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Original Article

PREMATURE RUPTURE OF THE MEMBRANE– MICROBIOLOGICAL ASSESSMENT

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Abstract:

Introduction: *Premature rupture of membranes (PROM) refers to the breaking of the amniotic sac before the onset of labor. When this happens before 37 weeks of gestation, it is termed preterm (PROM). One critical aspect of managing PROM or PPROM is the microbiological assessment, as infection plays a significant role in the outcome for both mother and fetus.*

Methods: *A prospective cross-sectional study was carried out in a private clinic at Dhaka from January 2023 to December 2023. A total of 50 pregnant patients (N=50) with PROM were enrolled in this study following the inclusive criteria. Data were collected in the pre-designed data collection sheet. Data were analyzed statistical package for social science (SPSS).*

Result: *Commonest organism 72% were no growth, 10% were streptococcus, 6% were candida, 2% were delivered alpha-hemolytic streptococcus, 2% were E. coli*

Conclusion: *Premature rupture of membrane and chorioamnionitis may cause antagonistic maternal consequences linked to infection. Premature rupture of membrane indicated lower birth weight for infants. Proper antibiotics must be certain prophylactically for the anticipation of intra-partum infection in case of PROM.*

Keywords:
Premature rupture of membrane (PROM), Infection, Preterm Delivery, Gestation age

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Introduction

The amniotic sac protects the fetus from infections. Once the membrane rupture, the risk of ascending infection from the vagina into the amniotic fluid increases, leading to conditions such as chorioamnionitis, which can have severe consequences for both the mother and baby. The liquor amnio has antibacterial activity due to Zinc protein complex. Once the membranes are ruptured the pregnancy is in jeopardy. Premature rupture of membranes (PROM) is defined as rupture of the membranes before the onset of labor .In approximately 10% of all pregnancies, it was estimated that PROM complicates 30to40%ofthe preterm deliveries and is one of the most common underlying causes of preterm delivery and perinatal death.[2] Premature rupture of membranes (PROM) is the single most common diagnosis associated with preterm delivery. Premature rupture of membranes is defined as rupture of the bag of waters before the onset of labor. PROM is prolonged when it transpires more than 18 hours earlier labor. PROM is preterm (PPROM) when it ensues before 37 weeks of gestation.[3] One of the most common complications of preterm PROM is premature delivery. The dormant period, which is the time from membrane rupture until delivery, generally is inversely proportional to the gestational age at which PROM ensues. When PROM occurs too early, surviving neonates may develop sequelae such as mal presentation, cord compression, oligohydramnios, necrotizing enterocolitis, neurologic impairment, intra ventricular hemorrhage, and respiratory distress syndrome.[4, 5]

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The etiology of PROM is largely unknown. The probable causes are either reduction of membrane strength or an increase in intrauterine pressure or both.[1] It may be associated with an incompetent cervix, unstable lie polyhydramnios, multiple gestations or possibly bacteriuria, especially beta-streptococci infection .[7] This process is in turn, accountable for many avoidable infant deaths. Anti- bacterial therapy when used in the hopeful management of preterm PROM is associated with perpetuation of pregnancy and a decrease in maternal and fetal morbidity .[8] PROM is very often seen in a tiring obstetric ward in our context. Proper diagnostic facilities, proper monitoring facilities and a standard protocol in the management can improve maternal and fetal outcomes. The study aimed to evaluate the microbiological assessment of premature rupture of membranes.

Microbiological assessment helps to –

1. Detect subclinical infection
2. Prevent maternal & neonatal complications like sepsis, neonatal pneumonia.
3. Guide appropriate antibiotic treatment.

Methods:

A prospective cross-sectional study was carried out from January 2023 to December 2023 at a Dhaka based private clinic. A total of 50 pregnant patients (N=50) with PROM in the maternity unit were enrolled in this study following the inclusive criteria. A purposive sampling technique was used. 50 samples of the high vaginal swab for c/s were collected from the patient with PROM & send to the laboratory. Data were collected by using a preformed tested questionnaire after taking a proper history, gestational age was determined by last menstrual period, previous antenatal records, clinical examination and ultrasonography (where available). Documentation of membrane rupture was made by a sterile speculum examination or pooling of amniotic fluid in the posterior vaginal fornix following fundal pressure. Demonstration of oligohydramnios by ultra-sonographic examination was used as a supporting diagnostic method (when available). A culture and sensitivity tests from high vaginal swab were performed during speculum examination. On admission, a blood sample was sent for leucocyte count (both TC & DC) for each patient to exclude any preexisting infection.

Inclusion Criteria

- Gravid women both Primi &Multi.
- Pregnancy more than 28 week's duration.
- Spontaneous rupture of membrane before initiation of labor.

Exclusion Criteria

- High-risk patient with hypertensive disorder of pregnancy with Cardiac disease and pregnancy with diabetes mellitus.

PROM

The definition of PROM is the rupture of membranes before the onset of labour. The membrane rupture that occurs before 37 weeks of gestation is referred to as preterm PROM.

Diagnosis of PROM

The diagnosis of PROM requires a thorough history, clinical examination, and selected laboratory studies and it may varies from individual to individual. Patients often report a sudden gush of fluid with constant leakage. Physicians must ask whether the patient is contracting, bleeding vaginally, has had intercourse recently, or has a fever. It is imperative to verify the patient's estimated due date because this evidence will direct subsequent treatment.

Data Analysis

The study coordinators performed random checks to verify data collection processes. Completed data forms were reviewed, edited and processed for computer data entry. Frequencies, percentages, and cross-tabulations were used for descriptive analysis data analysis were performed using Statistical Package for the Social Sciences (SPSS) Version 25.0. The significance level of 0.05 was considered for all tests.

Result:

Among the study population (N=50), the majority of the patients (24,48.0%) were within the age range of 26-30 years. Only seven patients (7, 14.0%) age were below twenty years. Half of the patients (25, 50.0%) had para1. Thirteen patients (13,26%)were at 30 weeks, ten patients(10,20%) were at 32 weeks, eleven patients (11, 22%) were at 33 weeks, fourteen patients (14, 28%) were at 34 weeks and two patients(2, 4%) were at 39 weeks (Table-1). Among the study population (N=50), thirty-two patients (32, 64%) delivered spontaneously. Liquor amount was slight in thirty-one patients (31, 62.0%), and nineteen patients

(19, 38%) had liquor which was profuse in amount. The majority of the patients (40, 80%)under went caesarean section (Table 2). Based on preterm and term delivery 56% were preterm delivery and 44% were term delivery (Table 3). Of fifty patients, twenty patients (20, 40.0%) had chorioamnionitis, five patients (5, 10%) had puerperal sepsis, and four patients (4, 8.0%) had disseminated intravascular coagulation (DIC). Twenty-three neonates (23, 46.0%) were born mature and twenty-one neonates (21, 42.0%) were still birth. Thirty- three neonates' (33, 66.0%) weight was under 2.5 kg. Apgar score at 1 minute found > 7 in sixteen neonates (16, 32.0%) & <7 in thirty-four neonates (34, 68.0%). Apgar score at 5 minute found > 7 in twelve neonates (12, 24.0%) and <7 in thirty-eight neonates (38, 74.0%) (Table 4). On microbiological examination of study subjects, no growth was found in thirty-six cases (40, 80%), four cases (4,8.0%) were group B streptococcus, three cases (3, 6%) were Candida, two cases (2, 4.0%) were alpha-haemolytic streptococcus, one case (1,2.0%) was E.Coli (Table 5). Eight patients (8, 16.0%) had urinary tract infections, two patients (2, 4.0%) had lower genital traction infections (Table 6).

Table-I

Distribution of the study population based on characteristics (N=50)

Characteristics	(N,%)
Age in years (Mean age:27.10±SD)	
<20	7,14.0%
20-25	12,24.0%
26-30	22,44.0%
31-35	9,18.0%
Parity	
0	12,24.0%
1	25,50.0%
2	13,26.0%
Gestational age weeks	
(Mean gestational age: 32.54±SD)	
30 weeks	13,26.0%
32 weeks	10,20.0%
33 weeks	11,22.0%
34 weeks	14,28.0%
39 weeks	2,4.0%

Table-II

Distribution of the study population based on events during labour (N=50)

Events	(N,%)
Induction of Labour	
Spontaneous	32,64.0%
Induce	18,36.0%
Modeof delivery	
Vaginal	10,20.0%
Caesarean section	40,80.0%

Table-III

Distribution of the study population based on preterm and term delivery (N=50)

Types of PROM	(N,%)
Preterm	28,56.0%
Term	22,44.0%

Table-IV

Distribution of the study population based on maternal and fetal outcome (N=50)

Maternaloutcome	(N,%)
Chorioamnionitis	20,20.0%
Puerperalsepsis	5,10.0%
DIC	4,8.0%
Fetaloutcome	(N,%)
Livebirth	29,58.0%
Stillbirth	21,42.0%
Mature	23,46.0%
Premature	27,54.0%
Birthweight	
<2.5kg	33,66.0%
>2.5kg	17,34.0%
Apgar score dat1minute	
<7	34,68.0%
>7	16,32.0%
Apgar score dat 5 minute	
<7	38,74.0%
>7	12,24.0%

Table-V

Distribution of the study population based on bacteriological presentation (N=50)

Organism	(N,%)
No growth	40,80.0%
Streptococcus	4,8.0%
Candida	3,6.0%
Alpha-haemolyticstreptococcus	2,4.0%
E.coli	1,2.0%

Table-VI

Distribution of the study population based on Infection characteristics (N=50)

Parameter	(N,%)
Urinary tract infection	8,16.0%
Lower genital tract infection	2,4.0%

Discussion:

This present study found that 14% were age group < 20 years, 24% were age group 20-25 years,44% were age group 26-30 years and 18% were age group 31-35 years. The mean±SD was 27.10±4.49. Another analysis found a mean±SD of 26.2±5.8years. Another study showed the mean±SD was 27.0±1.0years .[10] This presentstudy shows that 26% were 30 weeks, 20% were 32 weeks, 22% were 33 weeks, 28% were 34 weeks and 4% were 39 weeks. Mean±SD was 32.54±2.03 Tanir *et al*., showed gestational age mean±SD was 32.7±1.2 .[11] This current study found 24% had no para 50% had para 1 and 26% had para 2. The author showed a dissimilar result, that 61.8% had no parity.[10]

This present study found that 16% were urinary tract infections, 4% were lower genital traction infections. Another article found that 7.8% were urinary tract infections.[10] This present study showed that 68% were delivered spontaneously. A study was carried out in Australia and New Zealand. Estimated that 57% were spontaneous delivery.[12] This current study shows that 20% were vaginal delivery and 80% were caesarean sections. Another research found that 40% were caesarean sections.[13] Another study, the author described that 12.7% of caesarean sections in their gestation age was 26 weeks.[14] A contradictory study showed that 53.8%were vaginal deliveryand 46.2%werecaesarean sections .[11] This current study found that 52% were preterm and 48% were term delivery. Another author identified no differentiation was preterm and term delivery in premature rupture of the membrane .[15] Another study determined that bacterial vaginosis is common vaginitis in term pregnancy, but could not find any relationship between bacterial vaginosis and premature rupture of membranes at term .[16] In this study, in the case of fetal outcomes, 58% were live birth and 42% were still births, 66% in<2.5kg and 34%in>2.5kg in foetal birth. Another study found that the mean±SD was 2008±260 (g) in their study.[11]

This present study showed that 40% were chorioamnionitis, 10% were puerperal sepsis and 8% were DIC. Another author found that 39.4% were chorioamnionitis .[12] Another study showed that 43.0% were chorioamnionitis .[17] Another study showed Tanir*et al.,* showed 53.8% were chorioamnionitis[11]. This presentstudy found 36(72%) were no growth, 5(10%) were group B streptococcus, 3(6%) were E. coli, 1(2%) were alpha-haemolytic streptococcus, 1(2%) were candida, 1(2%) were anaerobes, 1(2%) was Chlamydia and 1(2%) pneumococcus. A similar study found 8% group B streptococcus, 7% mixed anaerobes and 3% E. coli.[14] Another article showed that 24 were no growth, 4 were group B streptococcus, 4 were candida, 4 were alpha-haemolytic streptococcus, 2 were chlamydia, 2 were anaerobes and 2 were pneumococcus.[12]

Bacterial infections is one of the main causes of PPROM leading to preterm delivery, pulmonary hypoplasia, sepsis and joint deformities .[18] A significant risk of PPROM is that the infant is very likely to be born within a few days of the membrane rupture. Another substantial threat of PROM is chorioamnionitis, which can be very hazardous for mothers and infants.[19] Broad-spectrum antibiotics, expected management, and antenatal corticosteroids are routinely used in our context with very partial success to prevent microbial growth, and intra-amniotic infection syndrome.[18]

Conclusion:

Although etiologies are diverse as reported in the literature, the first objective is to prevent infection. So this study was undertaken to determine the bacteriological assessment of premature rupture of membranes. Premature rupture of the membrane and chorioamnionitis is often associated with adverse maternal outcomes related to infection. This study found group B streptococcus, E. coli, alpha-haemolytic streptococcus, candida in study subjects. Premature rupture of membrane (PROM) results low birth weight in the infant.

Recommendations:

Biochemical, biophysical and microbiological parameters must be a viable for proper diagnosis of the PROM. Suitable antibiotics must be given prophylactically for the prevention of intrapartum infection (Chorioamnititis) in case of PROM. Patients with PROM before 32 weeks of gestation must be cared for expectantly until 33 completed weeks of gestation if no maternal or fetal contraindications exist. A single course of antenatal corticosteroids must be provided to women with PROM before 32 weeks of gestation to lessen the threats of respiratory distress syndrome (RDS), perinatal mortality, and other morbidities. Delivery is recommended when PROM

occurs at or beyond 34 weeks of gestation. Prevention of infection will go a long way to reduce perinatal mortality and morbidity.

Conflictofinterest

None declared.

Ethicalapproval

The study was approved by the Institutional Ethics Committee.

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