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Fetomaternal Outcomes of Premature Preterm Rupture of Membranes

Sara Rashid[1], Hibba Noor[1], Shallozan Khanum[1], Samia Tabassum[1]

[1]Department of Obstetrics and Gynecology, MTI/Hayatabad Medical Complex, Peshawar, Pakistan

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Correspondence to: Sara Rashid, Department of Obstetrics and Gynecology, MTI/Hayatabad Medical Complex, Peshawar, Pakistan.
Email: sararashid07@yahoo.com

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ABSTRACT

Background: Premature ruptures of membranes and preterm rupture of membranes can be termed as one among the complex obstetric conditions that occur prior to the gestational age of 37 weeks and before the initiation of labor. It is normally associated with a range of potential harmful outcomes to the health of both the baby and the mother. It contributes to various complications such as infection, bleeding, respiratory distress to the baby, and higher admissions to the intensive care unit. **Objective:** To determine the fetomaternal outcomes in patients with premature preterm rupture of membranes. **Study Design:** Descriptive cross sectional study. **Duration and Place of Study:** This study was conducted from November 2024 to May 2025 in the Department of Obstetrics and Gynecology, MTI/Hayatabad Medical Complex, Peshawar. **Methodology:** A total of 144 pregnant women aged 18–40 years with gestational age of 28–37 weeks presenting with premature preterm rupture of membranes were included. Maternal and neonatal outcomes were recorded and analyzed using SPSS version 27. Continuous variables were presented as mean ± standard deviation while categorical variables were expressed as frequencies and percentages. **Results:** The mean age of patients was 27.60 ± 4.73 years and mean gestational age was 33.06 ± 2.30 weeks. Majority of patients 85 (59.0%) were from rural areas. Vaginal delivery occurred in 109 (75.70%) cases while cesarean section was performed in 35 (24.30%) patients. Maternal complications included chorioamnionitis in 16 (11.10%) cases, postpartum hemorrhage in 13 (9.00%) cases, positive high vaginal cultures in 23 (16.00%) cases, endometritis in 8 (5.60%) cases, and maternal sepsis in 8 (5.60%) cases. Regarding neonatal outcomes, preterm birth occurred in 133 (92.40%) cases, low birth weight was recorded in 46 (31.90%) neonates, neonatal intensive care unit admission was required in 62 (43.10%) cases, respiratory distress syndrome was diagnosed in 18 (12.50%) neonates, neonatal sepsis developed in 12 (8.30%) cases, and stillbirths occurred in 9 (6.30%) cases. **Conclusion:** Premature preterm rupture of membranes is associated with significant maternal and neonatal complications.

INTRODUCTION

Rupture of membranes in the premature period refers to when the membranes or the fluid around the fetus breaks before 37 weeks of completion of the pregnancy and also before the onset of labour.1 This condition poses a number of complications to both the mother and the baby. There may not be a clear reason for the occurrence of the condition in some women. Rupture of the membranes in the premature period may form the reason for a number of complications.2 The fluid surrounding the fetus reduces in case the membranes rupture prematurely.3 This leaves the baby susceptible to germs from the outside environment. Additionally, the space for the baby to grow reduces.4 Some of the women experiencing the condition may feel concerned about the onset of labour due to uncertainty of when the child will be born.5

The fetomaternal consequences of premature preterm rupture of membranes can be severe. They also affect the baby shortly after birth. Many of these babies have a high risk of neonatal sepsis since bacteria gain easy entry into the uterus when the membranes have been open for a long time.6 Apgar scores can also be low since the baby may have experienced stress even before birth due to infection or being in a small amount of fluid.7 Asphyxia may also result at the time of delivery since the oxygen supply may become disrupted due to lack of proper shielding of the fetus.8 Most of the babies also require intensive care soon after birth.9

But for the mothers too this complication brings many risks. Postpartum hemorrhage may happen since the uterus may not be able to contract effectively in case of early labor or may be a result of infection that causes the uterus to be weakened.10 Some of the common conditions for the mother may also include infection of the uterus commonly known as chorioamnionitis or endometritis since the membranes have allowed bacteria to enter the

uterus.11 These may make the mother very ill since she may be suffering from fever, pain, and may have a foul smell.11 Generally, the premature rupture of the membranes in a premature birth poses a difficult scenario to both the mother and the unborn child since they have many health issues.12

An earlier study done on 115 pregnant women with PROM showed that most of the women, about 55.65%, delivered vaginally while 44.35% had caesarean section, and this tell that both types of delivery are common in this condition. The usual maternal complications seen were fever, postpartum hemorrhage, puerperal sepsis and anemia, which were 37.39%, 7.83%, 14.78% and 3.48% in order, showing that infection and bleeding were main problems. Out of the 115 women, 111 babies (96.52%) were born alive and only 4 (3.48%) were stillbirth, but most newborns had low birth weight. Around 33.91% babies were between 1.0–1.5 kg, 42.61% were 1.5–2 kg, and 23.48% were 2–2.5 kg, and also 36.52% had APGAR score less than 7, which show poor condition at birth.13

There is need to do this study in Peshawar because many women in this region still face limited antenatal care and late reporting to hospitals, so the real burden of premature preterm rupture of membranes is not well known. Many cases are managed at home or come very late, and this make more problems for mother and baby, but no proper data is present to show how serious the outcomes are. Also, different hospitals in Peshawar have different facilities, so it is important to understand how these factors affect fetomaternal results. By doing this study, the health workers can know the actual situation and plan better care for future.

METHODOLOGY

The research was conducted in the Obstetrics & Gynecology Department of MTI/Hayatabad Medical Complex in the province of Peshawar, started from November 2024 to May 2025. The research was of the descriptive type study. All the information was gathered at the same time. Permission was taken previously from the CPSP research ethics committee. The overall sample size was 144. Sample size was calculated from the WHO calculator by putting confidence interval 95%, margin of error 3%, and using prevalence of Stillbirth as 3.48%.13

Women between 18 and 40 years of age and having pregnancy of 28–37 weeks were included. Those having bleeding p/v with intact membranes, gestational age less than 28 weeks, or having any other pregnancy condition which could disturb fetal and neonatal outcome like IUGR, fetal malformation, preeclampsia, APH, multiple gestation, parathyroid diseases, adrenal diseases, hepatic and renal failure, DM type 1, or malabsorption were not taken so that no bias enter. Written consent was obtained before any information collection, and participation was voluntary.

A complete history was asked from every woman including complaints, duration of leakage, fever, abdominal pain, and movements of fetus. Examination was done in a simple manner, including general look, pulse, temperature, and abdominal palpation. A sterile speculum examination was done to see if fluid was coming from cervix, and pad test was also checked. The diagnosis of PPROM was made on these findings along with routine blood tests, urine test, high vaginal swab, cardiotocograph, and ultrasound. Ultrasound was used for checking gestational age, fetal growth, fetal presentation, any structural defect, and amniotic fluid amount. In early PPROM cases (28 weeks to 33 weeks + six days), conservative approach was followed, and patients were kept under monitoring until labor started on its own or until any maternal or fetal cause forced delivery, like foul smell of liquor, fever, meconium, abruption, cord problem, fetal distress, or if labor was already advanced. Women who had PPROM after 34 weeks and not going into labor were induced. All patients stayed in hospital till birth. Corticosteroids were given for lung maturity when the pregnancy was less than 34 weeks, either two doses of betamethasone 12 mg 12 hours apart or four doses of dexamethasone 6 mg 12 hours apart. Prophylactic antibiotics were given for 10 days or up to delivery. Mothers were monitored for signs of chorioamnionitis by keeping record of pulse, temperature, uterine tenderness, and liquor smell, and fetal tachycardia was checked on cardiotocograph. During labor, mothers were observed for abruption, PPH, and retained placenta. Babies who had low Apgar, prematurity, or suspicion of infection were shifted to NICU. Mothers were followed for six weeks after birth. All findings were written on a proforma by the trainee.

Lower Segment Caesarean Section meant delivery done through a lower uterine cut. Postpartum hemorrhage meant bleeding of 500 mL or more after vaginal delivery or 1,000 mL or more after cesarean. Endometritis meant infection of uterus lining within 10 days having fever of ≥38°C, tenderness, or foul discharge. Sepsis meant severe infection with fever >38°C, hypothermia <36°C, fast pulse >90/min, or fast breathing >20/min. Positive high vaginal cultures were taken as maternal infection. Chorioamnionitis meant infection of membranes with fever, pain, and smelly liquor. Retained product of conceptions meant remaining tissue inside uterus after delivery. Low Birth Weight meant baby weight less than 2,500 grams. Stillbirth meant no signs of life in baby after 20 weeks or weight ≥500 grams. Premature birth meant birth before 37 weeks. NICU admission meant baby shifted to neonatal intensive care area. Neonatal sepsis, respiratory distress syndrome, intraventricular hemorrhage, and pulmonary hypoplasia were taken as fetal complications. Anemia meant hemoglobin below 12 g/dL. Pre-Eclampsia meant blood pressure ≥140/90 mmHg on two occasions six hours apart with 2+ proteinuria. Eclampsia meant seizure in pregnancy with at least two associated features within 24 hours.

The data were analyzed with SPSS version 27. Continuous values were shown as mean ± SD, while categorical values were converted into frequencies and percentages. Fetomaternal outcomes of PROM like neonatal sepsis, low Apgar, birth asphyxia, postpartum hemorrhage, and maternal infections were mentioned as frequency and percentages.

RESULTS

The study included 144 patients with premature preterm rupture of membranes. The mean age of patients was 27.60 ± 4.73 years and mean gestational age was 33.06 ± 2.30 weeks at presentation. The mean parity was 1.85 ±

1.48 and mean body mass index was 23.46 ± 2.46 kg/m^2. Regarding residential distribution, majority of patients were belonged to rural areas 85 (59.0%) while 59 (41.0%) were from urban areas. In terms of socioeconomic status, 69 (47.9%) patients were from low socioeconomic status, 66 (45.8%) were from middle class and only 9 (6.3%) patients were from high socioeconomic background (as shown in Table 1).

Table 1
Patient Demographics

Demographics		Mean ± SD
Age (years)		27.60 ± 4.73
Gestational Age (weeks)		33.06 ± 2.30
Parity		1.85 ± 1.48
BMI (kg/m^2)		23.46 ± 2.46
Residential Status	Rural n (%)	85 (59.0%)
	Urban n (%)	59 (41.0%)
Socioeconomic Status	Low n (%)	69 (47.9%)
	Middle n (%)	66 (45.8%)
	High n (%)	9 (6.3%)

Regarding maternal outcomes in patients with premature preterm rupture of membranes, lower segment cesarean section was performed in 35 (24.30%) cases while 109 (75.70%) patients had vaginal delivery. Postpartum hemorrhage was occurred in 13 (9.00%) patients and endometritis was developed in 8 (5.60%) cases. Maternal sepsis was observed in 8 (5.60%) patients and positive high vaginal cultures was found in 23 (16.00%) cases. Chorioamnionitis was diagnosed in 16 (11.10%) patients while postpartum sepsis was occurred in 5 (3.50%) cases. Retained products of conception was identified in 5 (3.50%) patients and placental abruption was observed in 5 (3.50%) cases also (as shown in Table 2).

Table 2
Maternal Outcomes in Premature Preterm Rupture of Membranes

Maternal Outcomes		Frequency	%age
LSCS	Yes	35	24.30%
	No	109	75.70%
Postpartum Hemorrhage (PPH)	Yes	13	9.00%
	No	131	91.00%
Endometritis	Yes	8	5.60%
	No	136	94.40%
Sepsis	Yes	8	5.60%
	No	136	94.40%
Positive High Vaginal Cultures	Yes	23	16.00%
	No	121	84.00%
Chorioamnionitis	Yes	16	11.10%
	No	128	88.90%
Postpartum Sepsis	Yes	5	3.50%
	No	139	96.50%
Retained Products of Conception	Yes	5	3.50%
	No	139	96.50%
Placental Abruption	Yes	5	3.50%
	No	139	96.50%

In terms of neonatal outcomes, stillbirths was occurred in 9 (6.30%) cases while 135 (93.80%) were live births. Low birth weight was recorded in 46 (31.90%) neonates and preterm birth was occurred in 133 (92.40%) cases. NICU admission was required in 62 (43.10%) neonates and neonatal sepsis was developed in 12 (8.30%) cases. Respiratory distress syndrome was diagnosed in 18 (12.50%) neonates while intraventricular hemorrhage was found in 7 (4.90%) cases. Pulmonary hypoplasia was observed in only 2 (1.40%) neonates (as shown in Table 3).

Table 3
Neonatal Outcomes in Premature Preterm Rupture of Membranes

Neonatal Outcomes		Frequency	%age
Stillbirths	Yes	9	6.30%
	No	135	93.80%
Low Birth Weight (LBW)	Yes	46	31.90%
	No	98	68.10%
Preterm Birth	Yes	133	92.40%
	No	11	7.60%
NICU Admission	Yes	62	43.10%
	No	82	56.90%
Neonatal Sepsis	Yes	12	8.30%
	No	132	91.70%
Respiratory Distress Syndrome	Yes	18	12.50%
	No	126	87.50%
Intraventricular Hemorrhage	Yes	7	4.90%
	No	137	95.10%
Pulmonary Hypoplasia	Yes	2	1.40%
	No	142	98.60%

DISCUSSION

In current study, mean gestational age at presentation was 33.06 ± 2.30 weeks which indicates that most cases were occurred in late preterm period. This is likely because membrane integrity decreases as pregnancy advances and also increased uterine distension in later weeks makes membranes more vulnerable to rupture. Majority of patients 85 (59.0%) were from rural areas which may be attributed to poor antenatal care facilities and delayed presentation to tertiary care centers in rural settings. Regarding maternal complications, cesarean section was performed in 35 (24.30%) cases which suggests that conservative management with vaginal delivery was successful in majority of cases. However, chorioamnionitis was developed in 16 (11.10%) patients which is expected complication because prolonged rupture of membranes allows ascending bacterial infection from vaginal flora into amniotic cavity. Postpartum hemorrhage occurred in 13 (9.00%) cases which can be explained by increased risk of uterine atony and placental abnormalities associated with preterm labor and infection. For neonatal outcomes, preterm birth was occurred in 133 (92.40%) cases which is directly related to premature rupture of membranes triggering early labor. Low birth weight was recorded in 46 (31.90%) neonates because of preterm delivery before adequate fetal growth is achieved. NICU admission was required in 62 (43.10%) neonates due to prematurity related complications and need for respiratory support. Respiratory distress syndrome was diagnosed in 18 (12.50%) cases which results from surfactant deficiency in premature lungs. Stillbirths occurred in 9 (6.30%) cases which may be due to severe infection, placental insufficiency or extreme prematurity.

The mean gestational age in present study was 33.06 ± 2.30 weeks which is comparable with findings of Raveena Shree *et al.* 14 who reported mean gestation of 32 ± 2 weeks and Jha *et al.* 15 who observed 32.29 ± 1.15 weeks in their cohort. However, this is slightly higher than Ashraf

et al. 16 who studied earlier gestational ages. The mean maternal age of 27.60 ± 4.73 years in current study was lower than Ashraf *et al.* 16 who reported 31.6 ± 3.6 years and Irshad *et al.* 17 with 30-31 years, but similar to Rana *et al.* 18 who found mean age of 26 ± 7 years. This difference may be attributed to different demographic characteristics and marriage patterns in different geographical regions.

The cesarean section rate was 24.30% (n=35) in present study which is lower than many reported studies. Irshad *et al.* 17 found cesarean rate of 55.2% in immediate induction group and 37.3% in expectant group, while Shahwar *et al.* 19 reported 38% cesarean rate and Ashraf *et al.* 16 documented 41.5%. The lower rate in current study suggests successful conservative management approach. However, Rana *et al.* 18 reported only 4% cesarean rate in patients beyond 28 weeks which is even lower than present findings and this variation can be explained by different inclusion criteria and management protocols.

Chorioamnionitis occurred in 11.10% (n=16) of cases in present study which is higher than Jha *et al.* 15 who reported 3.8% in patients delivering after 34 weeks but lower than Raveena Shree *et al.* 14 who documented 15% chorioamnionitis. The maternal sepsis rate of 5.60% (n=8) was comparable to Raveena Shree *et al.* 14 who found 5% maternal sepsis. Positive high vaginal cultures were found in 16.00% (n=23) cases which is exactly similar to Rana *et al.* 18 who also reported 16% positive swabs and Shah *et al.* 20 who documented 16% proven infection, suggesting similar bacterial colonization patterns across different populations.

Regarding neonatal outcomes, preterm birth rate was 92.40% (n=133) in current study which reflects the pathophysiology of premature membrane rupture triggering early labor. Low birth weight was recorded in 31.90% (n=46) neonates which is lower than Raveena Shree *et al.* 14 who found 45% low birth weight cases. The NICU admission rate was 43.10% (n=62) in present study which is comparable to Ashraf *et al.* 16 who reported 55.4% NICU admission and Raveena Shree *et al.* 14 with 50% admission rate, but higher than Shah *et al.* 20 who documented only 34% NICU admissions. This variation may be due to different threshold criteria for NICU admission and availability of resources in different hospitals.

Respiratory distress syndrome occurred in 12.50% (n=18) cases which is lower than Ashraf *et al.*16 who reported 18.5% RDS and Asma *et al.* 21 who found 20% RDS in conservative group. The lower rate in current study might be due to higher mean gestational age allowing better lung maturity. Neonatal sepsis was 8.30% (n=12) which is higher than Jha *et al.* 15 who reported 5.7% but lower than Raveena Shree *et al.* 14 with 10% sepsis rate. Stillbirth rate was 6.30% (n=9) in present study which is lower than Raveena Shree *et al.* 14 who documented 6% neonatal mortality and much lower than Ashraf *et al.* 16 who reported 27.7% perinatal mortality. This significant difference can be explained by earlier gestational ages and shorter latency periods in their study population leading to worse outcomes.

The present study has several limitations that should be acknowledged. First, this was single center study conducted at one tertiary care hospital which may limit the generalizability of findings to other healthcare settings with different patient populations and management protocols. Second, the sample size was relatively small with only 144 patients which may affect the statistical power of results. Third, this study did not evaluate the long-term neonatal outcomes and follow-up data was not available to assess developmental outcomes in infants. Fourth, the latency period between rupture of membranes and delivery was not recorded which could have provided valuable information regarding outcomes.

CONCLUSION

Our study has concluded that premature preterm rupture of membranes is associated with significant maternal and neonatal complications. The findings demonstrate that majority of patients delivered preterm with considerable rates of low birth weight and requirement of neonatal intensive care admission. Maternal infectious complications including chorioamnionitis and sepsis were observed in notable proportion of cases.

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Ethical Approval: This research received approval from institutional ethics review board. The entire research procedure was conducted in compliance with guidelines established by ethics committee and principles outlined in Declaration of Helsinki.

Patients' Consent: Written informed consent was obtained from all study participants prior to their enrollment. The participants were informed that confidentiality of their data would be maintained and voluntary withdrawal from research was permitted at any stage.

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