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Neonatal Mortality from Preterm Premature Rupture of Membrane

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Abstract: ***Rates of perinatal and neonatal morbidity and mortality are high in pregnancies complicated by preterm premature rupture of membrane (PPROM). The aim of the study was to estimate the neonatal mortality and highlight the characteristics of neonatal deaths This is a prospective study conducted from 2012 until 2015 including 637 pregnant women with PPROM between 34 until 37 weeks of gestation. Neonatal and maternal data were entered into a database comprising maternal and neonatal data at Obstetric-Gynecologic University Hospital "Queen Geraldine" in Tirana, Albania. During the study period 7 neonates had a fatal outcome representing a mortality rate of 1.1% (95%CI 0.44 – 2.25). Premature rupture of membranes is responsible for increased perinatal morbidity among preterm neonates. Morbidity increases as the duration of premature rupture of membranes increases. Advances in care of preterm babies may reduce the perinatal mortality following premature rupture of membranes, but the ultimate solution lies in prevention of premature rupture of membranes before term.***

Keywords: neonatal morbidity, neonatal mortality, preterm premature rupture of the membranes

1. Introduction

PPROM occurs in only 2% of gestations but is linked to 40% of preterm births and can produce a considerable rate of neonatal morbidity and mortality (1). The three etiologies of neonatal deaths linked to PPROM are namely; prematurity, sepsis and lung hypoplasia. Women with chorioamnionitis deliver before non-infected women and infants born with sepsis have a high mortality rate about four times higher than those without sepsis 4. Also, there are maternal hazards linked to intrauterine infections. There is a rising evidence revealing a linkage between ascending infection from the cervix or vagina and PPROM. In women with PPROM, nearly one-third of gestations had positive amniotic fluid cultures 5,6 and studies had revealed that bacteria had the capability to cross even intact membranes (2). The routine treatment for PPROM is admission in the hospital, antibiotic prophylaxis and corticosteroid intake to increase the fetal lung maturation (3). The elective timing for planned delivery for women with PPROM is 34 weeks of pregnancy (4). This recommendation was built on a comparison of the neonatal outcomes prior to and beyond this cutoff gestation. In developed nations, the survival rate for neonates delivered ≥ 34 weeks of pregnancy is comparable to term neonates if they had received antenatal corticosteroids and are comparable regarding other cofounders (5). The fetal and neonatal morbidity and mortality risks are significantly affected by duration of latency and gestation at PROM. The primary complication for the mother is risk of infection. Complications for the newborn consists of prematurity, fetal distress, cord compression, deformation and altered pulmonary development. The most significant maternal risk of term PROM is intrauterine infection, the risks of which increase with the duration of membrane rupture. For patients with PPROM, the most likely outcome is preterm delivery within one week with its associated morbidity and mortality risks such as respiratory distress, necrotizing entercolitis (NEC), intra-ventricular hemorrhage and sepsis (6). Neonatal sepsis can be divided into two main subtypes depending on whether the onset is during the first 72 hours of life or later. Early onset septicemia is caused by organisms prevalent in the genital tract or in the labor room. Early onset bacterial infections occur either due to ascending infection following rupture of membranes or during the passage of baby through infected birth canal (7). PROM of duration more than 18 hours is the appropriate cut-off for increased risk of neonatal infection. There are recommendations of antenatal antibiotic administration in pregnant women who had PROM ≥18 hours but the regimen to prevent postnatal neonatal infection still varies among institutions (8). The aim of the study was to estimate the neonatal mortality and highlight the characteristics of neonatal deaths.

2. Material and Methods

This is a prospective study conducted from 2012 until 2015 including 637 pregnant women with PPROM between 34 until 37 weeks of gestation. Neonatal and maternal data were entered into a database comprising maternal and neonatal data at Obstetric-Gynecologic University Hospital "Queen Geraldine" in Tirana, Albania. Labor was defined as cervical change and painful contractions occurring more frequently than once every 10 min, as confirmed subjectively or using cardiotocography. We examined the following data: maternal information, including maternal age, gravidity, parity, GA at delivery, mode of delivery, induction delivery, and corticosteroid administration in the perinatal period; pregnancy-related complications, including pregnancy induced hypertension (PIH), diabetes, and threatened preterm delivery; clinical CAM; and PROM. Gestational age was determined based on the first day of the menstrual period and the first-trimester ultrasound.

Detail past obstetric history of patient was recorded. An account was taken regarding duration of gestation of previous pregnancies, mode of their termination and outcome with a view to find out whether it was responsible

for premature rupture of membrane (eg. incompetent OS, repeated miscarriage or malformation of fetus). Complete physical examinations of patients were conducted. It included general examination, to note for any evidence of occult /overt infection and systemic examination was conducted to rule out possible causes of PPROM: e.g. pregnancy induced hypertension, heart diseases, respiratory diseases etc. Obstetric examination included a record of height of uterus, presentation of fetus, presence or absence of fetal heart sound, presence of liquor, presence of uterine contraction. PPROM were confirmed if on speculum examination, there was amniotic fluid seen draining through the cervical OS along with reduced amniotic fluid index on ultrasound. Laboratory investigation included blood group, hemoglobin percentage, total and differential white cell count and ESR. In cases of suspected infection high vaginal swab culture and sensitivity was sent. All patients with PPROM were put on conservative management if no signs of infection were present. Active management was done if any sign of infection was present.

3. Results

During the study period 7 neonates had a fatal outcome representing a mortality rate of 1.1% (95%CI 0.44 – 2.25). The mean age of mothers is 28.8 (±6.5) years with a range 21-35 years. Characteristics of mothers an neonates are shown in table 1. One-third of preterm births are the result of PPROM which remains the leading cause of preterm deliveries and adverse neonatal outcomes. The etiology of PPROM remains elusive. Obstetrical strategies to treat PPROM remain controversial. Intentional delivery should not be an option for women with PPROM between 28 and 34 weeks of gestation in the absence of other indications for early delivery since it increases the incidence of neonatal deaths and the rate of Cesarean sections (9). Expectant management is a classical approach to managing PPROM before 34 weeks' gestation, including admission to the hospital, administration of corticosteroids, and broad-spectrum antibiotics prophylaxis (10). Corticosteroids for fetal maturation have been proven to improve neonatal outcomes in preterm births and reduce perinatal mortality, RDS, and IVH (11). According to the guidelines of the SOGC, following PPROM at ≤ 32 weeks' gestation, antibiotics should be administered to women not in labor to prolong pregnancy and decrease maternal and neonatal morbidity; for PPROM at > 32 weeks' gestation, antibiotics should be administered to prolong a pregnancy if fetal lung maturity is not evident and/ or delivery is not planned (12). Although there is no consensus regarding tocolysis, it may be used in women presenting with uterine contractions or can be used prophylactically to capitalize on the benefit of corticosteroids. Delivery is recommended when PROM occurs at or beyond 34 weeks' gestation (13). In the current study, management depended on Chinese guidelines for preterm labor and PPROM, which also recommend the conservative management of PPROM before 34 weeks' gestation in combination with antibiotic therapy and corticosteroids. Indications for active induction of labor or a Cesarean delivery during prolongation of a pregnancy were as follows: 17.8% of patients presented with clinical chorioamnionitis, 5.7% had maternal or fetal complications during prolongation of a pregnancy, and 20.8% had a pregnancy lasting 34 weeks. During prolongation of a pregnancy, maternal and fetal infections can occur. PPROM near viability complicates < 1% of pregnancies. Despite recent advances in obstetric and neonatal care, perinatal risks after previable PPROM remain very high and present a great challenge to clinicians. Previous studies have shown a wide range of neonatal survival from 8% to 55% (14). Many of the studies have included multiple pregnancy and women who delivered within 12 h of membrane rupture (15,16). This may lead to selection bias and may affect survival outcomes. We excluded these cases from our study and analyzed patients with early and late previable PPROM separately. This gives a clearer picture of neonatal survival outcomes in singleton pregnancies. We analyzed the risk factors in detail, especially those contributing to the infectious etiology of PPROM. These include current vaginal and urinary infections. In addition to the above, we analyzed the history of recent vaginitis and urinary infection, which, if not properly treated, increases the risk for PPROM. In a similar study done in Oman in 2012, Nihal et al found that the most common risk factor was infection (55%) (17,18). However, the site of infection was not mentioned separately. We have seen that almost half of the women had current urinary tract infection or vaginitis on admission. About a quarter of women also had recent urinary or vaginal infection. Hence, early detection and prompt treatment of these infections may prevent previable PPROM occurring due to infectious etiology. However, this needs to be evaluated by larger studies in future. In a study of 143 patients, Hunter et al reported that in 77% of cases, PPROM occurred between 20 and 24 weeks (18,19).

4. Conclusion

Premature rupture of membranes is a high-risk Obstetric condition. Active management is needed to enable delivery within 24 hours of premature rupture of membranes as it offers better neonatal outcome. Premature rupture of membranes, though common in term patients, is not responsible for increased maternal and fetal morbidity and mortality in them. Premature rupture of membranes is responsible for increased perinatal morbidity among preterm neonates. Morbidity increases as the duration of premature rupture of membranes increases. Advances in care of preterm babies may reduce the perinatal mortality following premature rupture of membranes, but the ultimate solution lies in prevention of premature rupture of membranes before term.

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Table 1: Characteristics of neonatal deaths

Variables	N	%
Maternal age, M (SD) range	28.8 (6.5), 21-35	
Gestational age, M (SD)		
28wks	2	28.6
29 wks	3	42.9
30 wks	1	14.3
36 wks	1	14.3
Parity		
1	3	42.9
3	4	57.1
Apgar score, 5 min >	7	100.0
Birthweight, M (SD) Range	1420 (514), 1000-2450	
Induction of labor		
No	5	71.4
Yes	2	28.6
Sepsis	5	
RDS	6	85.6
Asphyxia	3	42.9
NICU stay, M (SD) range	7.3 (5.1), 1-18	