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Labor induction in the patient with preterm premature rupture of membranes

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ABSTRACT

Preterm premature rupture of membranes (PPROM) affects up to one-third of all preterm births and confers serious maternal risks, including intra-amniotic infection, and an increased risk of neonatal complications, including respiratory distress and intraventricular hemorrhage. Management of PPROM is a highly individualized process that requires an accurate determination of gestational age and causal factors, as well as the balancing of maternal and fetal risks. In this review of the existing literature on induction of labor in PPROM, we examine the differences in appropriate management of patients with early (32 weeks 0 days to 33 weeks 6 days) and near term (34 weeks 0 days to 36 weeks 6 days) PPROM, and compare the safety and efficacy of available treatment options. This review of previous research findings provides general guidelines for clinical decision making and highlights the need for future research on management of PPROM.

Introduction

Preterm premature rupture of membranes (PPROM) defined as rupture of membranes prior to the 37th week of gestation complicates approximately 3% of all pregnancies and 25–33% of all preterm births.[1] In over 50% of patients diagnosed with PPROM, delivery occurs within a week of membrane rupture.[2] Latency of pregnancy following rupture of membranes is inversely associated with the gestational age at the time of membrane rupture.[3] Intra-amniotic infection (13–60%) and placental abruption (4–12%) are often associated with PPROM. These complications occur more frequently at earlier gestational age of rupture.[2]

As the gestational age at diagnosis decreases, the severity and frequency of associated neonatal complications increases. Respiratory distress syndrome is the most common serious complication observed in the neonate born after a pregnancy complicated by PPROM.[4] Other significant neonatal complications associated with PPROM include intraventricular hemorrhage, necrotizing enterocolitis, sepsis, contractures (associated with long-standing oligohydramnios/anhydramnios), umbilical cord prolapse (especially when the fetal presentation is non-vertex) and cesarean delivery for malpresentation.[4] Severe oligohydramnios or anhydramnios leads to an increased incidence of umbilical cord compression and nonreassuring fetal testing, which may increase the chance of cesarean delivery. The presence of intra-amniotic infection or inflammation in the setting of PPROM has been associated with an increased incidence of neurodevelopmental delay.[5,6]

Maternal complications are typically secondary to the increased likelihood of infection associated with PPROM. Intra-amniotic infection in patients with PROM is significantly higher for those with preterm PROM (13–60%)

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compared to those with PROM at term (1%).[4] Additionally, intra-amniotic infection is noted more frequently in women with prolonged PPROM, severe oligohydramnios and multiple digital vaginal examinations.

Accurate diagnosis as well as adequate estimation of gestational age is of the utmost importance in determining the appropriate management of pregnancies complicated by PPROM. Diagnosis is traditionally a clinical one, confirmed when a suspicious history or sonographic finding of oligohydramnios is accompanied by a pooling of fluid in the posterior fornix of the vagina or visual leakage of fluid from the cervical os. If no pooling or visual leakage is appreciated, then a positive nitrazine test (where the vaginal fluid demonstrates an alkaline pH) and the microscopic appearance of a fern pattern when examining dried vaginal discharge is highly suggestive of ROM. In the absence of these findings despite a highly suspicious history, the tampon (amnio dye) test may be used: indigo carmine dye is injected into the amniotic fluid via amniocentesis—blue coloring noted on the vaginally inserted tampon within 30 min of intrauterine dye instillation is considered confirmatory of rupture. At this time, pharmaceutical companies are no longer producing indigo carmine dye, so this test may not be an option in the near future. In the presence of a high degree of suspicion for ROM without the evidence of pooling, ferning, nitrazine and without the ability to perform an amnio dye test, consideration may be given to placental alpha-microglobulin-1 (PAMG-1) testing (also known as Amnisure®). This test measures placental alpha-microglobulin-1 (PAMG-1) which is found in higher concentrations within the amniotic fluid than in vaginal secretions.[7] However, PAMG-1 is not considered a first-line diagnostic test as studies have shown a false positive rate of up to 31% in laboring patients without clinical evidence of ROM.[8,9] Current management of early PPROM at or beyond viability favors measures to maintain the pregnancy in the absence of overt intra-amniotic infection, active labor, or non-reassuring fetal assessment. Management of late PPROM (after 34 weeks) focuses on expedited delivery. These differences accentuate the necessity of appropriate estimation of gestational age, which is a benchmark of sound prenatal care, either through well-documented menstrual dates, early sonographic dating or a combination of both.

Management

Causes of PPROM are numerous and subsequent management is heavily influenced by the pathophysiologic culprit, when it is known or suspected (Fig). Infection is commonly linked to PPROM with amniotic fluid cultures noted to be positive in 25–35% of samples.[2,10–12] Clinically diagnosed intra-amniotic infection is a contraindication to expectant management of pregnancy and warrants expedited delivery, reserving cesarean delivery for the typical obstetrical indications.

Initial evaluation of the patient with PPROM should include an assessment of intra-amniotic infection (e.g., presence of fever, uterine tenderness, purulent lochia and maternal, or fetal tachycardia), evaluation for active labor, fetal position, and fetal well-being are necessary for determining an appropriate management plan. Each of these potential issues needs to be assessed within the context of estimated gestational age, as this is often the guidepost for PPROM management. A thorough evaluation will allow the provider to assess for additional contraindications to expectant management.

Late PPROM 34 weeks 0 days–36 weeks 6 days

The risk of fetal complications associated with preterm delivery has an inverse relationship with regard to gestational age, as risks of severe complications are greatest near the limits of fetal viability and decrease as the pregnancy progresses. The risks of serious complications are low when a preterm delivery approaches term. Adjunctive treatments to prolong pregnancy are not part of current obstetric practice at this gestational age. Tocolysis may be considered in the preterm labor patient in order to administer antenatal corticosteroids prior to achieving 34 weeks. However, in the setting of late PPROM, this practice has not been shown to be as beneficial.[2,4,13] Antenatal corticosteroids are not currently recommended beyond 34 weeks 0 days for the improvement in fetal pulmonary maturity.

Delaying delivery in the patient with late PPROM has been associated with increased intra-amniotic infection, lower mean umbilical cord pH, and longer maternal hospitalization without demonstration of a significant decrease in perinatal complications.[14,15] Therefore, the current practice is delivery in this group. More recent research has suggested that expeditious delivery in late PPROM may not reduce the risk of neonatal sepsis as compared to expectant management, although the authors noted that the sample size may have been too small to demonstrate a difference given the low incidence of neonatal sepsis.[16] In addition, a recent Cochrane Review reported that planned delivery in the PPROM patient prior to 37 weeks was not associated with an improvement in perinatal morbidity or a reduction in perinatal mortality.[17] However, this meta-analysis does include a wide range of gestational ages as well as multiple studies with varied methodological quality. Current recommendations from the American Congress of Obstetricians and Gynecologists support the expeditious delivery of the patient with PPROM who has attained 34 weeks of gestation, as the risk for ascending infection is increased, the complications of prematurity are relatively low and the efficacy of antenatal corticosteroids to improve perinatal outcomes has not been established.[4]

Early PPROM: 23 weeks 0 days–33 weeks 6 days

Individualization of management is a hallmark of obstetrical care, but most particularly at the periviable gestational age. The care delivered to such patients should weigh the risk of ascending infection versus the risks of prematurity, including severe neonatal morbidity and mortality. Clinical diagnosis of intra-amniotic infection, active labor, and non-reassuring fetal status continue to be contraindications to expectant management in this patient group. However, there are adjunctive treatments that can increase latency and decrease perinatal morbidities.