

Feto-Maternal Outcome in Patients with Premature Rupture of Membranes, a Study of 250 Cases at a Tertiary Health Centre in Western India

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Abstract:

Background: Premature rupture of membranes is defined as spontaneous rupture of fetal membranes beyond 28 weeks of pregnancy but before the onset of uterine contractions. If PROM occurs before 37 completed weeks, it is referred to as preterm premature rupture of membranes (PPROM). PROM is associated with adverse outcomes in both; hence its management becomes crucial. It complicates 8% of pregnancies and is the cause of approximately one-third of preterm deliveries. It can lead to significant perinatal morbidity, including respiratory distress syndrome, neonatal sepsis, umbilical cord prolapses, placental abruption, and fetal death. Appropriate evaluation and management are important for improving neonatal outcomes. The risk of intrauterine infection increases with the duration of ROM. Evidence supports the idea that induction of labor, as opposed to expectant management, decreases the risk of chorioamnionitis without increasing the cesarean delivery rate. The objective of the present study was to investigate the labor, maternal, and perinatal outcomes.

Methods: The present prospective study was conducted in the Department of Obstetrics and Gynecology and associated Sheth L.G. Hospital, Narendra Modi Medical College, India from January 2023 to October 2023 among the patients diagnosed as premature rupture of the membrane with women complain of leaking attending antenatal OPD and antenatal ward. On admission, a detailed history was taken. General and Systemic examinations were done including Per Abdomen, Per Speculum and per vaginam carried out and investigations were done as per protocol. Diagnosis of PROM was confirmed by any of these methods. Continuous monitoring of maternal and fetal condition done antibiotics was given intra/ post-natal period. P/ V exam was done when necessary. Investigations done and maternal and fetal outcome were noted.

Results: More number of booked cases was found in study group. Maximum women were in the age group of 20-24 years. Majority of cases of PROM were idiopathic. PROM results in oligohydramnios due to drainage of liquor amnii. Majorities of the babies were underweighted in mothers with PROM. Thus, the better fetal outcome was associated with term gestational age. Higher chances of maternal complication were found among mothers with PROM.

Conclusions: From the above study, it can be concluded that PROM is associated with poor fetomaternal outcome. Early diagnosis and prompt management is required for better outcome of mother and baby.

Keywords: Maternal morbidity, Preterm premature rupture of membranes, Feto-maternal outcome, Chorioamnionitis, PROM, PPRM.

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Introduction

Premature rupture of membranes is defined as rupture of membranes before the onset of labour and beyond the viable age. It is called preterm PROM when it occurs before 37 completed weeks of gestation, and PROM that occur after 37 weeks of gestation defined as term PROM. Premature

rupture of membrane is associated with a high risk of maternal morbidity and mortality. Once the membranes rupture the integrity of pregnancy is in jeopardy. It occurs in approximately 8% of all pregnancies. In developing countries, the incidence of premature rupture of membrane is about 18-

20%. [1,2] Preterm prelabour rupture of a membranes (PPLROM) occurs in 1-5% of all pregnancies. It is responsible for approximately 30-40% of all preterm birth.

PROM is the leading cause of preterm births and perinatal morbidities. Prematurity and its recognized sequel like, respiratory distress syndrome, intraventricular haemorrhage, necrotizing enterocolitis are the major complications. Other fetal complications due to long standing oligohydramnios in PPRM, before 26 weeks are skeletal and craniofacial abnormalities and pulmonary hypoplasia [3,4,5].

Maternal morbidities are found in terms of chorioamnionitis which leads to endometritis, puerperal pyrexia, wound infection and placental abruption. Further, consequences may increase due to obstetric interventions in terms of instrumental deliveries and caesarean sections. It may be a result of fetal distress, dry labour or incoordinate uterine actions. [6] Close monitoring with timely intervention and good neonatal set up can contribute significantly to reduce fetomaternal morbidities and mortalities.

Numerous risk factors are associated with PROM such as black race, lower socio-economic status, smokers, past history of STI, previous preterm delivery or abortion, polyhydramnios and multiple pregnancy. Others are procedures such as cerclage, amniocentesis. The etiology is multifactorial [7,8,9]. Evidence suggests that PROM is related to membranes dysfunction on a molecular level [10], collagen dysfunction and programmed cell death in fetal-membranes [11,12].

Management of PROM is not clear, main uncertainty is related to induction of labour or expectant management. The key to the management of rupture of membrane is accurate assessment of gestational age, fetal position, presence or absence of chorioamnionitis, foetal heart rate monitoring. Group B streptococcal prophylaxis should be given based on prior culture results and intrapartum risk factors, if cultures have not been previously performed. The longer the time interval between rupture of membranes and onset of labour, the greater is the risk of ascending infection and chorioamnionitis. Number of vaginal examinations is more predictive of maternal infection than duration of membrane rupture [13].

The present study aims to determine the maternal and foetal outcome in premature rupture of membrane, especially in the context of developing countries to help in formulating effective intervention strategies and minimize complications. Hence the present Descriptive observational study was done at our tertiary care centre to determine maternal and foetal outcomes in premature rupture of membrane.

Material and Methods

The present study is a prospective observational study done from January 2023 to October 2023 in a tertiary care hospital and medical college. The study included 250 women with spontaneous rupture of membranes with gestational age between 28 to 40 weeks following were the criteria for the case enrolment in present study.

Inclusion Criteria:

- Gestational age beyond 28 to 40 weeks
- Singleton/multifetal gestation
- Primigravida/multigravida
- Breech presentation
- Cases of polyhydramnios

Exclusion Criteria:

- congenital anomalies of foetus
- intrauterine death
- contracted pelvis
- previous caesarean section

The study is based on women admitted to labour ward, in the department of Obstetrics and Gynaecology. The patients who fulfilled the inclusion criteria were enrolled in the study. Patient's detailed history, gestational age, per abdominal examination, per speculum and per vaginal examination, all routine investigations recorded in a predesigned proforma. The women enrolled for the study were observed and maternal and foetal outcome was noted. The management of women with PROM was done individually according to departmental policy.

Maternal complications observed in present study were puerperal pyrexia, chorioamnionitis and puerperal sepsis and defined as below:

Puerperal pyrexia is presence of a fever which is greater than or equal to 38.0°C, in a woman within six weeks of her having given birth. Most persistent fevers after childbirth are caused by genital tract infection.

The key clinical findings associated with clinical chorioamnionitis includes fever, uterine fundal tenderness, maternal tachycardia (>100/min), foetal tachycardia (>160/min) and purulent or foul amniotic fluid, maternal leucocytosis (>15,000/mm³). Maternal fever is the most important clinical sign of chorioamnionitis.

The clinical findings associated with Puerperal sepsis includes fever (temperature 38.5°C or higher), pelvic pain, abnormal vaginal discharge, abnormal smell/foul odour of discharge, delay in the rate of reduction of the size of the uterus (involution). Taking into consideration exclusion criteria, Incidence of PROM in present study could not be calculated, thus all cases were not included during study period. Following details were

collected and analysed in each case for study according to the proforma.

Observation and Discussion:

Table 1: Demographic Profile

Age	Cases	Percentage
<20	8	3.2
20-24	103	41.2
25-29	96	38.4
30-34	28	11.2
>35	15	6
Parity		
Nullipara	122	48.8
1	64	25.6
2	38	15.2
>2	26	10.4
Socioeconomic Status		
Lower	216	86.4
Middle	34	13.4
High	0	0
Cases		
Booked	154	61.6
Unbooked	34	13.6
Emergency	62	24.8

Highest number of PROM cases was observed in age group of 20- 24 years (41.2%) and collectively in 20-29 years (79.6%) which is also period of peak reproductive age. PROM cases were comparatively less (3.2%) in women below 20 years age group. In present study numbers of nulliparous (48.8%) and parous women (51.2%) were similar. It was observed that as age and parity increased, the cases of PROM decreased. This could be attributable to more sexual activity in younger age and thus more chances of genital tract infection among them. Majority of PROM cases were noted in lower socio-economic class (86.4%). The risk factors that

lead to an increase in cases of PROM among mothers belonging to low socio-economic status are malnutrition, infection, stress, higher parity, increased genitourinary infections due to poor personal hygiene, tobacco chewing etc. Majority of the women were registered cases (85.2%) and rest were the emergency cases (24.8%). this could be due to increased awareness and easy access for registration of pregnancy by implementation of various programs by government of India like JSSK Yojana. Regular antenatal visits can improve awareness of the women regarding risk factors and symptoms of PROM.

Table 2: Risk Factors associated with PROM

Risk Factor	Cases	Percentage
Idiopathic	165	66
Anaemia	84	33.6
History of PROM	20	8.8
History of Recent Intercourse	18	7.2
Infection	15	6
Breech	13	5.2
Twins	13	5.2
Polyhydramnios	10	4
History of Fever	9	3.6
CPD	5	2

In present study 66% cases were idiopathic and had no risk factors identified. Risk factors like Anaemia, previous history of PROM, history of recent coitus, infection, breech presentation, twins, polyhydramnios, h/o fever and cephalo-pelvic disproportion were identified.

Table 3: Factors affecting Maternal Outcome in Women with PROM

Risk Factor		Vaginal Delivery			LSCS			Total Number of Cases	P Value
		Spontaneous	Induced	Total	Not Induced	Induced	Total		
		No.(%)	No.(%)	No. (%)	No.(%)	No.(%)	No.(%)		
Parity	Nulliparous	45(36.8)	25(20.4)	70(57.2)	35(28.6)	15(12.2)	50(40.8)	122	< 0.0001
	Parous	83(64.8)	30(23.4)	113(88.2)	12(9.3)	5(3.9)	17(13.2)	128	
Bishop's Score	Unfavourable	22(29.3)	20(26.6)	42(55.9)	20(26.6)	13(17.3)	33(43.9)	75	<0.0001
	Favourable	106(60.5)	35(20)	141(80.5)	27(15.4)	7(4)	34(19.4)	175	
Duration of PROM	<12 Hours	67(41.1)	40(24.5)	107(65.6)	37(22.6)	18(11)	55(33.6)	163	0.002
	>12 Hours	61(70.1)	15(17.2)	76(87.3)	10(11.4)	2(2.2)	12(13.6)	87	
Membrane Status	Present	54(52.9)	24(23.5)	78(76.4)	17(16.6)	7(6.8)	24(23.4)	102	0.8059
	Absent	74(50)	31(20.9)	105(70.9)	30(20.2)	13(8.7)	43(28.9)	148	

Above table shows various factors influencing maternal outcome in women with PROM. Out of 250 cases 183 cases delivered vaginally either spontaneously or following induction, whereas 67 patients underwent LSCS.

In present study vaginal delivery was common mode of birth. Out of 122 nulliparous 57.2% women and out of 128 parous 88.2% women delivered vaginally, so there is higher chance of vaginal delivery in multiparous women which is statistically significant ($p < 0.0001$), thus vaginal delivery was common mode of birth in both nulliparous and parous women presenting with PROM at our hospital.

Out of 175 women with favourable cervix 80.5% women delivered vaginally. The progress of labour and outcome up to some extent depends on Bishop's score. When the bishop's score is favourable (≥ 4), there are higher chances of normal delivery in both primigravida and multigravida which is statistically significant ($P < 0.0001$). Chance of LSCS is higher in unfavourable cervix.

In present study majority of the women underwent vaginal delivery due to high number of patients with favourable bishop's score, active management of labour, timely induction and augmentation, strict monitoring of foetal heart rate and judicious use of oxytocic.

Out of 163 women presented in our hospital within 12 hours of leaking 65.6% women delivered vaginally, while out of 87 women presented in our hospital after 12 hours of leaking 87.3% women delivered vaginally, thus with increase in duration of PROM chances of vaginal delivery improves, which is statistically significant ($P = 0.0002$).

Out of 102 women with membrane present 76.4% women delivered vaginally, while out of 148 women with membrane absent 70.9% women delivered vaginally, thus vaginal delivery rate in women with membrane absent and membrane present found to be similar p-value of the above comparison between membrane present and membrane absent is 0.8059 which is not significant.

Table 4: Mode of Delivery and Indication for LSCS in PROM

Mode of Delivery	Spontaneous	Induced	Cases
Vaginal Delivery	128 (69.94%)	55 (30.05%)	183
LSCS	47 (70.14%)	20 (29.85%)	67
	175 (70%)	75 (30%)	250
Indication		Cases	%
Induction Failure		17	25.3
Twins		12	17.9
Fetal Distress		10	14.9
Breech		10	14.9
MSL		9	13.4
CPD		5	7.4
Severe Oligo		3	4.4
Cord Prolapse		1	1.4
Total		67	

Vaginal delivery was common mode of birth (73.2%). Out of all vaginal deliveries 69.94%

women delivered spontaneously, this suggests that PROM may induce the process of labour itself.

Remaining cases required induction with oxytocin or prostaglandins. High number of (80.5%) women with favourable cervix delivered vaginally, which is statistically significant ($p < 0.0001$). High number (65.6%) of women delivered vaginally presented at our hospital within 12 hours of leaking, which is statistically significant ($p = 0.0002$). The incidence of LSCS was 26.8% at our hospital. Timely use of labour inducing agents decreased PROM delivery

interval and therefore maternal and neonatal morbidity. The commonest indication for LSCS was induction failure (25.3%). The combined incidence of meconium-stained liquor and foetal distress was highest (28.3%) in present study. Other indications were twins, breech, cephalopelvic disproportion, severe oligohydramnios and cord prolapse. Foetal distress might be due to cord compression as a consequence of decreased amniotic fluid in PROM.

Table 5: Correlation between duration of PROM and Maternal Complications

Latency period in Hours	Total Cases	Puerperal Pyrexia	Puerperal Sepsis	Chorioamnionitis	Total no. of complications in each latency period
0-11	76	1(1.31%)	0	0	1(1.31%)
12-24	120	5(4.16%)	2(1.6%)	2(1.6%)	9(7.5%)
25-35	44	7(15.5%)	4(8.88%)	4(8.88%)	15(33.3%)
>36	9	3(33.3%)	1(11.1%)	2(22.2%)	6(66.6%)
	250	16(6.4%)	7(2.8%)	8(3.2%)	31(12.4%)

In present study maternal complications observed were puerperal pyrexia (6.4%), puerperal sepsis (2.8%) and chorioamnionitis (3.2%). maternal morbidity was definitely related to the duration of PROM. As a duration of PROM increased maternal morbidity also increased, which is statistically significant (0.0001). Maternal morbidity rate was (12.4%), and no maternal mortality was noted in present study as all women received early intervention and treatment in time.

Table 6: Neonatal Morbidity at different Gestational Age

Gestational Age in weeks	Total Neonates	RDS	LBW	Birth Asphyxia	NEC	Sepsis	MAS	TTN	Total
28-34	76	15 (19.7%)	10 (13.1%)	2 (2.6%)	1 (1.31%)	7 (9.2%)	1 (1.31%)	4 (5.2%)	40 (52.63%)
35-37	97	4 (4.12%)	2 (2.06%)	1 (1.03%)	1 (1.03%)	2 (2.06%)	2 (2.06%)	2 (2.06%)	14 (14.43%)
38-40	89	2 (2.24%)	0	1 (1.03%)	0	1 (1.03%)	1 (1.03%)	1 (1.03%)	6 (6.74%)
	262	21 (8.01%)	12 (4.58%)	4 (1.52%)	2 (0.76%)	10 (3.81%)	4 (1.52%)	7 (2.6%)	60 (22.9%)

In present study neonatal morbidity rate was 22.9%, as the gestational age advanced the neonatal morbidity rate decreased which is statistically significant ($p = 0.0094$). The complications observed were RDS (8.01%), Low birth weight (4.58%), sepsis (3.81%), TTN (2.6%), NAS (1.52%) and NEC (0.76%).

Table 7: Neonatal Mortality: Correlation between Gestational Age and Birth Weight

Gestational Age in Weeks	Total Neonates	Neonatal Deaths (%)
28-34	76	10 (13.15%)
35-37	97	6 (6.18%)
38-40	89	0
	262	16 (6.1%)
Birth Weight in Kg	Total Neonates	Neonatal Deaths (%)
<2 kg	53	6 (11.3%)
2.1- 2.5 kg	91	8 (8.79%)
2.6- 3 kg	82	2 (2.4%)
> 3 kg	36	0
	262	16 (6.1%)

Above table shows neonatal mortality at different gestational age in women presenting with PROM. Overall incidence of neonatal mortality was 6.10% in present study. In present study rate of neonatal death was high in preterm (13.1%) compared to border term pregnancies (6.1%) and (0%) in term pregnancies.

Neonatal mortality rate in present study was 6.10%, as the gestational age advanced the neonatal mortality rate decreased which is statistically significant ($p = 0.002$).

In present study higher number of deaths (11.3%) were observed in neonates with birth weight \leq

2.0kg, 9.7% death observed in ≤ 2.5 kg birth weight, 1.6% death observed in > 2.5 kg birth weight, while 0% death was observed in neonates > 3.0 kg, thus neonatal mortality decreased with increase in birth weight which is statistically significant ($p=0.0031$).

Discussion

The present study was a prospective and Descriptive type study aimed to find out maternal and perinatal outcome in term as well as preterm premature rupture of membrane pregnancy to ascertain the various etiological factors, maternal complications, fetal outcome. The present study was performed over 250 women presenting with PROM in the dept. of obs. And gynae of a tertiary healthcare centre and was compared to similar studies done elsewhere. The occurrence of PROM is more in un-booked cases were reported from rural areas compared to booked cases. In present study and Shweta et AL, incidence of PROM was similar in nulliparous and parous women. In some studies incidence of PROM was higher in nulliparous women ranging from 61% to 62%.

According some authors, chances of increased sexual activity and increased genital infections were common among nulliparous women. Multiparity could be a risk factor for PROM due to, previous trauma to the cervix and long-standing infection. Sabina Yesmin et al (2020) [14] showed 61.8% of the patients of PROM to be nulliparous.

The progress of labour and outcome up to some extent depends on Bishop's score. As the Bishop's score increases, the percentage of normal delivery goes up in both primi-gravidas and multigravidas. In Umed Thakor's [15] study Bishop's score at induction was 5.44 \pm 1.41. In study by Surayapalem S [16]. 63.8% of primigravida had a Bishop score 3-4. In the present study 26.8 % had caesarean section, being comparable to the study done by Chhangte [17] and Surayapalem S [16]. Rate of caesarean section was higher in the studies by Anjana Devi [18] and Singhal [19] and lower in the studies by Amulya M.N [20]. And Kamala J [21] compared to the present study.

In present study vaginal delivery is commonest due to active management of labor, timely induction and augmentation, strict monitoring of fetal heart rate and judicious use of oxytocic and instruments during delivery. It was observed that 45.03% babies had birth weight above 2.5 kg. Similar study was done by Chhangte [17] which shows 71% cases above 2.5 Kg weight and birth weight 3 Kg or above recorded in 29 % births. In this study puerperal pyrexia was seen in 6.4% cases, results were similar to study by Singhal [19]. In Kodkany [22] study maternal morbidity was seen in 21% of cases.

The relationship of ROM to the consequential fetal hazard is a matter of concern. With rupture of membranes the clock of infection starts to tick. In study done by Sanyal [23] et al., the perinatal morbidity was 32% and mortality was 5%. Kodkany [22] et al found in their study perinatal morbidity was 39.8% among which birth asphyxia was responsible for 29.5%. In the present study perinatal morbidity was 22.9%. Similar results were shown to the study done by Surayapalem S et al [24].

The perinatal mortality rate in our study was 6.1%. The major cause of perinatal mortality was birth asphyxia followed by sepsis in newborn which is common in many of the studies universally. Fetal morbidity always increases with increase in the PROM to delivery interval. Infection of the genital tract is a high-risk factor for development of PROM associated with an adverse outcome depending upon the nature and type of pathogen.

Conclusion

PROM is considered to be one of the most common clinical events which turn a normal pregnancy into a high-risk one for both the mother and the foetus. The assessment of women with possible membrane rupture is a management issue faced in every day practice.

The risk factors of PROM includes malnutrition, anaemia, prior PROM, prior preterm birth, cigarette smoking, polyhydramnios, urinary and sexually transmitted infection, stress, high parity, work during pregnancy, low body mass index, bleeding, low socioeconomic status etc. As etiology of PROM remains obscure, prevention is difficult so one has to concentrate more on its management. Regular antenatal care, good care of hygiene, nutrition, early diagnosis of vaginal infection, literacy and healthy habits can decrease the incidence of PROM. Clinical examination has good accuracy in diagnosis of PROM. However, in some cases, diagnosis is difficult with clinical examination mainly due to high leak with intact membrane. Recent techniques may provide a solution to the clinical challenge of diagnosis for rupture membrane.

Once PROM is diagnosed, it should be followed by early admission, careful observation and prompt management including administration of antibiotics and steroids in preterm pregnancy, induction or augmentation of labour reduce hospital stay and ultimately reduce perinatal and maternal complications like. Close antenatal monitoring and use of cervical swab for culture and sensitivity and according use of antibiotics can further decrease rate of such morbidities. Neonatal morbidity and mortality increase in PROM due to prematurity. Looking after a premature infant puts immense burden on economy and health care resources of

country. Therefore, risk scoring strategies like in previous history of preterm PROM, history of preterm deliveries should be developed to identify high risk cases and treating them prior to rupture.

In conclusion, careful antenatal monitoring, timely detection of PROM, early admission, strict aseptic precaution during examination, administration of antibiotics and steroids, timely use of induction agents to deliver the women are important factors in management. This will lead to better maternal and foetal outcome in pregnancy with PROM.

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