McDonald H, Brocklehurst P, Parsons J. Antibiotics for treating bacterial vaginosis in pregnancy [Cochrane review]. In: Cochrane Database of Systematic Reviews 2005 Issue 1. Chichester (UK): John Wiley & Sons, Ltd; 2005. DOI: 10.1002/14651858.CD000262.pub2.
- Mercer BM, Miodovnik M, Thurnau GR, Goldenberg RL, Das AF, Ramsey RD, et al. Antibiotic therapy for reduction of infant morbidity after preterm premature rupture of the membranes. A randomized controlled trial. National Institute of Child Health and Human Development Maternal-Fetal Medicine Units Network. JAMA 1997;278(12):989-95.
- Mercer BM. Preterm premature rupture of the membranes: diagnosis and management. Clin Perinatol 2004;31(4):765-82.
- Money DM, Dobson S, Infectious Diseases Committee. The prevention of early-onset neonatal Group B streptococcal disease [SOGC clinical practice guideline no 149]. J Soc Obstet Gynaecol Can 2004;26(9):826-32. Available: http://sogc.org/guidelines/public/149E-CPG-September2004.pdf.
- Mozurkewich EL, Wolf FM. Premature rupture of membranes at term: a meta-analysis of three management schemes. Obstet Gynecol 1997;89(6):1035-43.
- Naef RW, Allbert JR, Ross EL, Weber BM, Martin RW, Morrison JC. Premature rupture of membranes at 34 to 37 weeks' gestation: aggressive versus conservative management. Am J Obstet Gynecol 1998;178(1 Pt 1):126-30.
- Parsons M, Spellacy W. Premature rupture of membranes. In: Danforth DM, Scott JR, editors. Danforth's obstetrics and gynecology. 8th ed. Philadelphia: Lippincott Williams & Wilkins; 1999. p.269-77.
- Premature rupture of membrances. [ACOG practice bulletin no 1]. Washington: American College of Obstetricians and Gynecologists; 1998.
- Schutte MF, Treffers PE, Kloosterman GJ, Soepatmi S. Management of premature rupture of membranes: the risk of vaginal examination to the infant. Am J Obstet Gynecol 1983;146(4):395-400.
- Seaward PG, Hannah ME, Myhr TL, Farine D, Ohlsson A, Wang EE, et al. International Multicentre Term Prelabor Rupture of Membranes Study: evaluation of predictors of clinical chorioamnionitis and postpartum fever in patients with prelabor rupture of membranes at term. Am J Obstet Gynecol 1997;177(5):1024-9.