

The Fetal Outcome in Premature Rupture of Membranes Patients at a Tertiary Care Hospital in Northwest Maharashtra: A Prospective Observational Study

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ABSTRACT

Introduction: The most common complications associated with Premature Rupture of Membranes (PROM) are prematurity and neonatal infections thus needing neonatal intensive care unit (NICU) admissions & treatment. Neonatal complications are more when the time duration between the onset of PROM and delivery of fetus is more. Early diagnosis of PROM, good medical management and expediting the delivery reduce the risk of maternal and fetal morbidity and mortality.

Aim: To study the effect of duration from PROM to delivery on fetal outcome.

Methodology: A prospective and observational study was conducted at the Department of Obstetrics and Gynaecology in a tertiary institute. All pregnant patients were admitted in the labour ward with confirmed PROM & pregnancy of >28 completed weeks of gestational age. Fetal outcome was assessed for Apgar score at birth, Birth Asphyxia, Meconium aspiration syndrome, NICU admission, Antibiotic requirement, Necrotizing Enterocolitis, Neonatal jaundice, Pyrexia, NICU Stay. The fetal outcome as per the above parameters was assessed in relation to the maternal CRP levels at admission and duration from onset of PROM to delivery.

Discussion: Around 42% babies had >7 APGAR score while 58% had APGAR <7 at 5 minutes. In our study, maximum babies (68%) had birth weight >2.5kg. 3 babies were preterm with birth weight 2.5 kg. Out of 100 babies delivered 22 (22%) babies needed NICU admission for respiratory distress in 11 neonates (50%), neonatal sepsis in 7 neonates (31.8%) & neonatal jaundice in 4 neonates (18.18%). In our study, NICU stay of >15 days was observed in 40%. 78 patients out of which 31.81% of cases (7 cases) needed >30 days of NICU stay. Maximum neonates were discharged within 4 days of NICU admission. 30 cases out of 100 had raised levels of serum CRP levels out of which 22 (73.3%) had neonatal complications. The remaining 70 cases had normal serum CRP levels. 5 neonates of normal maternal CRP levels had complications. It was observed that raised levels of maternal CRP were highly associated with neonatal complications which was proved statistically highly significant with *p-value*.

Conclusion: In our study, the association of raised maternal CRP with neonatal complications and adverse neonatal outcomes is statistically significant. However, the PROM to delivery interval time showed no statistical significance in affecting the fetal outcome in these cases.

Keywords: Fetal mortality, Neonatal outcomes, Premature Rupture of Membranes

Journal of Research in Medical and Interpathy Sciences. 2(2);2024

INTRODUCTION

Premature rupture of membranes (PROM) usually occurs in 2% of cases of all births.¹ The main worry in the case of PROM is intra-uterine infection which causes neonatal morbidity and mortality and increased need for operative procedures.

Premature rupture of membranes at term is defined as rupture of membranes more than 37 weeks of gestation before onset of labour.² The time from the rupture of membranes to onset of labour is called the latent period. The diagnosis is the key factor in the maternal and fetal outcomes in PROM cases. The accurate assessment of gestational age and the presence and absence of infection is the key to proper management of cases.^{3,4}

The incidence of PROM is between 2–3% with the occurrence of spontaneous onset of labour within the initial 24 hours after spontaneous rupture of membranes in 80–90%. When premature PROM was considered the

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Conflict of Interest: None

Source of Funding: None

How to cite: Naik S, Naik A, Vaje M. The Fetal Outcome in Premature Rupture of Membranes Patients at a Tertiary Care Hospital in Northwest Maharashtra: A Prospective Observational Study. *Journal of Research in Medical and Interpathy Sciences. 2024;2(2):61–65*

incidence of spontaneous onset of labour dropped down to 30–40%.⁵ The treatment modalities are different according to the gestational age and usually delivery is preferred in cases of PROM.⁶

The most common complication associated with PROM is prematurity and neonatal infections thus needing NICU admissions & treatment. Neonatal complications are more when the time duration between the onset of PROM and delivery of the fetus is more. Early diagnosis of PROM, good medical management and expediting the delivery reduce the risk of maternal and fetal morbidity and mortality.⁷

AIM

To study the effect of duration from PROM to delivery on fetal outcome.

METHODOLOGY

STUDY TYPE

A prospective and observational study was conducted at department of obstetrics and gynaecology in a tertiary institute.

STUDY PERIOD

January 2021 to June 2022 (18 months)

Inclusion criteria:

All pregnant patients admitted to the labour ward with confirmed PROM & pregnancy of >28 completed weeks of gestational age.

Exclusion criteria:

- PIH, Eclampsia
- Gestational diabetes mellitus
- APH
- Heart disease in pregnancy
- IUD
- Congenital

Sample size

Considering the percentage of PROM & morbidity associated with it in previous studies is found to be around 20%.

Therefore, taking P = prevalence/ proportion of morbidity = 20%

$$Q = 100 - P = 100 - 20 = 80\%$$

$$ae = \text{allowable error} = 8\%$$

$$Z_{1 - \alpha/2} = 1.96 \text{ at } 5\% \text{ level of significance}$$

$$N = (1.96)^2 * 20 * 80 / (8)^2 = 96.04 = 97$$

According to the calculation done the sample size obtained was 97 considering loss of patients the sample size taken was 100 subjects.⁵

All pregnant women with more than 28 weeks of gestation & watery vaginal discharge were included in the study and informed written consent was taken. A Proper clinical history was elicited and a complete clinical examination was done. With all the aseptic precautions, speculum examination was done to identify leaking per vaginum and litmus paper test was done to confirm it. Per Vaginal examination was done to assess the BISHOP's score at admission.

After confirming the diagnosis of PROM, the patient was subjected to NST and was started on the course of I.V. antibiotics (inj. Ampicillin 1 gm 12 hrs apart I.V, inj. Metronidazole 100cc 8 hrs apart for 48 hrs and later to oral formulation). In all preterm PROM patients not in active labour a single course of Betamethasone 12mg IM (2 doses) 24 hrs apart was given. The patients were managed till delivery as per their PROM status & using the protocol followed by the department for managing cases of PROM.

Some patients of PROM went into spontaneous onset of labour, while in some tocolysis given till action of steroids and while in some induction or augmentation done as duration of PROM was more than 12 hours. All patients were monitored closely using a partograph once in labour and delivered accordingly.

Fetal outcome was assessed for Apgar score at birth, Birth Asphyxia, Meconium aspiration syndrome, NICU admission, Antibiotic requirement, Necrotizing Enterocolitis, Neonatal jaundice, Pyrexia, NICU Stay. The fetal outcome as per the above parameters was assessed in relation to the maternal CRP levels at admission and duration from onset of PROM to delivery.

OBSERVATION

Total number of deliveries during the study period - 1960.

Number of cases of PROM – 100

Incidence of PROM = 5.1%

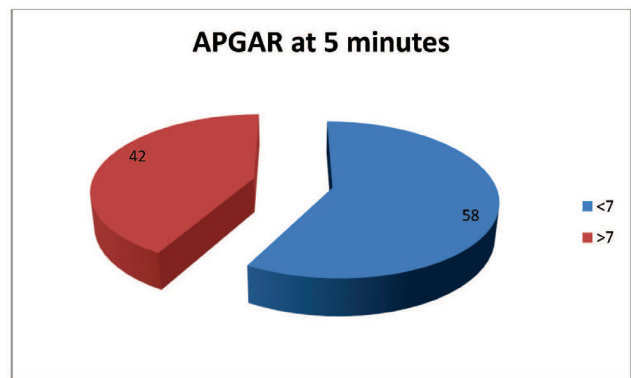


Figure 1: Apgar score (at 5 min) of the neonates of study participants.

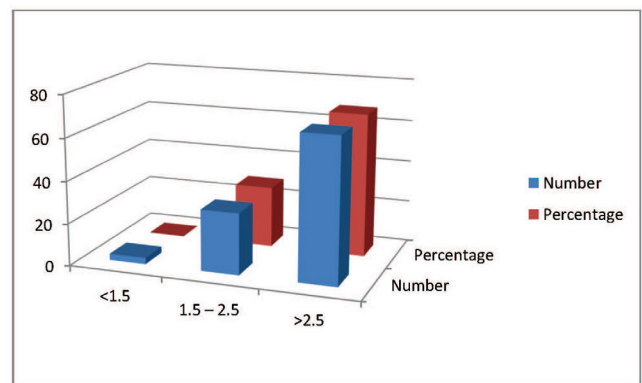


Figure 2: Birth weight of the Neonate.

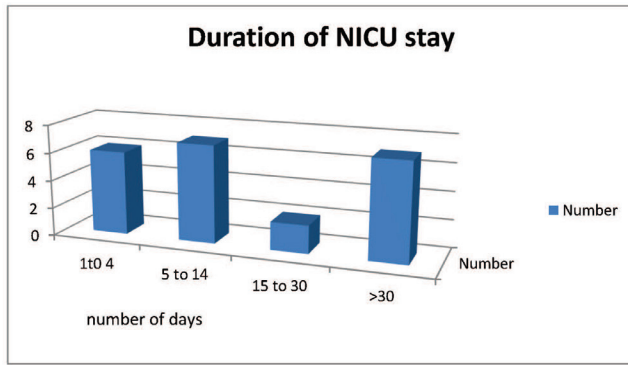


Figure 3: Duration of stay in NICU.

Table 1. Neonatal complication with respect to maternal CRP levels.

| Maternal CRP levels | Neonatal complications present | Neonatal complications Absent | Total | p-value |
|---------------------|--------------------------------|-------------------------------|-------|--------------|
| Normal | 5 | 65 | 70 | 0.00000..... |
| Raised | 22 | 8 | 30 | |

In our study maternal CRP was normal in 70% patients. Amongst them neonatal complications were observed in 5 patients. Maternal CRP was raised in 30% and neonatal complications were observed in 22 (66.6%) patients. (*p*-value <0.0000... highly significant.)

Table 2. PROM to delivery interval & Fetal outcome.

| PROM to Delivery interval | Mode of delivery | Neonatal complication | | |
|---------------------------|------------------|-----------------------|---|---|
| 0-6 hours | VD | 4 | 1 | |
| | LSCS | 8 | | 5 |
| 6-24 hours | VD | 59 | 9 | |
| | Vaccum | 1 | | 0 |
| | LSCS | 25 | | 9 |
| >24 hours | VD | 0 | 0 | |
| | LSCS | 3 | | 3 |
| Total | 100 | 27 | | |

No significant association was found between duration of PROM with mode of delivery and fetal complications

DISCUSSION

In our study 66 cases (66%) were of full-term gestation, 14% patients were early preterm (28 – 34 weeks), 16% patients belonged to late preterm group (34 – 37 weeks) while 4% cases were belonging to the post-dated pregnancy. This finding was similar to the study done by Trupti Nagaria in whom the maximum cases found were above 37 weeks of gestation.³ In the study done by Pondru M. *et al.* it was observed that term PROM was more (88.3%) than the preterm PROM (11.7%).⁸ In the study done by Tripti Nagaria, she observed that PROM cases belonging to > 37 weeks were 70.7% which was consistent with our study. The preterm

PROM observed were 29.3%.³ Biswas T *et al.* and Adeniji AO, Atanda OA also revealed nearly similar type 74 of findings belongs to gestational age.^{9,10}

In our study, it was observed that maximum patients (77%) reached the hospital within 6 hours of onset of PROM due to good booking status and increased awareness and education about PROM during antenatal visits. 98% patients were admitted to the hospital within 12 hours of PROM. While in a study done by Patil S. A. the average PROM to admission time was 9.6 hours.¹¹ In the study done by Neha Singh it was observed that 78% patients were admitted to the hospital within 12 hours of PROM with 44% in 6–11 hours of rupture of membranes.¹² 41.5% of cases were admitted within 6 hours of PROM and 33% within 6–12 hours in the study by Sailaja Surayapalem.¹³

Almost 63 (63%) cases were delivered vaginally either by spontaneous progress of labour or by induction and augmentation of labour whichever is needed. 36 (36%) cases were taken up for caesarean section while one was delivered by vacuum delivery. These findings are similar to a study done by Sailaja suggesting rate of LSCS being 27.5%.¹⁴⁻¹⁵ Maximum number of vaginal deliveries are observed in PROM cases specially in multigravida patients.¹⁶

Around 42% babies had good (>7) APGAR score while the other 58% had APGAR <7 at 5 minutes.¹⁷ 22 babies required NICU admission in our study. In our study, maximum babies (68%) had birth weight >2.5 kg. 3 babies were preterm and had birth weight <1.5kg who were conserved for 48 hours for the steroid coverage to be completed for the fetal lung maturity. 29% babies were in the group of birth weight 1.5–2.5 Kgs Findings of our study are also similar to the study done by Tigist Endale *et. al.*, in his study maximum participants (91.4%) had baby weight >2500 gms.¹⁷ Out of 100 babies delivered 22 (22%) babies needed NICU admission for various indications with respiratory distress being the most common, seen in 11 neonates (50%). Neonatal sepsis was seen in 7 neonates (31.8%). Neonatal jaundice was seen in 4 neonates (18.18%). The perinatal morbidity observed in the study by Sailaja was 26% which is similar to our study.¹⁵ The findings of our study were consistent with the findings of study done by Samay Singh having birth asphyxia as the commonest complication.¹⁸

Rupture of membranes subsequently leads to infections and jeopardizing the neonatal outcome and increasing the morbidity and mortality. In the study, it was observed that NICU admissions were observed in 15.3% patients with respiratory distress and sepsis being the commonest morbidity.¹⁹

In our study significant NICU stay of >15 days was observed in 40% patients out of which 31.81% of cases (7 cases) needed >30 days of NICU stay. Increased neonatal morbidity, low birth weight and sepsis leads to increased requirement of NICU in such cases. Despite high neonatal morbidity no mortality was observed in our study unlike other studies done universally. The major cause of neonatal mortality is observed to be birth asphyxia followed by sepsis.²⁰

Maximum neonates were discharged within 4 days of NICU admission.¹⁹

30 cases out of 100 had raised levels of serum CRP levels out of which 22 (73.3%) had neonatal complications. Remaining 70 cases had normal serum CRP levels. 5 neonates of normal maternal CRP levels had complications. It was observed that raised levels of maternal CRP were highly associated with neonatal complications which were proved statistically highly significant with *p-value*.

Maternal CRP levels were raised in 44% cases in a study done by Neha Singh and colleagues.²¹ In another study, it was observed that CRP was positive in 30.4% patients.²² C-reactive proteins also known as CRP is an acute phase reactant and rises in conditions with tissue trauma and inflammation. It is slightly raised during pregnancy and is not affected by the gestational age.

CONCLUSION

Raised maternal CRP is associated with neonatal morbidity. In our study, the association of raised maternal CRP with neonatal complications and adverse neonatal outcome is statistically significant. However, the PROM to delivery interval time showed no statistical significance in affecting the fetal outcome in these cases. This can be due to proper antibiotics coverage, monitoring and appropriate intervention in these cases.

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