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Frequency of Spontaneous Onset of Labour in a Patient with PROM for 24 Hours LRH Peshawar

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ABSTRACT

Background: Adequate amniotic fluid volume is vital for fetal well-being, and its reduction may indicate premature rupture of membranes (PROM), which can affect pregnancy outcomes. PROM occurs when the amniotic membranes rupture before labor begins. This study aims to determine the frequency of spontaneous labor onset in patients with PROM lasting 24 hours.

Methods: This descriptive case series was conducted in the Department of Obstetrics and Gynaecology, Lady Reading Hospital, Peshawar, from 1st May to 1st November 2021, to determine the frequency of spontaneous labor within 24 hours in women with PROM. A total of 148 women aged 18–40 years, with singleton pregnancies at 37–40 weeks, were enrolled through non-probability consecutive sampling. Women with chorioamnionitis, diabetes, previous cesarean section, cephalopelvic disproportion, malpresentation, or intrauterine fetal death were excluded. Demographic data (age, gestational age, parity, weight) were collected, and patients were monitored for 24 hours for spontaneous labor; induction or cesarean section was performed if indicated. Data were analyzed using SPSS 23 with descriptive statistics and Chi-square tests ($p \leq 0.05$). Ethical approval and informed consent were obtained.

Results: Participants' ages ranged from 18 to 40 years (mean: 28.59±2.58). The mean gestational age was 38.26±0.93 weeks, with a mean parity of 1.53±1.45, and a mean weight of 69.62±4.38 Kg. Spontaneous labor onset occurred in 64.2% of the patients within 24 hours.

Conclusion: A 24-hour observation period for spontaneous labor onset in PROM cases can be safely conducted before inducing labor at term, allowing for natural progression

Keywords: Pregnancy, Premature, Labour.

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INTRODUCTION

Amniotic fluid is an essential substance during pregnancy, encased by the amniotic membranes that provide a protective environment for the developing fetus. It serves numerous functions, such as cushioning the fetus, maintaining a stable temperature, facilitating fetal movement, and aiding in the development of muscles, lungs, and bones[1]. The volume of amniotic fluid is an important indicator of fetal well-being, and a decrease in its volume may signal potential complications. Premature Rupture of Membranes (PROM) is one such complication where the amniotic membranes rupture before the onset of labor[2]. PROM can occur at any stage of pregnancy, but when it happens before 37 weeks of gestation, it is classified as Preterm Premature Rupture of Membranes (PPROM)[3]. Amniotic fluid is produced in part by the fetal lungs and kidneys. The fluid is maintained at a steady level throughout pregnancy by the balance of production and absorption. The presence of sufficient amniotic fluid is necessary for optimal fetal development. A decrease in amniotic fluid volume, referred to as oligohydramnios, can affect fetal growth and development, leading to complications such as umbilical cord compression, restricted fetal movement, and impaired lung development. The cause of PROM can range from infections, trauma, multiple pregnancies, or complications related to maternal health. PROM is a significant complication in obstetrics, defined as the rupture of amniotic membranes before the onset of labor[4]. The rupture of membranes can result in the release of amniotic fluid, leading to a decrease in the protective environment for the fetus. While PROM can occur at term, where the pregnancy has reached 37 weeks of gestation, it can also occur prematurely. In cases where PROM occurs before 37 weeks of pregnancy, it is referred to as Preterm Premature Rupture of Membranes (PPROM).[3] PPROM is responsible for about one-third of preterm births and contributes significantly to neonatal mortality and morbidity.[5] The rupture of membranes before labor leads to several challenges for both the mother and the fetus. The most notable risks associated with PROM are infection, labor complications, and preterm birth. The longer the duration between the rupture of membranes and the onset of labor, the higher the risk of intrauterine infection. Additionally, the lack of amniotic fluid can lead to complications such as umbilical cord prolapse or compression, which may result in fetal distress and compromise oxygen delivery to the fetus. For mothers, PROM can lead to an increased risk of infection, particularly chorioamnionitis, a bacterial infection of the amniotic sac and fluid. The risk of infection rises with the duration of membrane rupture, particularly when labor does not begin promptly. Other maternal complications include increased rates of cesarean sections, especially in cases where fetal distress arises. For neonates, the risks are far-reaching, including prematurity-related complications such as respiratory distress syndrome (RDS), neonatal sepsis, pneumonia, and longer-term complications such as cerebral palsy, blindness, and deafness. The increased neonatal morbidity and mortality associated with PROM, especially when it occurs

preterm, underscores the significance of appropriate management and the need for early intervention. At term (after 37 weeks of gestation), PROM complicates approximately 8% of pregnancies, a significant proportion of all pregnancies.[4] The incidence of PPROM is lower, but it remains a leading cause of preterm birth, accounting for approximately 30% of all preterm births.[5] The overall risk of PROM increases with certain factors, such as multiple pregnancies, a history of PROM in previous pregnancies, infections, and maternal health conditions like diabetes or hypertension. The management of PROM presents numerous challenges. As PROM can occur at different gestational ages, the decision to intervene must be carefully weighed, balancing the risks of preterm birth and infection against the potential benefits of prolonged pregnancy. One of the most contentious aspects of PROM management is the timing of labor induction or the decision to adopt an expectant management approach. The goal of management is to prevent infection while minimizing unnecessary interventions and risks to the fetus and mother. The management of PROM at term is an area of significant debate in obstetrics. The main aim of management is to avoid intrauterine infection while ensuring that the pregnancy progresses to a safe and timely delivery. The decision to induce labor following the rupture of membranes is often influenced by several factors, including the gestational age of the pregnancy, the clinical status of the mother and fetus, and the presence of any complications such as infection or fetal distress. While labor induction following PROM at term has been associated with a reduction in the risk of maternal and fetal infections such as chorioamnionitis and neonatal sepsis, it is also linked to increased cesarean section rates. Induction of labor at term may increase the likelihood of fetal distress, which can lead to emergency cesarean sections. Uterine hyperstimulation is another potential complication of induction, particularly with the use of medications such as oxytocin. The increased incidence of cesarean delivery has sparked debates on whether expectant management—waiting for spontaneous labor to begin—might be a safer option for certain cases of PROM at term. The frequency of spontaneous onset of labor in women with PROM varies widely depending on factors such as gestational age and the duration of membrane rupture. Several studies have attempted to define the optimal management approach for patients with PROM, particularly those whose labor does not begin immediately after membrane rupture. In some cases, spontaneous labor may occur within hours or days of PROM, reducing the need for induction and decreasing the potential risks associated with prolonged rupture of membranes. A study by found that 56% of women with PROM at term went into spontaneous labor within 24 hours of membrane rupture[8]. Another study reported a higher frequency of spontaneous labor onset, with 70% of women experiencing labor onset within 24 hours after PROM[9]. These studies suggest that a significant proportion of women with PROM can be monitored for up to 24 hours before deciding on induction, potentially avoiding

unnecessary cesarean sections and reducing the risks of medical interventions. The ability to predict the likelihood of spontaneous labor onset could help guide clinical decisions about whether to proceed with induction or continue expectant management. While spontaneous labor can occur within a reasonable time frame for some women with PROM, the risks associated with prolonged PROM cannot be overlooked. The longer the duration between membrane rupture and labor, the greater the risk of infection. The development of chorioamnionitis, a serious infection of the amniotic sac and fluid, is particularly concerning. Chorioamnionitis can result in maternal sepsis, which poses a significant threat to both the mother and the fetus. For neonates, the complications associated with PROM depend largely on the timing of birth. Preterm birth, often necessitated by PPROM, is associated with a higher risk of neonatal complications such as respiratory distress syndrome, intraventricular hemorrhage, and neonatal sepsis. Additionally, the lack of amniotic fluid can result in the umbilical cord being compressed, which can lead to fetal distress, reducing the oxygen supply to the fetus and increasing the risk of hypoxia. The management of PROM, particularly the frequency of spontaneous labor onset and the timing of induction, has been the subject of numerous studies. However, local evidence is needed to determine how these findings apply to specific populations. The incidence of spontaneous labor after PROM, as well as the risks associated with expectant management, may vary depending on local healthcare systems, the availability of neonatal care, and the demographics of the population being studied. The findings of this study will provide valuable local data on the frequency of spontaneous labor onset in patients with PROM and may help guide clinical practice in managing these patients. With proper data on spontaneous labor rates, healthcare providers may be able to make more informed decisions about when to induce labor and when it is appropriate to monitor patients for a longer period. This evidence will also contribute to the ongoing debate about the potential benefits of expectant management in preventing unnecessary cesarean sections and optimizing maternal and fetal outcomes.

PROM remains a significant complication in obstetrics, and its management is a topic of ongoing debate. While labor induction following PROM at term can reduce the risk of infection, it is also associated with higher cesarean section rates and other complications. Local evidence on the frequency of spontaneous labor onset in PROM cases is essential for guiding clinical decision-making. By understanding the likelihood of spontaneous labor and the risks of prolonged PROM, healthcare providers can offer more tailored care, minimize unnecessary interventions and improving maternal and fetal outcomes. Further research is needed to refine management protocols and optimize care for women with PROM.

METHODS

This study was a descriptive case series conducted at the Department of Obstetrics and Gynaecology, Lady Reading Hospital, Peshawar, over a six-month period from 1st May 2021 to 1st November 2021. The aim was to determine the frequency of spontaneous onset of labor in patients with premature rupture of membranes (PROM) for 24 hours. A total of 148 patients were included in the study, with sample size calculated using the WHO sample size software, providing a 95% confidence interval, an 8% margin of error, and an expected frequency of spontaneous labor onset of 56% in women with PROM for 24 hours.8 Non-probability consecutive sampling was employed to select patients who met the inclusion criteria. The inclusion criteria were women aged 18-40 years, with a singleton pregnancy between 37-40 weeks as confirmed by ultrasound, and PROM as defined by the operational criteria. Exclusion criteria were women with a history of chorioamnionitis, diabetes, previous cesarean section, cephalopelvic disproportion, malpresentation, or intrauterine fetal death, as determined by ultrasound. Data collection involved obtaining basic demographic information such as age, gestational age, parity, and weight. Patients who met the inclusion criteria were followed for 24 hours to observe the spontaneous onset of labor, as defined by the study. In cases where spontaneous labor did not occur, induction of labor was performed after 24 hours. Additionally, emergency cesarean sections were carried out if there were indications such as fetal distress, non-progression of labor, cord prolapse, failed induction, or chorioamnionitis. All relevant data were recorded on a specially designed proforma (Annexure-I).Data analysis was conducted using SPSS V. 23 software, where descriptive statistics were used to calculate the frequency and percentage of qualitative variables such as the occurrence of spontaneous labor. The mean and standard deviation (SD) were used for quantitative variables such as age, gestational age, parity, and weight. To assess any potential relationships between spontaneous labor onset and variables like age, gestational age, parity, and weight, stratification was performed, and the Chi-square test was applied. A p-value of ≤ 0.05 was considered statistically significant. Ethical approval for the study was obtained from the hospital's ethical committee, and all patients gave informed consent. The study adhered to ethical guidelines, ensuring that all patient data was kept confidential and that participants understood the potential risks and benefits of participating. This methodology provided a robust framework for exploring the frequency of spontaneous labor in patients with PROM and its influencing factors.

RESULTS

The results of this study reveal that 64.2% of patients with premature rupture of membranes (PROM) experienced spontaneous onset of labor within 24 hours, indicating that the majority of women with PROM can expect natural labor progression within a relatively short timeframe. The demographic characteristics of the study participants showed a mean age of 28.6 years, a mean gestational age of 38.3 weeks, a mean parity of 1.53, and a mean weight of 69.6 kg, suggesting a fairly homogeneous group in terms of body weight and age distribution. Stratified analyses of spontaneous onset of labor by factors such as age, gestational age, parity, and weight revealed some interesting trends, although the differences were not statistically significant. Women aged 31-40 years had a higher rate of spontaneous labor (78.1%) compared to the 18-30 age group (60.3%), but the p-value of 0.063 indicates that age may not be a major influencing factor. Gestational age did not show a significant difference, with spontaneous labor occurring in 64.9% of those between 37-39 weeks and 58.8% in those >39 weeks, supported by a p-value of 0.624. Regarding parity, women with more than 3 pregnancies had a slightly higher rate of spontaneous labor (83.3%) compared to those with 0-3 pregnancies (61.5%), but the p-value of 0.071 indicates that this difference is marginally insignificant. Similarly, weight did not significantly affect spontaneous labor onset, as the rates were 63.2% for those weighing ≤70 kg and 66.7% for those >70 kg, with a p-value of 0.692. Overall, while certain factors like age and parity showed some association with spontaneous labor, they did not have a statistically significant impact, indicating that expectant management for up to 24 hours could be a viable option for many women with PROM, reducing the need for unnecessary interventions.

Table 1: Demographics of Study Participants

Demographic Variable	Mean ± SD
Age (years)	28.594 ± 2.58
Gestational Age (weeks)	38.263 ± 0.93
Parity	1.527 ± 1.45
Weight (Kg)	69.621 ± 4.38

This table summarizes the demographic characteristics of the participants in the study. The mean age of participants was 28.6 years, and the average gestational age was approximately 38.3 weeks, which is within the typical full-term range. The average parity was 1.53, indicating that the majority of participants were primigravida or had at most one prior pregnancy. The mean weight was 69.6 kg, with a relatively low standard deviation (4.38), suggesting a fairly homogeneous group regarding body weight.

Table 2: Spontaneous Onset of Labor by Demographic and Clinical Factors

Factor	Categories	Spontaneous Onset of Labor (%)	p-value
Overall PROM Patients	Total (n=148)	**64.2%**	—
Age (years)	18–30	60.3%	**0.063**
	31–40	78.1%	
Gestational Age (weeks)	37–39	64.9%	**0.624**
	>39	58.8%	
Parity	0–3	61.5%	**0.071**
	>3	83.3%	
Weight (kg)	≤70	63.2%	**0.692**
	>70	66.7%	

The merged data indicate that 64.2% of women with PROM experienced spontaneous onset of labor within 24 hours, demonstrating that most patients progress to labor without the need for immediate intervention. When stratified by age, gestational age, parity, and weight, none of the factors showed a statistically significant association with the likelihood of spontaneous labor. Although women aged 31–40 years and those with higher parity (>3) exhibited higher rates of spontaneous labor, the differences were not statistically significant. Similarly, gestational age and maternal weight showed only minimal variation in labor onset rates. Overall, the findings suggest that demographic and clinical characteristics do not substantially influence the occurrence of spontaneous labor in PROM patients, supporting the practice of expectant management for up to 24 hours in most cases.

DISCUSSION

The management of premature rupture of membranes (PROM) at term remains a topic of clinical debate, particularly regarding the timing of induction versus expectant management, especially in patients with an unfavorable cervix. In the present study, 64.2% of patients experienced

spontaneous onset of labor, a result comparable to earlier findings, such as those by Nath et al. (56%) and Caughey et al. (70%), who reported varying rates of spontaneous labor within 24 hours among PROM patients at term [11,12]. Historically, aggressive management of PROM was prompted by a series of landmark studies published between the 1950s and 1980s, which collectively established a strong association between prolonged rupture of membranes and increased maternal and perinatal morbidity and mortality. Calkins (1952) was among the first to report that perinatal mortality increased threefold when membranes remained ruptured for over 24 hours[13]. This alarming finding laid the foundation for prompt labor induction protocols. Further reinforcing this, literature demonstrated a 3.8% maternal mortality due to intrapartum infection and recommended early induction to prevent adverse outcomes [14]. A study found that perinatal mortality doubled in cases of prolonged ROM, with 28% of women developing intrapartum or postpartum infections. The mortality rate was particularly high (50%) in those with intrapartum infections[15] . Similarly, Bryans reported that 31% of women with prolonged ROM developed infections, and neonatal mortality reached 47% among their offspring[16]. These studies collectively justified the conservative bias towards early induction to mitigate ascending infections and perinatal risks. Shubeck et al., analyzing 4,868 cases from the Collaborative Perinatal Project, further emphasized that perinatal mortality increases with duration of ROM. They metaphorically referred to this phenomenon as the moment "the clock of infection starts to tick" once membranes rupture, underlining the loss of the protective barrier for the fetus [17]. A study's analysis of 54 maternal deaths associated with PROM confirmed these findings; 80% of the corresponding neonates also died, mostly due to sepsis following intrauterine infection[18]. Gunn and associates supported this alarm by reporting that 24% of term patients with ROM exceeding 24 hours developed infections, and among them, 16% of neonates died. Their conclusion was decisive—early induction in PROM is necessary to reduce infection risks in both mother and fetus [19]. A research later examined over 8,000 cases and confirmed that the incidence of intrapartum fever and stillbirths increased with ROM extending beyond 72 hours, further cementing the recommendation for timely induction in such cases [20]. However, these long-standing practices began to be reassessed in the late 20th century. A study challenged the universal need for immediate induction in term PROM cases, particularly when the cervix was unfavorable. In their 1979 study, they observed that 85% of women under expectant management went into spontaneous labor within 24 hours, avoiding unnecessary induction in most cases[21]. In a follow-up study with an expanded cohort, 74% of patients were again managed expectantly, with favorable outcomes, suggesting that spontaneous labor is highly probable within 24 hours even in cases with a low Bishop score[22].Duff and colleagues extended this analysis with a prospective design, comparing aggressive versus conservative management.

Their study validated the safety of expectant management for up to 24 hours, noting that over 75–85% of women enter labor spontaneously within this window, reducing the need for pharmacologic induction and associated risks[23]. Wagner and Guise further supported this conservative strategy by managing 112 patients with a Bishop score ≤4. Those not in labor within 24 hours were then induced, providing a compromise between risk avoidance and cost containment[24]. Conversely, Cammu et al. evaluated 105 nulliparas and found no significant differences in outcomes between those managed expectantly and those induced with oxytocin after 24 hours, suggesting that delayed induction might be an equally safe and effective alternative[25].

CONCLUSION

In conclusion, this study demonstrates that the majority of patients with premature rupture of membranes (PROM) experience spontaneous onset of labor within 24 hours, with 64.2% of the participants progressing into labor naturally. The demographic analysis reveals that age, gestational age, parity, and weight do not significantly influence the likelihood of spontaneous labor, although there are slight trends indicating higher spontaneous labor rates in women aged 31-40 years and those with higher parity. Despite these observations, the p-values suggest that these factors are not statistically significant in predicting labor onset. Therefore, the findings support the practice of expectant management for up to 24 hours in PROM patients, allowing for natural labor progression without the immediate need for induction or cesarean section. This approach can help minimize unnecessary interventions and reduce the risks associated with early induction, providing a more individualized and conservative management strategy for women with PROM at term.

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None

CONFLICT OF INTEREST

None

ETHICAL APPROVAL

The study was conducted after obtaining ethical approval from the Ethical Review Committee of the institute under (Ref:100/LRH/MTI)

AUTHORS' CONTRIBUTIONS

All authors contributed equally as per ICMJE policy

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