

Neonatal outcome of maternal premature rupture of membranes more than 18 hours

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Abstract

Background: Premature Rupture of Membranes has been known to complicate pregnancy since ages. Several risk factors may be associated with occurrence of premature rupture of membranes. It is associated with varied neonatal complications, neonatal sepsis and prematurity being the most hazardous ones.

Objectives: This study was conducted to evaluate the incidence of neonatal sepsis following premature rupture of membranes, risk factors and neonatal complications associated with premature rupture of membrane of more than 18 hours in the neonates admitted in a tertiary care center.

Methodology: Descriptive observational study was undertaken for 18 months from August 2013 to January 2015 in the College of Medical Sciences, Chitwan, Nepal. This study included 82 neonates admitted to the Neonatal Intensive Care Unit with maternal history of premature rupture of membranes of more than 18 hours with medical conditions excluded.

Results: The incidence of premature rupture of membranes in this hospital was 8.9%. Frequently associated maternal risk factors were history of prior abortion (16, 19.5%), urinary tract infection (7, 8.5%), and antecedent coitus (7, 8.5%). In the study population, 68 (83%) neonates had complications and 14 (17%) neonates had no complication. The incidence of neonatal sepsis following PROM in present study was 6.1%. Neonatal sepsis was significantly associated with chorioamnionitis ($p < 0.001$). The most frequently occurring complication was probable neonatal sepsis (53, 64.6%), followed by prematurity (31, 37.8%) and perinatal asphyxia (15, 18.3%). There was a directly proportional relation of neonatal sepsis, chorioamnionitis, respiratory distress syndrome and mortality with duration of premature rupture of membranes.

Conclusion: Commonly occurring maternal risk factors with PROM were prior abortion, UTI and antecedent coitus. In the study population, infectious morbidity was highest. Chorioamnionitis was significantly associated with culture proven neonatal sepsis. Prolonged duration of premature rupture of membranes increased the risk of neonatal sepsis, meningitis, respiratory distress syndrome and perinatal death. Prevention of these risk factors, appropriate and timely management including improved obstetric and neonatal care can provide intact survival of the neonates.

Key words: Chorioamnionitis; Neonatal sepsis; Premature rupture of membranes

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INTRODUCTION

Premature rupture of membranes (PROM) occurs in approximately 10% of all pregnancies. When this event occurs before 37 weeks of gestation, it is termed as preterm premature rupture of membranes (PPROM) that has been estimated to affect 3% to 4.5% of all deliveries¹. The time between the rupture of membranes and the onset of labor is defined as the latency period. Thus, premature rupture of membranes affect both preterm pregnancies to term pregnancies, and childbirth may be premature or not, depending on how long the period of latency is².



When this event lasts more than 18 hours before labor, it is regarded as prolonged, which is associated with an increased rate of neonatal infections to relatively ten folds³.

Rupture of membranes often leads to the onset of labor. In term pregnancy, rupture of membranes leads to spontaneous labor in 70% cases within 24 hours⁴. And delivery occurs within 7 days of PPRM in over 80% of cases⁵.

The etiology of PROM seems to be multifactorial³. The complications of PROM for the infant are preterm delivery, RDS, infection (Pneumonia, meningitis, sepsis), pulmonary hypoplasia, limb and body deformities, umbilical cord compression, abruption and cord prolapse⁶.

There is paucity of studies regarding PROM and its implications in neonates in Nepal. This research was conducted to help health professionals identify maternal risk factors and neonatal outcomes following prolonged PROM, so that health professionals who assist them will be able to deliver a more targeted assistance thereby helping to reduce the incidence of newborns' morbidities.

METHODOLOGY

Patients: All live born neonates with maternal history of premature rupture of membranes more than 18 hours. Babies born to mothers with toxemia of pregnancy, Medical disease other than infection were excluded from the study.

During this study period the standard management was as follows:

Obstetric practice: The documentation of the rupture of membranes was done by sterile speculum examination confirming the pooling of amniotic fluid in the posterior vaginal fornix or/and direct visualization of fluid leakage from the cervical canal by the Gynecology/ Obstetric Department of COMS-TH. The diagnosis of chorioamnionitis was made clinically. Presence of fever 38°C and at least 2 of the following conditions were regarded as Chorioamnionitis⁶,

- i) Maternal tachycardia >100/min,
- ii) Fetal tachycardia >160/min,
- iii) Uterine tenderness,
- iv) Foul smelling amniotic fluid
- v) Maternal leukocytosis >15000/mm³
- vi) CRP >2.7 mg/dl
- vii) With no other site of infection.

Mothers with suspicious chorioamnionitis were given antibiotics immediately after admission. In neonates delivered outside, rupture of membranes was diagnosed based on maternal history of passage of gush of fluid per vaginam before onset of labor pain. Neonatal sepsis was diagnosed when generalized systemic features were associated with pure growth of bacteria in one or more sites and Neonatal sepsis was presumed when clinical and laboratory findings are consistent with bacterial infection but blood culture was sterile⁷. Meningitis was diagnosed based on history, clinical examination, septic screen, blood culture and analysis of the cerebrospinal fluid for cell count, protein, glucose concentration, gram stain and culture⁸. History and clinical evaluation consistent with hyaline membrane disease and typical chest x-ray findings in a preterm baby with no other alternative diagnosis like congenital pneumonia, was diagnosed as respiratory distress syndrome⁹. Slow gasping or no breathing at birth or Apgar score less than 4 at 5 minutes was regarded as perinatal asphyxia¹⁰. Birth asphyxia was presumed in home deliveries when there was a history that the baby had failed to cry or breathe at birth, had gasped for a long time, had to be stimulated for a prolonged period of time, or was unable to suck in the first 24 hours.

Neonatal practice: During the study period, 1666 deliveries were conducted in the hospital. 154(149 born in our hospital and 5 referred from other hospitals) neonates had history of PROM, 21 refused admission, 41 had associated maternal exclusion criteria and 10 left against medical advice, so study was completed in 82 neonates.

These neonates were admitted in the hospital, septic screening sent, and antibiotics started (Injection Cefotaxime and Injection Amikacin). Antibiotics were discontinued after 72 hours if the baby did not have any symptoms and blood cultures were sterile. Urine and CSF culture were only done in cases presenting after 72 hours of life or those with positive blood culture reports. Antibiotics were tailored according to culture sensitivity reports and the duration of antibiotics depended upon the underlying condition and clinical improvement.

This Hospital based descriptive observational study was conducted for 18 months from August 2013 to January 2015 in the Department of Pediatrics (Neonatal Intensive Care Unit) and Post natal ward of College of Medical Sciences, Bharatpur. Subjects were thoroughly evaluated by the investigator as per designed proforma which included history, physical examination, and course during hospitalization. Study variables were maternal

risk factors and neonatal complications. Analysis was performed using SPSS (Statistical Package for Social Sciences) version 20. Statistical method included determination of p-value using Chi – square test. For tables where expected frequencies were less than five, Fisher's Exact test was performed. Statistical test was considered significant at 0.05 level of confidence.

RESULTS

The most common maternal age group was 20-35 years, 77(89%). The majority of mothers were primigravida, 47 (57.3%). 36 (43.9%) mothers belonged to lower middle class families. Most mothers were housewives, 53 (64.6%). 47 (57.3%) mothers had up to secondary level of education.

The incidence of PROM was 8.9%.

Maternal risk factors: Commonly occurring risk factors were prior history of abortions [16 (19.5%)], antecedent

coitus [7 (8.5%)] and urinary tract infections [7 (8.5%)].

Neonatal complications: In the study population, 68 (83%) neonates had complications and 14 (17%) neonates had no complication. The incidence of neonatal sepsis among the study population was 6.1%. Maternal chorioamnionitis was significantly associated with neonatal sepsis ($p < 0.001$). Most common complication was probable neonatal sepsis [53 (64.6%)] followed by hyperbilirubinemia [35 (42.7%)], prematurity [31 (37.8%)], perinatal asphyxia [15 (15.9%)], IUGR [6 (7.3%)], neonatal sepsis [5 (6.1%)], RDS [3 (3.7%)], congenital anomalies [2 (2.4%)], meningitis [2 (2.4%)] and perinatal death [1 (1.2%)]. The statistically significant association was seen with probable neonatal sepsis among terms ($p = 0.044$) and RDS in preterm neonates ($p = 0.021$). There was significant association between oligohydramnios and congenital anomalies (p -value = 0.023). Neonatal sepsis, meningitis, RDS, chorioamnionitis and perinatal death increased with increasing duration of PROM.

Table 1: Maternal socio-demographic characteristics

Variables	Subgroup	No of patients(%)
Age	<20	7(8.5)
	20-35	73(89)
	>35	2(2.5)
Gravida	Primi	47(57.3)
	Multi	35(42.7)
Level of education	Illiterate	4(4.9)
	Primary level	13(15.9)
	Secondary level	47(57.3)
	Undergraduate and higher	18(21.9)
Socioeconomic status (Kuppuswamy) ¹¹	Upper class	2(2.4)
	Middle upper	30(36.6)
	Lower middle	36(43.9)
	Upper lower	14(17.1)
	Lower	0(0)
Employment	Housewives	53(64.6)
	Skilled labour	24(29.3)
	Unskilled labour or manual workers	5(6.1)

Table 2: Distribution of neonates according to maternal risk factors

Variables	No of patients(%)
Multiple gestation	2(2.4)
CPD	3(3.2)
UTI	7(8.5)
Abnormal PV discharge	1(1.2)
Previous abortion	16(19.5)
Previous preterm birth	2(2.4)
Polyhydramnios	1(1.2)
Oligohydramnios	2(2.4)
Smoking	2(2.4)
Antecedent coitus	7(8.5)

Table 3: Distribution of Neonates according to complications

Complication	Subgroups	No. of patients (%)
Neonatal sepsis	Chorioamnionitis	5(6.1) 3(60) p<0.001
Probable neonatal sepsis		53(64.6)
Meningitis		2(2.4)
Prematurity	28-31 weeks	4(4.9)
	32-37weeks	27(32.9)
	>37 weeks	31(62.2)
Respiratory distress syndrome		3(3.7)
Perinatal Asphyxia		15(18.3)
Hyperbilirubinemia		35(42.7)
IUGR		6(7.3)
Congenital anomalies		2(2.4)
Perinatal mortality		1(1.2)

Table 4: Distribution of neonatal complication as per gestational age

Neonatal morbidities	No. of patients in different Gestational age in weeks			p-value
	28-31 weeks	32-37 weeks	>37 weeks	
RDS (Yes)	1 (33.3)	2 (66.7)	0 (0)	0.021
Neonatal sepsis (Yes)	0 (0)	3 (60)	2 (40)	0.485
Probable neonatal sepsis (Yes)	4 (7.5)	21 (39.6)	28 (52.8)	0.044
Meningitis (Yes)	0 (0)	0 (0)	2(100)	0.585
Perinatal asphyxia (Yes)	0 (0)	4(26.7)	11 (73.3)	0.618
Intrauterine growth restriction (Yes)	0 (0)	0 (0)	6 (100)	0.170
Hyperbilirubinemia (Yes)	4(11.4)	19(54.3)	12 (34.2)	<0.001
Congenital anomalies (Yes)	0 (0)	2 (100)	0 (0)	0.201
Perinatal mortality (Yes)	0 (0)	0 (0)	1 (100)	1.000

Table 6: Distribution of neonatal complication as per duration of PROM

Neonatal morbidities	Duration of PROM			p-value
	18-24 hours	24-48 hours	>48 hours	
RDS (Yes)	0 (0)	0 (0)	3(100)	0.056
Neonatal sepsis (Yes)	1(20)	1 (20)	3 (60)	0.513
Probable neonatal sepsis (Yes)	18 (34.0)	16 (30.2)	19 (35.8)	0.044
Meningitis (Yes)	0 (0)	1 (50)	1 (50)	0.524
Perinatal asphyxia (Yes)	8 (53.3)	1 (6.7)	6 (40)	0.092
Perinatal mortality (Yes)	0 (0)	0 (0)	1 (100)	0.622

DISCUSSION

Incidence of PROM in this study was 8.9% which is comparable to other studies. The incidence of PROM was 7.7% and 6.9% in studies done by Boskabadi et al. (2011)³ and Nili et al. (2003)¹ respectively. The most frequently associated maternal risk factors were history of prior abortion (16, 19.5%), urinary tract infection (7, 8.5%), and antecedent coitus (7, 8.5%). It is in concordance

with study by Patil et al. (2014)¹² where the percentage of women with PROM with history of recent coitus was 10% and UTI was 6%. Theoretically, sexual intercourse and UTI may increase the possibility of ascending infection thus leading to PROM¹². A study done at Punjab Medical College, Faisalabad, Pakistan showed 17.6% of mothers with PROM had a history of previous abortion¹³. Repeated abortions which are managed with dilatation

and evacuation damage the function of cervix muscili sphincter lead to dilated cervix. And dilated cervix can cause PROM in successive pregnancies¹⁴.

The incidence of neonatal sepsis following PROM in present study was 6.1%. Neonatal sepsis was significantly associated with chorioamnionitis ($p < 0.001$). This is in concordance with results given by Asindi et al. (2002)¹⁵ where chorioamnionitis was present in upto 50% among the infants born to mothers with PROM with proven sepsis but only in 3.3% among infants with no proven sepsis. Alam et al. (2014)¹⁶ also emphasized on the importance of chorioamnionitis ($p < 0.001$; AOR, 4.1) as an independent risk factor for culture proven neonatal sepsis in PROM in their study.

Prolonged duration of PROM increased the risk of neonatal sepsis, RDS and perinatal death. It is consistent with study by Alam et al. (2014)¹⁶, they reported that yield of culture positivity was eight times more in neonates with more than 48 hours of maternal PROM at the time of birth. Culture negative Meningitis in this study occurred in neonates with mother with PROM of more than 24 hours. No one developed meningitis in neonates of mothers with PROM of 18-24 hours. It hints that prolonged duration of PROM has some bearing over

the occurrence of meningitis in neonates. Infectious neonatal morbidities increased with prolonged duration of PROM².

RDS was major neonatal morbidity in neonates with PPRM like in studies by Khanal et al. (2009)¹⁷ and Boskabadi et al. (2011)³, they also mentioned that duration of PROM increased the risks of RDS. Rauf et al. (2014)¹⁸ proposed a proportional relation between duration of PROM and perinatal asphyxia.

This study is limited by lack of long term follow up of patients born to mothers with premature rupture of membrane for more than 18 hours. Also being a single centre study with limited number of patients, the results should be generalized with caution.

CONCLUSION

This study helps to clarify the risk factors and probable complications of Premature rupture of membranes. Appropriate measures should be taken to reduce abortions, UTI and antecedent coitus to prevent PROM. Neonates born to mothers with PROM of more than 18 hours should be observed vigilantly for neonatal sepsis, RDS or perinatal asphyxia as well as other morbidities.

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