Outcomes in Gestations Between 20 and 25 Weeks with Preterm Premature Rupture of Membranes

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**Background:** Preterm deliveries complicate 11% of all births within the United States. In the urban inner city population, this figure approaches approximately 18%. In one quarter to one third of these deliveries, preterm premature rupture of the membranes (PPROM) has been a causative factor.

**Objective:** The purpose of this study was to evaluate outcomes of pregnancies complicated by preterm premature rupture of membranes at less than or equal to 24 weeks gestation at our institution.

**Methods:** A retrospective review of 300 charts was performed on patients delivered at our institution from December 2003 to December 2004. Patients with gestational ages between 20 and 24 weeks with ruptured membranes were included in the study. Maternal, fetal, placental, and neonatal characteristics were reviewed.

**Results:** A total of 16 infants were delivered. Seven infants were live born. The latency period was 4 days. The mean gestational age was 22 1/7 weeks. The average life span of the live born infants was noted to be 20 days. Chorioamnionitis was demonstrated in 85% of the placental specimens; in 57% of these specimens, group B streptococcus was noted to be the etiologic agent. Of the 16 infants delivered, only one infant is still alive and neurologically intact.

**Conclusion:** Various pathogens have been associated with PPROM and subsequent preterm delivery. The findings of this study suggest that within our population, group B streptococcus appears to be the primary causal agent associated with PPROM. Prevention of infection by early surveillance and patient education may help to decrease the incidence, but further investigation is warranted.

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The prevalence of preterm birth with concomitant premature rupture of membranes is widespread in the inner city community. The rate of preterm delivery in the African-American population is 17% compared with 9.8% in Caucasians. The rate of preterm birth in our population ranges from 18 to 21%. The population serviced by our institution is approximately 90% African descent (African, Caribbean, US born African Americans), 7% Hispanic, 2% Russian ancestry, and 1% Asian. Although neonatal survival rates have improved for the general population, communities with a lower socioeconomic status continue to experience poor neonatal outcomes.

Preterm premature rupture of membranes is defined as rupture of the membranes before the onset of labor and before 37 completed weeks' gestation; it is most often associated with genital tract infection. Etiologic agents most often noted are chlamydia, Trichomonas, bacterial vaginosis and group B streptococcus. The impact of associated infection portends a weakening of the fetal membranes which theoretically provides a mechanism for rupture. In a study by Thorsen et al, it was suggested that the presence of bacterial-derived endotoxins and IL-1 may play a role in the promotion of membrane rupture. The morbidity associated with this condition is significant, affecting both maternal and neonatal outcomes.

**Key Points**
- Group B streptococcus may be the causative agent for preterm premature rupture of membranes.
- Antenatal assessment for group B streptococcus earlier than 34 weeks may be indicated in some populations.
- Patient education serves as an important adjunct in reducing the risk of preterm premature rupture of membranes.
Therefore, the need for further investigation is paramount. As a result, the goal of this study was to evaluate pregnancy outcomes associated with preterm premature rupture of membranes between gestational weeks 20 and 25.

Materials and Methods

A retrospective review of 300 charts was performed. Charts were reviewed from the medical records department as well as the recently implemented computerized charting program. Fourteen patients delivered at our institution from December 2003 to December 2004 and met the inclusion criteria. Two patients had twin gestations. Maternal characteristics included gestational ages between 20 to 24 weeks that were evaluated in the triage area of the labor and delivery suite. Exclusion criteria included those patients who were 19 6/7 weeks gestation or 25 weeks gestation at the time of presentation. Gestational age was determined by last menstrual period and first trimester ultrasound as denoted by the medical record and a sonogram performed at the time of admission. Gonorrhea, chlamydia, group B streptococcus cultures, as well as wet prep evaluations, were obtained from each patient. Premature rupture of membranes was confirmed by vaginal pooling, a positive Nitrazine test and amniotic fluid arborization. All patients with a confirmed gestational age of 23 weeks and/or an estimated fetal weight of 500 g received both Maternal Fetal Medicine and Neonatal Intensive Care Unit consultations. All patients received prophylactic antibiotic therapy using ampicillin and erythromycin. Two patients received antenatal steroids at 24 weeks gestation. Infants with APGARS of 0 at one minute and 0 at five minutes were considered stillborn. The surviving neonates were followed in the Neonatal Intensive Care Unit until death or discharge. Each fetus was assessed for infection, respiratory distress syndrome, and intraventricular hemorrhage. Each stillborn, neonatal demise, and all placentas were evaluated by pathology. No genetic evaluations were performed.

Results

The average age of the patients was 27.9 (23-39 yr old). All patients in the study were African-American. A total of 16 infants were delivered, including two twin intrauterine pregnancies (Table 1). There were 8 male and 8 female infants. Seven infants were live born, 3 male and 4 female. The average time of membrane rupture to delivery (latency period) was 4 days (range 0–17). No infants delivered beyond 25 5/7 weeks. The mean gestational age was 22 1/7 weeks with an average APGAR score of 6 at one minute and 7 at five minutes. The birth weights ranged from 312 g to 690 g (mean 522.5 g). The average life span of the live born infants was noted to be 20 days, with a range of 1 to 122 days. The female infants survived an average of 38 days longer than the male infants. The mean placental weight was 453 g. Chorioamnionitis was demonstrated in 85% of placental specimens (Fig. 1); in 57% group B streptococcus was noted to be the etiologic agent. Of the 16 infants delivered, 7 were born alive and received intensive neonatal support; 5 subsequently died to sepsis and 2 died to respiratory distress syndrome (Fig. 2).

One infant who received antenatal steroids remains alive and neurologically intact. Of the stillborn infants, no limb defects or other obvious anatomic abnormalities were noted.

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* Received antenatal steroid therapy
Pathologic Findings

- Chorio • Chorio and GBS
- Abruption • Abruption and GBS

Fig. 1 Placental pathologic findings. *Chorioamnionitis; **group B streptococcus.

Discussion

Advances in perinatal medicine have allowed survival of infants at earlier gestational ages. Preterm premature rupture of membranes and preterm labor may represent a clinical continuum. There are many risk factors for preterm premature rupture of membranes, including a previous history of preterm delivery, smoking, and vaginal bleeding, as well as intrauterine infection. Various pathogens have also been associated with preterm premature rupture of membranes (PPROM) and subsequent preterm delivery. These include chlamydia, mycoplasma, and group B streptococcus. One of the main findings of this study suggests that within our population, group B streptococcus appears to be the primary causal agent associated with PPROM. This is in agreement with other studies that found bacterial vaginosis as the main causative agent.

In this study, 85% of all placentas demonstrated chorioamnionitis. There was no apparent relationship between the latency period and the presence of chorioamnionitis as has been suggested in early studies by Macintosh and Harrison. However, in our population, neonates with histologic chorioamnionitis had a higher rate of sepsis. This is in agreement with a study done by Ogunyemi et al which demonstrated that histologic chorioamnionitis was a major contributor to fetal morbidity and mortality. Infection may also affect the weight of the placenta which has been shown to affect the amount of time the fetus spends in utero. Dempsey et al showed that a smaller placenta was associated with decreased fetal weight and hence a shorter time was spent in utero. This theoretically may play a role in fetal latency.

Respiratory distress syndrome and neonatal sepsis are commonly encountered in preterm infants. Although corticosteroids were used in only two patients in this study, the incidence of RDS was low. This is most likely due to the small sample size of this study. Neonatal sepsis was the major cause of morbidity and mortality in this study population. This finding is in agreement with other studies that correlate the presence with intrauterine infection and neonatal death. Greater than 50% of our patients with neonatal sepsis also had positive group B streptococcal cultures. This finding, in association with the increased number of placental infections with group B Streptococcus, provides a basis for an association between the two entities. Winram et al demonstrated that group B streptococcus could penetrate intact amniotic membranes and hence provide a basis for placental infection. The American College of Obstetrics and Gynecology guidelines suggest that surveillance for group B streptococcus be performed at 35 weeks' gestation. However, it may be prudent in this population to evaluate for the presence of this organism earlier in the second trimester. However, a possible clinical investigation might include the provision of patient education in terms of the importance of prenatal care, the effects of group B streptococcus in pregnancy and testing for the organism at 20 weeks with corresponding treatment.

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The major limitations of this study were its small sample size and retrospective nature which may have allowed for the addition of conflicting variables. A larger prospective trial may afford greater significance in changing the incidence of preterm labor and premature rupture of membranes in urban communities.

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References


Please see John D. Yeast's editorial on page 699 of this issue.

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I long to accomplish a great and noble task, but it is my chief duty to accomplish humble tasks as though they were great and noble.

—Helen Keller