

Frequency Of Feto-Maternal Outcomes In Prelabour Rupture Of Membranes

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Abstract

Objective: To determine the frequency of fetomaternal outcomes in patients with prelabour rupture of membranes presenting to tertiary care hospitals.

Methods: A descriptive study was conducted at the Department of Obstetrics and Gynaecology, Fauji Foundation Hospital, Rawalpindi from 25th March 2023 to 25th January 2024

A total of 245 patients with prelabour rupture of membranes (PROM) were included in the study, fulfilling the inclusion criteria. All patients were managed as per standard protocol and followed until delivery. Data regarding fetomaternal outcomes was noted.

Results: This study found that the mean age of the patients was 29.89 ± 5.83 years. Among 245 patients of PROM, in 160 cases maternal and in 90 instances fetal complications were observed. As per maternal outcomes, 93 (58%) underwent cesarean section, puerperal sepsis was observed in 31 (19%) and 36 (23%) wound site infections occurred. On the neonatal side, 29(32%) had low APGAR scores while 26 among 90 (29%) had low birth weight. NICU admission was necessary in 21 (23%) babies while fetal distress was recorded in 14 (16%) newborns.

Conclusion: Our study has concluded that a considerable proportion of patients with PROM experienced fetomaternal complications. Among maternal complications, it is observed that a significant number of pregnant women with PROM required cesarean sections. This warrants a careful and timely management of such cases to ensure good fetal outcomes.

Keywords: Fetal membranes, Premature rupture, Fetal distress, Puerperal infection, Cesarean section

Introduction

Prelabour rupture of the membranes (PROM) is defined as loss of amniotic fluid before the start of labour and is characterized as a painless flow of fluid out of the vagina.¹ The magnitude of PROM varies in different countries and populations. Its worldwide prevalence ranges from 5% to 15% of all pregnancies. Regardless of its occurrence in low or high-income countries, PROM is considered an important and notable reason for maternal, perinatal and neonatal morbidity and mortality.²

Though the precise cause of PROM is unidentified, nonetheless different studies proposed various possible causes. They include the ethnicity of pregnant women, below average BMI, h/o infections involving the genitourinary system, smoking, poor socioeconomic status, current or previous history of maternal depressive disorders, and use of assisted fertility techniques.^{3,4} Amongst them, infections involving endometrial lining, premature ageing of cells and DNA damage caused by oxidative stress are major susceptible factors.³

PROM is a notable cause of perinatal morbidity and mortality. Its impact ranges from affecting the well-being of mothers and newborns to economic loss at the national level due to drug

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D.S, N.A.B - Conception of study
- Experimentation/Study Conduction
D.S, N.A.B, S.I, A.F, A.R -
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expenditure, cost of health professionals, prolonged hospital stays and absence from the workplace.⁵

Rupture of membranes, if occurs before 37 weeks, is considered one of the chief reasons for pre-term births both spontaneous & induced and its associated complications, so considering this impact, several epidemiological studies and clinical trials have been conducted. The complications in mothers associated with prelabour rupture of membranes are accelerated risk of chorioamnionitis that leads to a rise in caesarean section rates also post-delivery incidence of PPH and endometritis.⁶ Regarding babies, there is an increased risk of cord prolapse, pre-maturity, and sepsis that can lead to fetal distress and fetal demise. It is also noted that earlier the gestational age at the time of rupture of membranes is directly proportional to the complications.⁶

A study conducted by Endale T et al. has shown that the frequency of puerperal sepsis was 11.4%, wound site infection 6%, low Apgar score 23.8%, low birth weight 9.7%, and NICU admission was 25.4% in cases of PROM.⁷ In another study by Nagaria T, et al. has shown that the frequency of C-sections was 32%, low birth weight was 30.2%, Low Apgar score was 10.83%, puerperal sepsis 71.43% and wound site infection was 75.67% in PROM cases.⁸ In another study by Fahmy AM, et al. has shown that frequency of fetal distress was 88% in preterm prelabour rupture of membranes.⁹

The irony is that despite tremendous advancement in the past few years care provided to pregnant women and babies, still in cases of PROM fetal outcome remains a frustration to date.¹⁰ Especially in developing countries like Pakistan it is associated with remarkably high maternal and neonatal mortality rates.¹¹ PROM has vital significance for the further course and outcome of pregnancy. Late diagnosis and management in such cases leads to missing the chance for suitable and timely interventions. Hence, this study aims to find out the frequency of fetomaternal outcomes in pregnant women at term presented with prelabour rupture of membranes. This will help manage these cases and prevent such complications through timely interventions..

Materials And Methods

A descriptive study was conducted at the Department of Obstetrics and Gynaecology, Fauji Foundation Hospital, Rawalpindi from 25th March 2023 to 25th January 2024

A total of 245 patients with prelabour rupture of membranes (PROM) were included in the study. The sample size was calculated using WHO sample size software, 95% confidence level and a 3% margin of error with the expected frequency of wound site infection by 6% in prelabour rupture of membranes.⁷ Non-probability consecutive sampling was done. The diagnosis of PROM was made if any one of the following conditions was present in pregnant ladies at term before the start of labour pains, sudden gush of fluid leaking from the vagina, recurrent dampness or constant leaking with liquor seen on pad or undergarment or a speculum examination revealing liquor pooling in the upper vagina or trickling through the cervical os which will further increase by coughing or straining (Valsalva manoeuvre).

Women aged 18 to 40 years with singleton pregnancy on ultrasound having a gestational age 37 to 41 weeks on LMP of any parity and having Prelabour rupture of membranes as per operational definition were included in the study.

Women in labour or uterine contractions <1 hour of rupture of membranes or having a cervical dilatation >3cms by digital examination, previous caesarean section on medical record with malpresentation on ultrasound and contracted pelvis/cephalopelvic disproportion on physical examination were excluded from the study.

Fetomaternal outcomes were in terms of

C-section: A cesarean section was done to deliver a baby through the abdomen with a 6- to 7-inch-long horizontal incision through the skin

Puerperal sepsis: It was defined as three or more of the following present

- Fever (oral temperature 38.5°C/101.3°F or higher on any occasion by thermometer).
- Pelvic pain (visual analogue score>3).
- Abnormal smell/foul odour of vaginal discharge.

Wound site infection: It was defined as the presence of erythema of greater than 1cm from the wound margin, tenderness on palpation and the presence of sero-sanguinous or purulent discharge on physical examination in post-operative patients who underwent cesarean section.

Low Apgar score: It was defined as Apgar score at 5 minutes after delivery ≤ 5

Low birth weight: It was defined as the weight of a fetus or newborn at birth of less than 2500 g on a weighing machine.

NICU admission: It was defined as neonate admission to the NICU due to fetal distress.

Fetal Distress: Fetal distress was determined by an abnormal fetal heart rate pattern heart rate (greater than 160 bpm heart rate or less than 120 bpm heart rate) diagnosed by auscultation and continuous electronic fetal monitoring (EFM).

Patients from the Department of Obstetrics and Gynaecology, Fauji Foundation Hospital, Rawalpindi were evaluated and selected according to inclusion and exclusion criteria. Patients were explained the risks/benefits of the study and informed consent was taken before inclusion. Approval from the institutional Ethical Committee was obtained.

Basic demographics like age, gestational age, and duration of PROM were noted.

All patients were managed as per standard protocol and were followed till delivery. The departmental standard protocol is to induce the patients after informed consent who presented with PROM.

Data regarding fetomaternal outcomes (C-section, Puerperal sepsis, Wound site infection, Low Apgar score, Low birth weight, fetal distress and NICU admission) was noted as per operational definition by the researcher herself on specially designed proforma.

Data was entered and analyzed using IBM-SPSS version 25. Quantitative variables like age, gestational age, parity, and duration of PROM were measured as mean and standard deviation. Categorical variables like C-section, Puerperal sepsis, wound site infection, Low Apgar score, Low birth weight, fetal distress and NICU admission were measured in terms of frequency percentages. Fetomaternal outcomes were stratified by age, gestational age, parity, and duration of PROM. Post-stratification chi-square test was applied $p \leq 0.05$ was considered statistically significant.

Results

The mean age of the patients with prelabour rupture of membranes included in this study was 29.89 ± 5.83 days and mean parity was 2.39 ± 1.99 . The mean gestational age of patients was 38.93 ± 1.35 weeks and the mean duration of prelabour rupture of membranes (PROM) was 21.079 ± 7.89 hours. These demographic details are presented in Table 1 below.

Table 1: Mean $\pm$ SD of patients according to age, gestational age, parity and duration of premature rupture of membranes (PROM).n=245

Demographics	Mean $\pm$ SD
Age(days)	29.89 $\pm$ 5.83
Gestational age (weeks)	38.93 $\pm$ 1.35
Parity	2.39 $\pm$ 1.99
Duration of PROM (hours)	21.079 $\pm$ 7.89

If we talk about the mode of delivery in these patients, then 93 out of 245 (38%) underwent cesarean section while 62% of patients (152 out of 245) delivered vaginally. This is presented in Table II below. C-sections were also more frequent when PROM lasted ≤ 24 hours 59 (63.4%) compared to >24 hours 34 (36.6%), with a p-value of 0.510.

Table 2: Frequency and %age of patients according to mode of delivery.n=245

Mode of delivery	Frequency	%age
Caesarean section	93	38%
Vaginal delivery	152	62%
Total	245	100%

Regarding feto-maternal outcomes, 160 (65%) patients experienced maternal complications out of 245. Out of these 160 patients, 93 (58%) underwent cesarean section, puerperal sepsis was observed in 31 (19%) and 36 (23%) wound site infections occurred. The maternal outcome frequencies and percentage is presented in Table 3 below:

Table 3: Frequency and %age of patients according to maternal outcomes

Outcome	Frequency	Percentage
Cesarean section	93	58%
Puerperal sepsis	31	19%
Wound site infection	36	23%
	160	100%

Now if we consider fetal outcomes, 90 babies out of 245 (37%) experienced fetal outcomes. Among these 90 babies, 29(32%) had low APGAR scores while 26 among 90 (29%) had low birth weight. NICU admission was necessary in 21 (23%) babies while fetal distress was recorded in 14 out of 90 (16%) newborns. These fetal outcomes are presented in Table 4 below:

Table 4: Frequency and %age of newborns according to fetal outcomes

Fetal outcomes	Frequency	Percentage
Low APGAR score	29	32%
Low birth weight	26	29%
NICU admission	21	23%
Fetal distress	14	16%
Total	90	100%

In terms of stratification, cesarean sections were found to be more frequent in patients aged 18-30 years (42.4%) as compared to those over 30 years of age (32.1%), with a p-value of 0.097. and the stratification of cesarean section concerning gestational age revealed that 40.4% of women underwent cesarean sections whose gestational age was between 37-39 weeks as compared to 33.7% in those beyond 39 weeks, with a p-value of 0.300. (Table 5).

Table 5: Stratification of C-Section concerning the age of patients and their gestational age

		Cesarean Section (n)		Cesarean Section (%age)		P value
		Yes	No	Yes	No	
Age (years)	18-30	59	80	42.4%	57.6%	0.097
	>30	34	72	32.1%	67.9%	
	Total	93	152	38%	62%	
Gestational age (weeks)	37-39	63	93	60.4%	59.6%	0.300
	>39	30	59	33.7%	66.3%	
	Total	93	152	38%	62%	

Discussion

In our study, patients' mean age was 29.89 years, mean parity was 2.39 and the mean gestational age at which they presented was 38.93 weeks. The average duration of PROM was 21.079 hours. These findings reflect a typical population of pregnant women experiencing prelabour rupture of membranes, with most patients exhibiting common gestational age, range and parity. The mean duration of PROM suggests that these cases were managed promptly, which is vital in curtailing potential complications in such cases. A study by Kasliwal et al. also endorsed that the risk of neonatal morbidity increases as the duration of PROM to delivery interval increases and the mean duration in their study was 18.74 hours.¹²

A significant portion of the patients i.e. 93 among 245 underwent a cesarean section. C-sections are typically considered when labour does not progress adequately or when there are signs of fetal distress or maternal complications. The slightly higher rate of C-sections in younger patients and those with shorter PROM duration might reflect a more cautious approach in managing younger mothers or those with early labour onset.

The occurrence of puerperal sepsis in 31 out of 245 patients is a significant finding. Sepsis rates were slightly higher in older patients and those with prolonged gestation. Prompt management of PROM and timely delivery are crucial in reducing the risk of sepsis. Wound site infections were observed in 36 out of 245 of the cases, particularly among younger mothers and those with earlier gestational ages. This may be due to the surgical intervention required in these cases, such as C-sections, which carry a risk of infection. The slightly higher incidence in younger patients might reflect differences in tissue healing and immune response.

The findings of our study are also reinforced by a study conducted by Chandra et al. to estimate the incidence of unfavourable maternal outcomes in cases of PROM. The study showed that the incidence of fever was 67.3%, puerperal sepsis 12.3%, wound infection & PPH 6.1% and lower respiratory tract infection & urinary tract infection both 4.1%.¹³

Among fetal outcomes, our study found that 29 out of 245 newborns had a low APGAR score, indicating that these infants required immediate medical attention after birth. Low birth weight was observed in 26 of the 245 newborns, which is a common outcome in cases of PROM due to the potential for premature delivery. Almost similar results were shown in a study done by Wijaya et al., among newborns < 1 kg birth weight was observed in 4.8% and between 1.5 -2.5kg were 84.5% of newborns.¹⁴

Among other fetal outcomes, our study shows that 21 newborns required NICU admission and fetal distress was recorded in 14 out of a total of 245 newborns. A multicenter study including 7019 pregnancies with PROM showed that newborns encountered neonatal sepsis and pneumonia most commonly. Duration of rupture of membranes significantly affected the frequency of early onset pneumonia. It is observed in that study that when the interval between PROM to delivery was more than 16 hours, the babies born were at higher risk of developing pneumonia.¹⁵

In another study by Rana et al.,¹⁶ they investigated the fetomaternal outcomes in cases of preterm cases between 24 to 36 weeks in which rupture of membranes occurred. The study was conducted in New Delhi India and involved 150 pregnant women who were conservatively managed. The study aimed to assess the duration from membrane rupture to delivery, the rate of natural labour, and the incidence of complications such as chorioamnionitis, postpartum sepsis, and neonatal outcomes. It is noted in the study that as the gestational age increases, the mean period from membrane rupture to delivery decreased, from 15.13 ± 10.9 days at 24-28 weeks to 2.1 ± 0.1 days at 34-36 weeks. The rate of spontaneous labour increased significantly with gestational age, from 67% at 28-32 weeks to 86% at 34-36 weeks ($p = 0.001$). The commonest complications included chorioamnionitis (6.6%), postpartum sepsis (6%), and neonatal sepsis (5%). The study found that perinatal mortality was 9.3%, with a higher mortality rate of 73% at 24-28 weeks, which decreased to 0% at 32-36 weeks. The study concluded that managing such cases with antibiotics and steroids is generally useful, but in the case of chorioamnionitis, early delivery should be considered.

Khan et al,¹⁷ carried out a study on pregnant women with premature rupture of membranes at term and recorded data regarding different maternal and fetal outcomes. This was a cross-sectional descriptive study that was conducted at Hayatabad Medical Complex, Peshawar, and included 241 women who experienced spontaneous PROM at term. The study found that maternal complications occurred in 60 out of 241 patients (24.9%), including wound infection (46.7%), oligohydramnios (26.6%), puerperal pyrexia (11.7%), and chorioamnionitis (15%). Fetal complications were observed in 145 out of 241 cases (60.16%), including respiratory distress syndrome (53.8%), hyperbilirubinemia (24.1%), neonatal sepsis (16%), and necrotizing enterocolitis (6.2%). The study also noted that 56.01% of deliveries were cesarean sections, primarily due to fetal distress and chorioamnionitis. The mean age of pregnant women included in the study was 28 ± 4.49 years, and their gestational age (mean) was 38 ± 1.04 weeks. The study concluded that conservative management of PROM at term carries significant risks for both mother and baby, recommending early delivery to avoid severe complications.

A study, published in the Cureus journal,¹⁸ investigated the effect of PROM on different fetomaternal outcomes in a tertiary care centre. The study included 100 pregnant women with PROM to primarily evaluate the effectiveness of conservative versus active management approaches. The study found that conservative management was generally safe and beneficial when combined with appropriate antibiotic and steroid therapy, reducing the incidence of neonatal sepsis (5%) and respiratory complications (5%). However, the study also noted that early intervention was necessary in cases of infection or fetal distress, with cesarean sections performed in 4% of cases due to fetal distress. The study stresses the vital role of monitoring and on-time intervention to guarantee good maternal and fetal outcomes.

Conclusions

Our study has concluded that managing pregnancies complicated by prelabour rupture of membranes presents significant challenges due to the high incidence of adverse feto-maternal outcomes. A considerable proportion of patients required cesarean sections, reflecting the complexities and risks associated with this condition. Additionally, maternal complications such as puerperal sepsis and wound site infections were prevalent, highlighting the increased vulnerability of these patients to postpartum infections and the need for careful postoperative care.

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