

A Hospital Based Assessment of the Factors Increasing the Risk of PROM and Effect of Duration of Rupture of Membranes on Fetomaternal Outcome

Suchandra¹, Renu Jha², Kumudini Jha³

¹Senior Resident, Department of Obstetrics and Gynecology, Darbhanga Medical College and Hospital, Laheriasarai, Darbhanga, Bihar, India.

²Associate Professor, Department of Obstetrics and Gynecology, Darbhanga Medical College and Hospital, Laheriasarai, Darbhanga, Bihar, India

³Professor and HOD, Department of Obstetrics and Gynecology, Darbhanga Medical College and Hospital, Laheriasarai, Darbhanga, Bihar, India

Received: 03-02-2023 / Revised 23-03-2023 / Accepted 28-04-2023

Corresponding author: Dr. Suchandra

Conflict of interest: Nil

Abstract:

Aim: The aim of the present study was to assess factors increasing the risk of PROM and effect of duration of rupture of membranes on fetomaternal outcome.

Methods: A prospective observational study was conducted on 200 patients presented with term PROM in the Department of Obstetrics and Gynaecology for the period of one year.

Results: PROM was more common in women with age 21-25years (73%), who were housewife (90%), were underweight (19%), were from the rural area (58%), belong to lower SES (62%) and were primigravida (58%). Majority (85%) of patients had spontaneous onset of labour in less than 24 hours of PROM and 6 (15%) went into spontaneous labour after 24 hours of PROM. Out of 60 women who had vaginal delivery, labour was induced in 86.66% women. Most common risk factor was malpresentation (45%) followed by history of PROM (30%), Polyhydramnios (14%), multiple pregnancy (10%) and febrile illness (5%). The most common indication for Caesarean section was previous 1 LSCS (10%), followed by fetal distress (4%), breech presentation (4%) and cephalopelvic disproportion (1.5%). Out of 220 babies, 12 (5.45%) were admitted in NICU for jaundice, RDS, early neonatal sepsis, conjunctivitis, neonatal seizures, meconium aspiration syndrome, perinatal asphyxia. It was found statistically significant. Majority of the neonates were admitted for 3 days. 3 (25%) neonates required admission in NICU for <3days and 4 (33.34%) neonates required NICU admission for >3days.

Conclusion: PROM is associated with poor fetomaternal outcome and timely diagnosis and prompt management is required for better outcome.

Keywords: Fetal Distress, Fetomaternal Outcome, Perinatal Morbidity, Risk Factors.

This is an Open Access article that uses a funding model which does not charge readers or their institutions for access and distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>) and the Budapest Open Access Initiative (<http://www.budapestopenaccessinitiative.org/read>), which permit unrestricted use, distribution, and reproduction in any medium, provided original work is properly credited.

Introduction

Premature rupture of the membranes (PROM) is commonly defined as the rupture of the amniotic sac occurring prior to the initiation of uterine contractions. Preterm premature rupture of membranes (PPROM) is the term used to describe the rupture of membranes before 37 weeks of gestation. On the other hand, term premature rupture of membranes refers to the rupture of membranes occurring after 37 weeks of gestation. The latent period refers to the interval between the rupture of the membranes and the initiation of active labour. [1] The foetal membrane is comprised of two distinct layers: the inner amnion and the outer chorion. The amnion, in its

terminological context, can be characterised as a resilient structure. The membrane is both firm and pliable. The avascular foetal membrane, which is located deep within, is in direct contact with the amniotic fluid and plays a crucial role in the progression of human pregnancy. The amnion contributes a significant portion of the tensile strength exhibited by the foetal membranes. Therefore, it is crucial to prioritise the development of components that safeguard against the rupture or tearing of the placenta for a successful outcome in pregnancy. [2] Preterm rupture of membranes (PROM) is a substantial contributor to adverse outcomes in the perinatal period, leading to increased rates of morbidity and mortality. The

impact of preterm premature rupture of membranes (PROM) encompasses various consequences, including maternal and neonatal mortality and morbidity, as well as economic implications such as increased drug expenses, hospitalization costs, loss of productivity in the workplace, and financial burden on healthcare professionals. [3]

In the majority of cases, the mechanism of PROM cause is unknown, but it may be related to a structural defect in the membranes caused by collagen deficiency or malformation, which causes the membranes to weaken and be destroyed by the enzymatic process in inflammatory or infectious processes. It is also linked to mechanical factors, such as twin pregnancies caused by uterine volume distention. [4,5] Based on previous evidence, low family income, maternal age, employment, education level, multiple pregnancies, gestational ages, hypertension, diabetes mellitus, history of abortion, abnormal vaginal discharge, ANC follow-up, urinary tract infection, and history of Chorioamnionitis were risk factors for PROM. [6-10]

The aim of the present study was to assess factors increasing the risk of PROM and effect of duration of rupture of membranes on fetomaternal outcome.

Materials and Methods

A prospective observational study was conducted on 200 patients presented with term PROM in the Department of Obstetrics and Gynaecology, Darbhanga Medical College and Hospital, Laheriasarai, Darbhanga, Bihar, India for the period of one year.

Pregnant women with gestational age 37 completed weeks and above with spontaneous rupture of membranes and giving consent were included. Pregnant women with gestational age less than 37 completed weeks with PROM and patients of term prelabour rupture of membranes presenting with

Antepartum hemorrhage (abruption) were excluded.

Detailed history was taken with respect to PROM and its risk factors. Detailed examination including Per Speculum examination was done and PROM was confirmed by Per Speculum examination. In women not having frank leaking of amniotic fluid USG done had confirm liquor volume. The patients were managed as per the Departmental Protocols for the management of PROM.

Antibiotic prophylaxis was given to all the patients presenting with PROM. Bishop's score was calculated and patients induced as per the departmental protocols for induction of labour. Details of progress of labour and mode of delivery including indication for caesarian section were recorded, and patients were discharged as per the departmental protocols. In postpartum period patients were followed up till day 42 of delivery. Patients were advised to visit hospital 6 weeks postpartum and any postpartum complications in terms of puerperal pyrexia, wound sepsis, chorioamnionitis, Urinary tract infections were noted. In patients who were unable to come, then they were contacted telephonically. The neonatal outcomes were recorded in terms of jaundice, RDS, neonatal sepsis, conjunctivitis, neonatal seizures, meconium aspiration syndrome, perinatal asphyxia, NICU admission, length of NICU stay, mortality. All the data were entered into the Microsoft Excel sheet and tabulated. Analysis was performed using IBM SPSS (Statistical Package for Social Sciences) version 20 software. Frequency distribution and cross tabulation was performed to prepare the tables. All the categorical data was expressed as number and percentage. Chi Square test was used to compare the percentage and P value of less than 0.05 was considered as statistically significant.

Results

Table 1: Characteristics of the study population

Parameters		N%	P Value
Age (years)	<21	14 (7)	0.777
	21-25	146 (73)	
	26-30	20 (10)	
	31-35	16 (8)	
	>35	4 (2)	
Occupation	Housewife	180 (90)	<0.001
	Working women	20 (10)	
BMI	Normal (18.5-24.9)	156 (78)	0.001
	Underweight (<18.5)	38 (19)	
	Overweight (>25-29.9)	6 (3)	
	Obese (\geq 30)	0	
Area	Rural	116 (58)	0.668
	Urban	84 (42)	
SES	Lower class	134 (62)	0.025
	Upper lower	64 (32)	

	Lower middle	10 (5)	
	Upper middle	2 (1)	
ANC provider	Specialist	160 (80)	<0.001
	ANM worker	40 (20)	
Gravida state	Primigravida	116 (58)	0.034
	Multigravida	82 (41)	
	Grand multigravida	2 (1)	

PROM was more common in women with age 21-25years (73%), who were housewife (90%), were underweight (19%), were from the rural area (58%), belong to lower SES (62%) and were primigravida (58%).

Table 2: Relation of duration of PROM with labour progression

Duration of PROM	Labour progression		P Value
	Spontaneous onset of labour	Induction of labour	
≤24 hours	34 (85)	46 (76.66)	0.058
>24 hours	6 (15)	14 (23.34)	0.120
Total	40	60	

Majority (85%) of patients had spontaneous onset of labour in less than 24 hours of PROM and 6 (15%) went into spontaneous labour after 24 hours of PROM.

Table 3: Relationship of labour progression and mode of delivery in PROM

Duration of PROM	Mode of delivery		P Value
	Vaginal delivery	Caesarean section	
≤24 hours	52 (86.66)	8 (20)	<0.001
>24 hours	8 (13.34)	32 (80)	0.001
Total	60	40	

Out of 60 women who had vaginal delivery, labour was induced in 86.66% women.

Table 4: Risk factors

Risk factors	N%
History of recent coitus	2 (1)
Febrile illness	10 (5)
Multiple pregnancies	20 (10)
Polyhydramnios	28 (14)
History of PROM	60 (30)
Malpresentation	90 (45)

Most common risk factor was malpresentation (45%) followed by history of PROM (30%), Polyhydramnios (14%), multiple pregnancy (10%) and febrile illness (5%).

Table 5: Indication of Caesarean section in patients with PROM

Indication of C section	Frequency	Percent	P value
Previous 1 LSCS	20	10	
Fetal distress	4	4	
Breech presentation	4	4	
Cephalopelvic disproportion	3	1.5	
Contracted pelvis	3	1.5	0.016
Transverse lie	2	1	
Twin pregnancy with first twin non-cephalic	2	1	
Non-progress of labour	1	0.50	
Deep transverse arrest	1	0.50	
Total	40	40	

The most common indication for Caesarean section was previous 1 LSCS (10%), followed by fetal distress (4%), breech presentation (4%) and cephalopelvic disproportion (1.5%).

Table 6: NICU admission and hospital stay

NICU admission	N%
Admitted	12 (5.45)
Not admitted	190 (94.55)
Hospital stay	
<3 days	3 (25)
>3 days	4 (33.34)

Out of 220 babies, 12 (5.45%) were admitted in NICU for jaundice, RDS, early neonatal sepsis, conjunctivitis, neonatal seizures, meconium aspiration syndrome, perinatal asphyxia. It was found statistically significant. Majority of the neonates were admitted for 3 days. 3 (25%) neonates required admission in NICU for <3days and 4 (33.34%) neonates required NICU admission for >3days.

Discussion

The optimal approach to diagnosis and treatment of women with term prelabour rupture of membranes (PROM) is a challenge. PROM complicates approximately 5% to 10% of all pregnancies, of which approximately 80% occur at term. PROM is a matter of concern for all obstetricians as it is associated with significant maternal and fetal morbidity and mortality. PROM causes 18-20% of perinatal morbidity and 21.4% perinatal mortality. Three common causes of fetal death associated with PROM are sepsis, asphyxia and pulmonary hypoplasia. Maternal complications include intra amniotic infection which is seen in 13-60% of women, placental abruption and postpartum endometritis.⁸ There are numerous risk factors for PROM such as, lower socioeconomic status, smoking during pregnancy, illicit drug use during pregnancy, low body mass index (BMI) and malnutrition, concomitant infection, history of PROM in previous pregnancy, sexually transmitted infections, inadequate prenatal care, polyhydramnios and multiple gestation. Maternal and fetal outcomes in PROM depends on factors like gestational age, interventions (antibiotics, steroids) done, duration of labour, development of intrapartum chorioamnionitis. [11]

PROM was more common in women with age 21-25years (73%), who were housewife (90%), were underweight (19%), were from the rural area (58%), belong to lower SES (62%) and were primigravida (58%). In the study done by Nagaria T et al. in the year of 2016 most of the women with PROM were in the age group of 20-25 years. [12] In contrast, Ekachai et al (2000) found that BMI <20 was significantly different between the PROM group and the control group. Underweight women were significantly more prone for the PROM. [13] In a study done by Endale T et al. in Ethiopia, it was seen that out of 185 women, 70.3% belonged to rural and 29.7% were from urban. [8] Surayapalem S et al, noted that the incidence of PROM was high in cases of low SES (64%). [14] For majority of the women the ANC provider were specialist (80%) followed by 20% patients in whom the antenatal care was provided by ANM workers. In Shrestha SR et al. study almost all the patients had ANC check-up. [15] No literature was found which compared the outcome in terms of PROM, in patients in whom the antenatal care was provided

by specialist or ANM workers. However, in majority of women with PROM antenatal care was provided by specialist, this may be because the women at risk of PROM or any other risk factors usually attend the centers with specialist availability.

Majority (85%) of patients had spontaneous onset of labour in less than 24 hours of PROM and 6 (15%) went into spontaneous labour after 24 hours of PROM. In Mukharya J et al study significant difference was found in the PROM to delivery interval of patients in active and expectant management group. As PROM to delivery interval was significantly more in expectantly managed group. [16] This may be because majority of patients (84.5%) in our study presented within 12-48 hours of PROM. It has been seen that in 95% of patients labour starts within 24 hours. [17] Out of 60 women who had vaginal delivery, labour was induced in 86.66% women.

PROM is associated with increased risk of chorioamnionitis, unfavourable cervix and dysfunctional labour, increased caesarean rates, postpartum haemorrhage, and endometritis in mother. In the fetus, there is increased occurrence of sepsis, cord prolapse, fetal distress due to increased fetal wastage. Thus, earlier the gestational age at the time of PROM longer is the latency and more the complications. Most common risk factor was malpresentation (45%) followed by history of PROM (30%), Polyhydramnios (14%), multiple pregnancy (10%) and febrile illness (5%). The most common indication for Caesarean section was previous 1 LSCS (10%), followed by fetal distress (4%), breech presentation (4%) and cephalopelvic disproportion (1.5%). Out of 220 babies, 12 (5.45%) were admitted in NICU for jaundice, RDS, early neonatal sepsis, conjunctivitis, neonatal seizures, meconium aspiration syndrome, perinatal asphyxia. It was found statistically significant. Majority of the neonates were admitted for 3 days. 3 (25%) neonates required admission in NICU for <3days and 4 (33.34%) neonates required NICU admission for >3days. Padmaja et al in their study major risk factors was anaemia (20%), UTI was 10%, lower genital infections were 8%, cervical stitch was 2%, mal-presentations were 4%, hydramnios were 4% and there were no risk factors in 27% of the patients. History of term PROM was seen in 15% of the patients. [18] The commonest risk factor of PROM was malpresentation (36.2%). Patil S et al in their study reported that malpresentation was 13% and history of coitus was 10%, UTI and previous history of PROM constitute to 6%. [19] Major risk factors for PROM in Shrestha SR et al study was antecedent coitus, hydramnios, smoking, cephalo-pelvic disproportion, and previous abortion. [15]

Conclusion

PROM was seen in pregnant women of all age groups and more commonly in 21-25 years. Housewives residing in rural areas belonging to economically poor class were mostly affected. PROM was commonly seen in Primigravida between 37 completed weeks to 39 weeks 6 days of gestational age. Induction of labour was done in majority of cases. Common risk factors associated were malpresentation and history of PROM. Common intrapartum complication seen was fetal distress and non- progress of labour. Common indications for Caesarean section were previous 1 LSCS with PROM, fetal distress, breech presentation and cephalopelvic disproportion. In vaginal swab culture most common microorganism grown was gram positive staphylococcus followed by *E. coli*, *Pseudomonas* and *Acinetobacter*. Most common postpartum maternal complication was puerperal pyrexia followed by wound sepsis, chorioamnionitis and UTI. Common neonatal complications were jaundice followed by RDS. NICU admission was seen in 5.45% neonates. To conclude, PROM is associated with poor fetomaternal outcome and timely diagnosis and prompt management is required for better outcome.

References

1. Gibbs R, Karlan B, Haney A, Nygaard I. Danforth's obstetrics and gynecology. 10th ed. Philadelphia: Lippincott Williams & Wilkins; 2008.
2. Cunningham FGLK, Bloom SL, Hauth JC. Williams's obstetrics. 23th ed. USA: McGraw-Hill Companies; 2010.
3. Gabbe SG, Niebyl JR, Simpson JL. Obstetrics: Normal and problem pregnancies. 5th ed: Ed: Churchill Livingstone; 2007.
4. Abouseif HA, Mansour AF, Hassan SF, Sabour SM. Prevalence and outcome of preterm premature rupture of membranes (PPROM) among pregnant women attending Ain Shams maternity hospital. Egyptian Journal of Community Medicine. 2018 Apr;36(2):99-107.
5. Hackenhaar AA, Albernaz EP, Fonseca T. Preterm premature rupture of the fetal membranes: association with sociodemographic factors and maternal genitourinary infections. Jornal de pediatria. 2014 Mar; 90:197-202.
6. Zhou Q, Zhang W, Xu H, Liang H, Ruan Y, Zhou S, Li X. Risk factors for preterm premature rupture of membranes in Chinese women from urban cities. International Journal of Gynecology & Obstetrics. 2014 Dec 1;127(3): 25 4-9.
7. Woyessa TB, Fulea LG, Edossa AW. Premature rupture of membrane and its associated factors among pregnant women admitted to public hospitals in Nekemte town, western Ethiopia. Int Res J Obstet Gynecol. 2020; 3:27.
8. Endale T, Fentahun N, Gemada D, Hussen MA. Maternal and fetal outcomes in term premature rupture of membrane. World journal of emergency medicine. 2016;7(2):147.
9. Addisu D, Melkie A, Biru S. Prevalence of preterm premature rupture of membrane and its associated factors among pregnant women admitted in Debre Tabor General Hospital, North West Ethiopia: institutional-based cross-sectional study. Obstetrics and Gynecology International. 2020 May 14;2020.
10. Sirak B, Mesfin E. Maternal and perinatal outcome of pregnancies with preterm premature rupture of membranes (pprom) at Tikur Anbessa Specialized Teaching Hospital, Addis Ababa, Ethiopia. Ethiop Med J. 2014 Oct 1;52(4):165-72.
11. Medina TM, Hill DA. Preterm premature rupture of membranes: diagnosis and management. Am Fam Physician. 2006;73(4):659-64.
12. Nagaria T, Diwan C, Jaiswal J. A study on fetomaternal outcome in patients with premature rupture of membranes (PROM). Contracept Obstet Gynecol. 2016;5(12):4123-7.
13. Ekachai K, Patipan S. Risk factors related to premature rupture of membranes in term pregnant women. Aust N Z J Obstet Gynaecol. 2000;40(1):30-2.
14. Surayapalem S, Cooly V, Salicheemala B. A study on maternal and perinatal outcome in premature rupture of membranes at term. Int J Reprod Contracept Obstet Gynecol. 2017; 6:5368-72.
15. Shrestha SR, Sharma P. Fetal outcome of prelabour rupture of membranes. N J Obstet Gynaecol. 2006;1(2):19-24.
16. Mukharya J, Mukharya S. Comparative study of fetal and maternal outcomes of prelabour rupture of membranes at term. Int J Reprod Contracept Obstet Gynecol. 2017;6(1):149-63.
17. Middleton P, Shepherd E, Flenady V, McBain RD, Crowther CA. Planned early birth versus expectant management (waiting) for prelabour rupture of membranes at term (37 weeks or more). Cochrane Database Syst Rev. 2017;1(1):CD005302.
18. Padmaja J, Swarupa K. Maternal and Perinatal Outcome in Premature Rupture of Membranes at Term Pregnancy. IAIM. 2018;5(4):87-91.
19. Patil S, Patil V. Maternal and Foetal Outcome in Premature Rupture of Membranes. IOSR J Dent Med Sci. 2014;13(12):56-83.