THE INFLUENCE OF MATERNAL VAGINAL AEROBIC FLORA ON NEWBORN EARLY INFECTIONS

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Abstract

Objectives: To study cervical colonization in women with premature rupture of membranes and the influence of infection on preterm newborns.

Methods: Prospective analysis.

Results: 167 (38.66%) from 432 preterm deliveries were complicated with premature

prelabour rupture of the membranes (PPROM). Organisms which induce chorioamnionitis and newborns infections mostly belong to group *B streptococci (GBS), E. Coli* and *Staphylococcus aureus*. In most cases of congenital neonatal sepsis cases bacteriological cultures from the mother had been negative. Documented sepsis during 72 hours of life was detected in 13.17% of our patients and 55.8% of women received antibiotics. The risk of neonatal mortality rises proportionally and significantly in relation to low birth weight in PRM cases.

Conclusions: Further randomised trials with more sensitive methods of bacterial investigation should be conducted in order to reduce the incidence of preterm deliveries and newborn early infection.

Key words: premature rupture of membranes, neonatal complications.

Introduction

Premature rupture of fetal chorioamniotic membranes by definition occurs before the onset of labor. Premature rupture of fetal membranes (PROM) occurs in approximately 10% of all pregnancies (1). When this event occurs before 37 weeks of gestation, it is deemed preterm premature rupture of membranes (PPROM) that has been estimated to affect 3% to 4.5% of all deliveries (2). Premature delivery is still a major medical problem as about 50% of cases are presumably due to infection. Preterm PROM increases the risk of prematurity and leads to a number of other perinatal and neonatal complications, including a 1 to 2 percent risk of fetal death.

Potential pathogens arise largely from the ascending route of the genital tract and from the endogenous vaginal flora, causing chorioamnionitis. Organisms which induce chorioamnionitis and newborns infections mostly belong to group *B streptococci (GBS), E. Coli, Staphylococcus aureus, Klebsiella spp,* while respiratory tract organisms like *Haemophilus influenzae, Streptococcus pneumoniae* occur more rarely. The incidence of preterm deliveries is 8-11% in Romania.

Objective

The purpose of the study was to explore the vaginal aerobic flora and the influence of infection on preterm deliveries in Clinic of Obstetrics and Gynecology „Bega" Timisoara in 2004-2006.

Methods:

Prospective analysis.

Study design

There were 432 preterm deliveries in Clinic of Obstetrics and Gynecology „Bega" during the 3 year period. Although in general in good clinical practice, in the case of all spontaneous preterm deliveries, bacteriological analyses are taken from the cervix and vagina, only 68 bacteriological samples were taken from the cervix and 50 from the vagina during 3 years. In 120 cases bacteriological samples were taken from the preterm newborn`s blood.

Results

- 167 (38.66%) from 432 preterm deliveries were complicated with premature prelabour rupture of the membranes (PPROM).
- Route of delivery in 280 (64.8%) women was cesarean section. 51% of women received antibiotic before labor and corticosteroid were used in 187 (43.2 %) of cases to induce fetal lung maturity.
- Acute chorioamnionitis was diagnosed in 34 cases (7.88%). The incidence of chorioamnionitis increased significantly with decreasing gestational age.

Most of the bacteriological samples taken from the cervix and the vagina were negative (Table 1).

Table 1. Relationship between gestational age and presence of pathogens in the cervix and the vagina before threatened or during preterm delivery.

Gestational age (weeks)	E. coli	Staphylococcus aureus	GBS	Other aerobic pathogens *	Number of negative samples	Number of investigated samples
26-30		1		1	22	24
30-34	5	3	1	2	27	38
34-37	2	2	4	10	37	55
Total	7	6	5	14	86	118

*other aerobic pathogens (*Klebsiella spp, Haemophilus influenzae, Streptococcus pneumoniae)*

- Neonatal sepsis was diagnosed by positive blood or cerebrospinal fluid cultures. Possible neonatal sepsis was diagnosed when two or more of the following criteria were present: white blood cell count less than 5000/mm^3, polymorphonuclear counts less than 1800/mm^3, ratio of bands to total neutrophil counts greater than 0.2.
- In most cases of congenital neonatal sepsis cases bacteriological cultures from the mother had been negative, or the samples had not been taken (Table 2).

Table 2. Relationship between presence of pathogens isolated from the mother`s cervix during pregnancy and preterm newborn`s perinatal infection.

Organism from cervix	Perinatal death	Congenital sepsis	Congenital pneumonia	Omphalitis	Conjunctivitis	*Infectio nonspecific*	Without infection	Total
E. coli	1	2		2	8		2	15
Staphylococcus aureus	1	3		2	5	3		14
GBS	2	1						3
Other aerobic pathogens	2	4	2	1	3	1	3	16
Sample negative	4	8	6	5	12	5	28	70
Sample was not taken	2	4	1	6	9	7	22	49
Total	12	22	9	16	37	16	55	167

- In 8 of 22 congenital sepsis cases pathogens were isolated from the newborn`s blood (E. Coli, group B streptococci (GBS), Staphylococcus aureus, Klebsiella pneumoniae, Haemophilus influenzae).
- Mother and newborn did not share the same pathogens in 13% cases.
- PPROM is associated with 30% to 40% of premature births and it is also responsible for the neonatal problems resulting from prematurity (3). PPROM by itself is not an indepenent risk factor for producing neonatal morbidities (Table 3).
- Precocious neonatal mortality at preterm babies with PPROM represents 11.16%. The risk of mortality rises proportionally and significantly in relation to low birth weight in PRM cases.

Table 3. Neonatal morbidity after PPROM.

Comorbid Conditions	Cases	Percent
Neonatal early sepsis	22	13.17
Moderate /severe intraventricular hemorrhage	42	25.14
Respiratory distress syndrome	72	8o.83
Apnea of prematurity	78	46.70
Pulmonary hypoplasia	2	1.19
Anemia of prematurity	123	73.65
Patent ductus arteriosus	6	3.59
Retinopathy of prematurity	26	15.56
Secondary spontaneous pneumothorax	5	2.99
Pneumonia	9	5.38
Bronchopulmonary dysplasia	6	3.59
Necrotizing enterocolitis	2	1.19
Skeletal deformities	11	6.58

* Surviving preterm babies had multiple comorbid conditions. Therefore, the percentages presented do not equal 100%.

Discussion

Rupture of membranes before 37 weeks of gestation accounts for 20% to 40% of PROM (4). Prematurity is the most significant factor in the increased perinatal morbidity and mortality associated with PROM because delivery occurs within 7 days of PROM in over 80% cases. So PROM is not an independent risk factor for neonatal morbidity in preterm births. Neontal morbidity is affected mainly by prematurity itself, rather than by the occurrence of PROM (5). 84.66% of our infants were preterm which is more than two fold in other reported cases.

The neonatal pulmonary consequences of PPROM include congenital pneumonia which often is associated with maternal chorioamnionitis and surfactant deficiency (RDS) following preterm delivery, and pulmonary hypoplasia and pulmonary hypertention are secondary to interruption of fetal lung growth associated with loss of amniotic fluid. These three conditions may occur simultaneously in the same patient, and presenting signs of each may overlap with other confounding bedside diagnosis.The frequency of pulmonary hypoplasia following midtrimester PPROM has been reported as 0% to 24%. Kilbride et al. identified the risk of pulmonary hypoplasia as nearly 80% with early rupture of the membranes (<25 weeks getation) combined with duration of severe oligohydramnios greater than 14 days (3). In our study there was 2 cases of pulmonary hypoplasia.

Although previous reports have suggested that prolonged PROM might accelerate pulmonary maturity, this effect has not consistently been recognized. For infants with respiratory distress, surfactant should be given as soon as possible after birth. A recent study suggests that complicted RDS cases, including those with superimposed asphyxia or infection following PROM, may benefit from earlier surfactant retreatment. In addition to RDS, severe preterm infants are at risk for other major morbidities, including intraventricular hemorrhage, necrotizing enterocolitis, retinopathy of prematurity, and chronic lung disease. Limited outcome data suggest that these complications occur at similar rates for PROM survivors as for infants born without PROM (1). In our study 43.1% of infants had RDS .

In PROM cases deformities are significantly related to the duration and severity of oligohydramnios. The reported incidence of skeletal abnormalities in PROM series ranged from 0% to 35% . Commonly, the newborn`s feet or hands are broad and spade-like and may be somewhat edematous. In vertex presentation, the skull is elongated with molding, often with Potter facies. Breech positioning, which is two to three times more frequent following oligihydramnios in early midtrimester, may result in marked fetal hip flexion contractures and hyperextention of the lower extremities with an increased risk of hip dislocation. In our study 6.5% of infants had skeletal deformities with club foot being the most common.

Incidence of documented sepsis in the premature born from mothers with rupture of membranes greater than 24 hours is approximately 4%. When signs and symptoms of chorioamnionitis are present the risk of proven sepsis increases to 6%. When prolonged rupture of membranes accompanied with prematurity, the incidence of proven sepsis is 6-7% and in highly suspected and proven sepsis the rate is 7- 13% (6). Although the risk of neonatal sepsis is reduced after intrapartum prophylaxis, of a 5% to 9% risk remains (1).

Documented sepsis during 72 hours of life was detected in 13,17% of our patients and 55.8% of women received antibiotics. Sign of infection may be difficult to assess, particularly when the newborn has been partially treated. For preterm infants it is recommended that a sepsis work-up and empiric antimicrobial therapy is started shortly after birth. Depending on the antibiotic used for maternal prophylaxis, resistant or unusual organisms may predominate as etiologic agents for neonatal sepsis.

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