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Original Article

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Descriptive Study of Risk Factors and Fetomaternal Outcomes following Premature Rupture of Membranes (PROM) at a Tertiary Care Centre

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ABSTRACT

Background: Premature rupture of membranes (PROM) is associated with maternal and perinatal complications, with 60% of cases occurring at term. This study aims to identify risk factors for PROM and analyze the mode of delivery and fetomaternal outcomes.

Methods: A prospective study was conducted at a Medical College and tertiary care hospital, including term patients with spontaneous rupture of membranes (PROM) and clear leak. Patients were assessed through history, clinical examination, and managed with antibiotics, labor induction, and partograph monitoring.

Results: The study highlights that 56.1% of patients with PROM were induced with prostaglandins, while 80% had normal vaginal deliveries. Fetal outcomes were generally favorable, with 92.2% requiring no resuscitation, though 7.8% required NICU admission. Spontaneous labor was more likely when the latent period was shorter than 12 hours.

Conclusion: Early diagnosis, evaluation, and individualized treatment of PROM are crucial for improving maternal and neonatal outcomes, with timely management reducing complications and enhancing care for both mother and baby.

Key-words: Premature rupture of membranes (PROM), Antenatal management, Neonatal outcome, Maternal morbidity, Latency period

INTRODUCTION

Premature rupture of membranes is such a condition in which there is a high risk of maternal and perinatal adverse outcomes. Premature rupture of membranes has an incidence of 5-10%. About 60% of cases of PROM occur at term.

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It causes maternal complications, increased operative procedures, neonatal morbidity, and mortality and hence is a significant event [1].

The management of premature rupture of membranes can range from expectant management to immediate intervention and termination of pregnancy. Amongst the varying degrees of concern in PROM, infection remains the most important. The preventive treatment requires further clarification of etiology, not yet fully understood [2,3]. PROM is defined as the spontaneous rupture of membranes at term and before the onset of active labour. The latent period of PROM is defined as the time from rupture of membranes to the onset of active labour [4].

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The diagnosis of PROM must be established to see the fetal and maternal outcome. Many times, the diagnosis is made just by visualization of the drainage of clear amniotic fluid from the cervix. It can be confirmed by laboratory tests like the detection of fern patterns. The principles of management include an accurate assessment of gestational age, confirmation of amniotic fluid leak, and to detect the presence of infection and timely delivery. Currently, a plan of active management is mostly accepted in the case of PROM. Active management includes measures targeting to prevention of infection and active intervention by induction of labour [5,6].

This study was conducted to identify the risk factors causing PROM, and to study the mode of delivery and fetomaternal outcome.

MATERIALS AND METHODS

Place of study- This observational study was conducted on patients presenting with spontaneous rupture of membranes (PROM) and admitted to a tertiary care center- Badwaik hospital in western Maharashtra for 1 year.

Inclusion Criteria

- Term patients with 37 completed weeks confirmed by dates and first-trimester ultrasound
- Singleton pregnancy
- Cephalic presentation
- Clear leak confirmed on per speculum examination

Exclusion Criteria

- Presentation other than cephalic
- Multifetal pregnancy
- Previous LSCS
- Polyhydramnios
- Meconium stained liqour

Sample Size- Sample Size was calculated from formula $n = 4pq/ d^2$. A total of 180 cases were included in the study after obtaining their written informed consent.

Research Design- A detailed history was taken for each patient, including months of amenorrhea, duration of leaking, the onset of labor pains (if applicable), and potential predisposing factors like previous PROM, cervical incompetence, cervical encirclage, cervicitis, vaginitis, or urinary infections. Socioeconomic status was assessed using the Kuppuswamy scale. The patients underwent thorough examinations, including general and systemic assessments, sterile speculum examinations, and per-vaginal examinations to evaluate cervical favorability, dilatation, and effacement, while ruling out cord prolapse. Clinical diagnosis of amnionitis was made in patients presenting with maternal or fetal tachycardia, maternal leukocytosis, uterine tenderness, or fever.

For management, all patients with PROM were started on antibiotics. In cases where PROM lasted more than 2 hours and the cervix was favorable, labor was induced with oxytocin. For patients with an unfavorable cervix, prostaglandin-induced agents were used. During active labor, the progress of labor was closely monitored using a real-time partograph to assess cervical dilatation, effacement, and the overall progress of labor.

Statistical Analysis- Data was statistically described in terms of mean (±SD), frequencies (number of cases), and percentages where appropriate. Appropriate graphs and tables were prepared to represent the study observations. Data collection was done using a standardized data collection tool and data was entered in Microsoft Excel 2021 and analyzed using Excel and Epi-Info 7.2.1.

RESULTS

In our study, 180 cases of PROM were observed across all age groups, with the highest incidence in the 21-25 years age group (38.9%), followed by 26-30 years (31.7%) and 31-35 years (17.8%). Cases were less frequent in those younger than 20 years (6.7%) and older than 35 years (5%).

In our study, the incidence of PROM was higher in primigravidas, who accounted for 56.1% of cases, while multigravidas constituted 43.9% of the study population (Fig. 1).

Ethical approval- Ethical approval was obtained from the institutional Ethics Committee.

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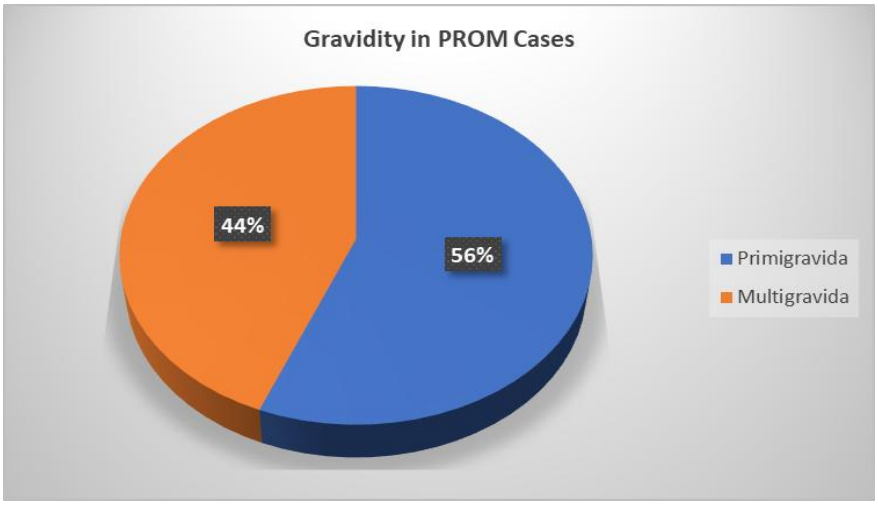

Fig. 1: Gravidity Wise Distribution in PROM Cases

In our study, suspected predisposing factors were relatively rare. A history of PROM was observed in 2.7% of cases, while genital tract infections were present in 2.2%. Urinary tract infections were noted in 3.9% of cases, and cervical incompetence was identified in 5% of the study population.

In our study, several factors were associated with cases of PROM. Fever during labor was observed in 11.7% of cases, while 10.6% had associated medical conditions such as gestational hypertension and hypothyroidism. Socioeconomic status varied, with 48.3% belonging to the upper middle class, 39.4% to the lower middle class, 7.2% to the lower class, 4.4% to the upper class, and 0.6% to the upper lower class. Inadequate maternal weight gain was noted in 2.2% of cases. Regarding maternal occupation, 82.2% were homemakers engaged in moderate work, while 5.5% were involved in sedentary jobs or heavy labor.

In our study, 45% of cases progressed to active labor within 6 hours of PROM, while 38.3% did so within 12 hours. Labor onset occurred between 13 to 24 hours in 15% of cases, whereas 1.1% took 25 to 48 hours. A delayed onset beyond 48 hours was observed in 0.6% of cases (Fig. 2).

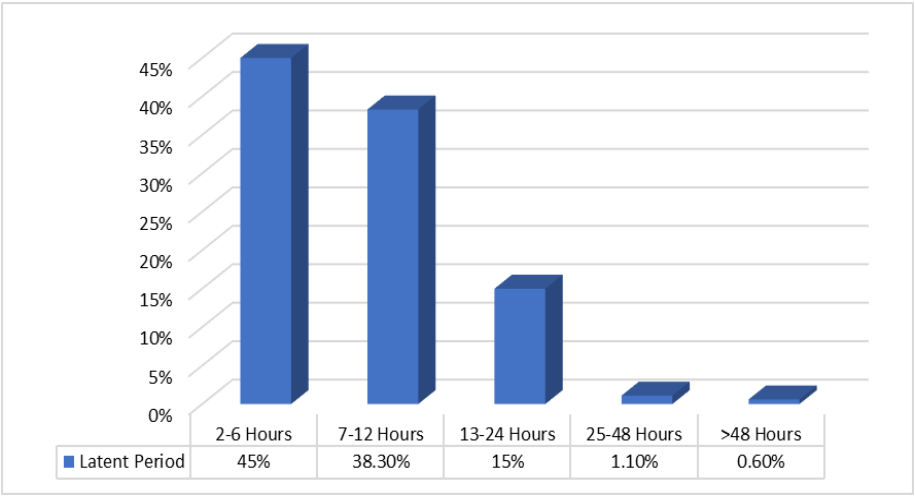

Fig. 2: Latent Period in PROM Cases

In our study, most patients (56.1%) underwent labor induction with prostaglandins, ensuring prompt initiation of uterine contractions. Spontaneous labor occurred in 36.1% of cases, while 7.8% required further induction with Syntocinon due to an inadequate response, underscoring the need for tailored management in PROM cases. In our study, 80% of patients had a normal vaginal delivery, while 17.2% required a cesarean section, primarily due to failed induction. Additionally, 2.7% of cases underwent vaginal delivery assisted by forceps (Table 1).

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Table 1: Mode of Delivery in PROM Cases

Mode of Delivery	Number	Percentage (%)
Normal Vaginal Delivery	144	80
LSCS	31	17.20
Vaginal Delivery by Forceps	5	2.80

In our study, the sex distribution of newborns was nearly equal, with 53.3% being female and 46.7% being male. In our study, 78.8% of babies had a birth weight greater than 2.5 kg, with 48.9% weighing between 2.5 and 2.9 kg and 33.9% exceeding 3 kg. Meanwhile, 15% had a birth weight between 2 and 2.4 kg, and 2.2% weighed less than 2 kg.

In our study, 91.7% of babies had a good APGAR score, while 8.3% had a poor score. Resuscitation and NICU admission were required in 7.8% of cases. Fever was observed in 16.1% of newborns, and neonatal sepsis occurred in 8.3%, with 3.3% testing positive for E. coli and other infections. There were no cases of fetal or neonatal death. Congenital anomalies were identified in three babies, including 1.1% with CTEV and 0.6% with fetal microcephaly.

In our study, chorioamnionitis was observed in 3.3% of cases, while 96.7% remained unaffected. Maternal leukocytosis was present in 25.6% of cases, indicating that a quarter of the mothers exhibited an elevated white blood cell count. These findings highlight the diverse factors associated with PROM, including maternal age, previous pregnancies, infections, and socioeconomic factors. The outcomes show a predominantly positive neonatal prognosis, with few complications.

DISCUSSION

Premature Rupture of Membranes (PROM) is a significant obstetric complication that contributes to increased maternal and fetal morbidity, mortality, and a higher incidence of operative deliveries. The present study evaluated risk factors associated with PROM and analyzed labor outcomes, maternal complications, and perinatal prognosis.

The highest incidence of PROM was noted in women aged 21–30 years, accounting for 70.6% of cases. This aligns with findings by Shrestha and Sharma [7], as well as Dasgupta *et al.* [8], who reported similar trends. The mean maternal age in this study was 28 years, slightly higher than the 25 years noted by Dasgupta and 22 years in Shrestha's study. This variation may reflect regional factors such as early marriages and reproductive practices.

Parity did not show a significant association with PROM in this study. Primigravidas comprised 56.1% of cases, and multigravidas 43.9%, comparable with findings from Begum *et al.* [10], who also observed no clear link between PROM and parity. However, Shivaraju *et al.* [11] reported a higher risk of genital tract infections among primigravidas, attributing this to increased sexual activity and associated infections, particularly in low socioeconomic groups.

Known risk factors such as a history of PROM, genital infections, urinary tract infections, and cervical incompetence were present in smaller subsets of the population. These findings align with Dasgupta *et al.* [8], who emphasized the role of microbial enzymes in weakening fetal membranes, leading to rupture. Nair *et al.* [9] also observed that bacterial exposure to membranes contributes to PROM, reinforcing the relevance of infection control in antenatal care.

Fever was observed in 11.7% of patients, like rates noted by Dasgupta and Nair. This correlation between maternal morbidity and latency period emphasizes the importance of timely antibiotic therapy and active management. Studies by Dasgupta *et al.* [8] reported increasing maternal fever rates with prolonged latency, consistent with our data.

In terms of occupation, most patients were housewives (82.2%), with no direct correlation observed between physical activity and PROM. However, socioeconomic status may play an indirect role. Nair *et al.* [9] found that PROM was more prevalent among lower socioeconomic groups, where infections, poor nutrition, and limited access to healthcare are common.

The latent period after PROM is a critical determinant of outcomes. In our study, 83.3% of patients entered active labor within 12 hours, and 98.3% within 24 hours. This rapid progression is a favorable finding when compared with other studies such as Dasgupta *et al.* [8], who noted labor onset within 24 hours in 80% of cases. Prompt admission and management may have contributed to shorter latency in our population.

Regarding delivery outcomes, 80% of women delivered vaginally, while 17.2% underwent cesarean section.

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These findings align with Shrestha *et al.* [7], who reported a similar cesarean rate of 27%, and Dasgupta's 14%. Cesarean deliveries in PROM are often attributed to failed induction or non-reassuring fetal status.

Neonatal outcomes were largely favorable. Approximately 91.7% of neonates had good APGAR scores, while 8.3% had scores <5 and required resuscitation. NICU admission was necessary in 7.8% of cases, particularly those with longer latency periods. These observations match the trends reported by Nair *et al.* [9]. Only one neonate presented with confirmed infection, and importantly, no perinatal deaths were recorded. In contrast, Dasgupta *et al.* [8] reported a perinatal mortality rate of 4.6%. Our lower complication rate is likely attributable to early diagnosis, antibiotic use, and NICU availability.

Maternal morbidity also increased with longer latency. Leukocytosis was noted in 46% of patients, with some progressing to sepsis. Infections such as chorioamnionitis and uterine tenderness were more frequent in patients with extended rupture durations. Shivaraju *et al.* [11] and Dasgupta *et al.* [8] similarly emphasized the direct relationship between PROM duration and infection risk.

Social and occupational determinants also played a role. Migratory farm laborers, as discussed by Swami *et al.* [12], often face higher maternal morbidity due to unstable healthcare access. These factors highlight the importance of community-based healthcare strategies.

In contrast to some studies reporting fetal or neonatal deaths, our study reported zero perinatal mortality. This outcome is likely due to effective prophylactic antibiotics and early neonatal interventions. The findings underscore the importance of timely referral and multidisciplinary care in managing PROM.

Overall, this study emphasizes that PROM-related complications can be minimized through early detection, routine antenatal checkups, infection screening, and active management. Ensuring access to institutional delivery and improving maternal education are essential steps to further reduce PROM-associated morbidity and mortality [13–20].

CONCLUSIONS

In conclusion, the findings from our study emphasize that the duration of PROM significantly affects both maternal and neonatal outcomes. As the latency period increases, the chances of complications such as maternal sepsis, neonatal infection, and the need for resuscitation increase. Early diagnosis, active management, and timely interventions are essential in reducing these risks and improving outcomes for both mother and baby.

CONTRIBUTION OF AUTHORS

Research concept- Prajakta Katti, Ajit Nagarsenkar
Research design- Shobhana Dangi, Amrut Arun Swami
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Data collection- Prajakta Katti, Ajit Nagarsenkar
Data analysis and Interpretation- Amrut Arun Swami
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Critical review- Prajakta Katti, Ajit Nagarsenkar
Article editing- Ajit Nagarsenkar, Shobhana Dangi, Amrut Arun Swami
Final approval- Shobhana Dangi, Amrut Arun Swami

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