Advanced Medical Journal, Vol.9, No.1, P.127-134,2024 https://doi.org/10.56056/amj.2024.244

Optimum Mode of Delivery in Gestations Complicated by Preterm Premature Rupture of Membrane During 32-37 weeks of Gestation

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Abstract

Background and objectives: Preterm premature rupture of membrane is amniotic fluid leakage due to fetal membrane rupture before 37 gestational weeks. The aim was to know the optimum mode of delivery in pregnant women with preterm premature rupture of membrane.

Methods: A prospective observational study was performed on 50 pregnant ladies with a gestational age of 32-37 weeks with preterm premature rupture of membrane admitted to the Sulaimani Maternity Teaching Hospital from June 2021 to June 2022. Demographic features, medical history,mode of delivery and neonatal outcome were recorded .

Results: The mean±SD (standard deviation) of maternal ages was 27.2±5.8 years (ranging from 16 to 38). The mean±SD of gravidity, parity, and abortus was 2.9±1.95, 1.6±1.7, and 1.4±0.6, respectively. The associations of women's age, residency, occupation, educational level, parity, and past medical history with mode of delivery were statistically insignificant (p-values of >0.05). The association of the indications of C/Ss with the delivery outcome was statistically significant (p-value of <0.001). The associations of gestational ages at rupture and birth did not affect the delivery outcome (p-values of >0.05). Besides, the fetal outcome did not affect the delivery outcome, except for fetal gender significantly (p-value = 0.05) affected the delivery outcome.

Conclusions: The associations between indications of cesarean section and fetal gender with mode of delivery were statistically significant in pregnant women with preterm premature rupture of membrane between 32-37 gestational weeks.

Keywords: Fetal outcome,Gestational age,Leakage of the amniotic fluid,Preterm premature rupture of membrane.

Introduction

Premature rupture of membrane (PROM) is the leakage of amniotic fluid due to fetal membrane rupture at least one hour before the onset of labor, irrespective of gestational age.[1-13] The

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PROM occurs in 2-25% of all pregnancies ;however, PROM prior to 37 gestational weeks is called preterm PROM(PROM),and it is of all pregnancies. [2,3,10,11,14-18] Further,about 30-40% of PPROM is associated with preterm deliveries, which cause significant mortality and morbidity.[1,2,14]

Preterm delivery is classified as spontaneous preterm delivery because of the spontaneous onset of labor, or PROM, and PPROM contributes to one-third of all preterm deliveries.[20,21] Moreover, the World Health Organization (WHO) classifies the PPROM into the pre-viable preterm period (<24 gestational weeks), the extreme preterm period (24-28 gestational weeks), the very early preterm period (28-31 gestational weeks), the moderate preterm period (32-34 gestational weeks), and the late preterm period (35-37 gestational weeks).[22]

Many PPROM complications must be considered while managing PPROM, including fetal prematurity, the principal issue to the fetus, and infection, the principal risk to the mother.[2] Further, prematurity in PPROM can result in cord prolapse, umbilical cord compression due to oligohydramnios, placenta abruption, and chorioamnionitis.[2] Also, chorioamnionitis causes significant maternal and neonatal complications, like bronchopulmonary dysplasia, early onset neonatal sepsis, periventricular injuries, and intraventricular hemorrhage.[2] Worldwide, preterm fetuses constitute 50% of neonatal deaths, and who survive is associated with long-lasting neurodevelopmental disabilities.[20]

Conservative or expectant management of pregnant women with PPROM before 34 weeks of gestation can be beneficial; however, managing PPROM between 32-37 gestational weeks is a controversial problem.[2,21] Additionally, immediate induction of labor in PROM after 37 gestational weeks is beneficial because the fetus is already mature[2]. Besides, intentional delivery of PPROM by cesarean section (C/S) removes the fetus from a pro-inflammatory intrauterine environment, or waiting to deliver the preterm fetus by vaginal delivery (VD) adversely affects the outcome.[2,3] However, it is a challenging condition in the current obstetrical practice to manage PPROM because there are still controversies about optimal timing and method of delivery to reduce maternal and neonatal complications.[3,23]

The current study aimed to know the optimum mode of delivery in pregnant women with PPROM between 32-37 weeks of gestational age, i.e., the moderate to late preterm period, as WHO classified it.[22]

Patients and methods

A prospective observational study was performed on 50 pregnant women admitted to the Sulaimani Maternity Teaching Hospital from June 2021 to June 2022. The women were randomly selected by using a simple random sampling method.

The Ethical Committee of the Kurdistan Higher Council of Medical Specialties (KHCMS) approved the study proposal (No. 1182, September 8, 2021), and a formal acceptance letter was obtained from the Sulaimani Maternity Teaching Hospital before starting the study. Also, the women gave informed consent for their inclusion in the study.

The inclusion criteria included pregnant women with a gestational age of 32-37 weeks with PPROM. However, the exclusion criteria included the term PROM and refusal to participate in the study.

The demographic features were recorded, including maternal age, gestational ages at rupture, birth age, residencies, educational levels and parity, and gravidity. Further, medical history of hypertension (HTN), diabetes mellitus (DM), and steroid administration were recorded. Also, the mode of deliveries, including VD and emergency C/Ss, and the indication of the C/S, were recorded. The neonatal outcomes

were recorded, alive, admission to the neonatal intensive care unit (NICU), and death. After delivery, the neonatal Apgar scores, fetal weight, and gender were also recorded.

The "IBM SPSS Statistics version 25" software was used to analyze the data, and descriptive and inferential statistics were used. Further, a p-value of ≤0.05 was considered a statistically significant association. Also, Pearson Chi-Square was used to determine the significance of the association between categorical independent and dependent variable pairs.

Results

The mean±SD (standard deviation) of the ages of the women was 27.2±5.8 years (ranging from 16 to 38). Further, the mean±SD of gravidity, parity, and abortus was 2.9±1.95 (ranging from 1 to 7), 1.6±1.7 (ranging from 0 to 6), and 1.4±0.6 (ranging from 1 to 3), respectively.

The women's age, residency, occupation, educational level, parity, and past medical history did not affect the delivery outcome—their associations were statistically insignificant (*p*-values of >0.05). (Table 1).

Table (1): Associations between the demographic features and past medical history with the Mode of delivery

Demographic features and past medical history		Mode of delivery(%)		Total (%)	p-values
		VD	Emergency C/S		
Age groups (year)	16-19	4 (8)	0 (0)	4 (8)	0.559
	20-24	10 (20)	3 (6)	13 (26)	
	25-29	10 (20)	5 (10)	15 (30)	
	30-34	7 (14)	4 (8)	11 (22)	
	35-38	6 (12)	1 (2)	7 (14)	
Residency	Urban	21 (42)	8 (16)	29 (58)	0.889
	Suburban	8 (16)	2 (4)	10 (20)	
	Rural	8 (16)	3 (6)	11 (22)	
Occupation	Housewife	30 (60)	10 (20)	40 (80)	0.732
	Employee	6 (12)	2 (4)	8 (16)	
	Teacher	1 (2)	1 (2)	2 (4)	
Educational level	Illiterate	7 (14)	2 (4)	9 (18)	0.138
	Primary School	7 (14)	3 (6)	10 (20)	
	Secondary School	8 (16)	4 (8)	12 (24)	
	Preparatory School	4 (8)	0 (0)	4 (8)	
	University or institute	11 (22)	2 (4)	13 (26)	
	Postgraduate	0 (0)	2 (4)	2 (4)	
Parity	Primigravida	13 (26)	3 (6)	16 (32)	0.423
	Multiparous	24 (48)	10 (20)	34 (68)	
Past medical history	Hypertension	6 (12)	1 (2)	7 (14)	0.779
	DM	3 (6)	2 (4)	5 (10)	
	Hypertension and DM	2 (4)	1 (2)	3 (6)	
	None	26 (52)	9 (18)	35 (70)	
Total		37 (74)	13 (26)	50 (100)	—

C/S = cesarean section; DM = Diabetes mellitus; VD = Vaginal delivery

The association of the indications for performing C/Ss with the mode of delivery was statistically significant (*p*-value of <0.001); the indications, like previous C/S and fetal distress, affected the decision to perform an emergency C/S. (Table 2.)

Table (2): The association of the C/S indications on the mode of delivery

Indication of C/S	Mode of delivery (%)		Total (%)	p-values
	VD	Emergency C/S		
None	36 (72)	0 (0)	36 (72)	<0.001
One previous C/S	0 (0)	3 (6)	3 (6)	
Two previous C/Ss	0 (0)	2 (4)	2 (4)	
Three previous C/Ss	0 (0)	2 (4)	2 (4)	
Four previous C/Ss	0 (0)	1 (2)	1 (2)	
FOP	1 (2)	2 (4)	3 (6)	
Fetal tachycardia	0 (0)	1 (2)	1 (2)	
Signs of chorioamnionitis	0 (0)	1 (2)	1 (2)	
Fetal distress during IOL	0 (0)	1 (2)	1 (2)	
Total	37 (74)	13 (26)	50 (100)	

C/S = cesarean section; FOP = Failure of progress; IOL = induction of labor; VD = vaginal delivery

The mean±SD of the gestational ages at rupture and birth were 34.37±1.43 weeks (ranging from 32 to 36) and 34.63±1.28 weeks (ranging from 32 to 37), respectively. However, the associations of gestational ages at rupture and birth did not affect the mode of delivery (*p*-values of >0.05). Table 3.

Table (3): The associations of gestational ages at rupture and birth (week) with the mode of delivery .

Gestational ages		Mode of delivery (%)		Total (%)	p-values
		VD	Emergency C/S		
At time of membrane rupture (week)	32-34	19 (38)	6 (12)	25 (50)	0.747
	35-36	18 (36)	7 (14)	25 (50)	
At birth (week)	32-33	6 (12)	3 (6)	9 (18)	0.691
	34-35	18 (36)	7 (14)	25 (50)	
	36-37	13 (26)	3 (6)	16 (32)	
Total		37 (74)	13 (26)	50 (100)	—

C/S = cesarean section; VD = Vaginal delivery

The mean±SD of fetal Apgar score and fetal weight was 6.1±2 (ranging from 1 to 9) and 2486±530.6 grams (ranging from 1300 to 3450). Besides, the delivery outcome did not affect the fetal outcome, Apgar scores, and fetal body weight (gram); however, fetal gender significantly (p-value = 0.05) affected the delivery outcome. (Table 4).

Table (4): Associations of fetal outcomes with the mode of delivery

Fetal outcomes		Mode of Delivery (%)		Total (%)	p-values
		VD	Emergency C/S		
Fetal outcome	Admitted to NICU	22 (44)	9 (18)	31 (62)	0.716
	Early neonatal death	2 (4)	1 (2)	3 (6)	
	Alive	13 (26)	3 (6)	16 (32)	
Fetal Apgar score groups	Low Apgar score (1-6)	20 (40)	8 (16)	28 (56)	0.640
	Good (7-10)	17 (34)	5 (10)	22 (44)	
Fetal weight group (gram)	Low birth weight (<2500)	13 (26)	6 (12)	19 (38)	0.481
	Normal birth weight (2500-4500)	24 (48)	7 (14)	31 (62)	
Fetal gender	Male	28 (56)	6 (12)	34 (68)	0.050
	Female	9 (18)	7 (14)	16 (32)	
Total		37 (74)	13 (26)	50 (100)	—

C/S = cesarean section; NICU = neonatal intensive care unit; VD = Vaginal delivery

Discussion

In the current prospective study, we collected 50 women with PPROM for one year to know the optimum mode of delivery in pregnant women with PPROM between 32-37 gestational weeks. However, except for the indications for doing C/S and fetal gender, no demographic features, medical history, gestational age at rupture and birth, fetal outcome, Apgar score, and fetal weight (gram) were statistically significantly affected by the mode of delivery (Tables 1-4).

The current study found only 6% of neonatal death, although the majority of the babies (62%) were admitted to the neonatal intensive care unit (NICU). The current finding is comparable to the literature; the study performed by Kayiga et al.[23] in Uganda found 65 per 1000 live births (= 6.5%) near our result. Besides, Kayiga et al.[23] found a statistically insignificant association between delivery outcome and perinatal mortality. Likewise, the fetal outcome did not significantly affect the delivery outcome in the current study; although most babies were admitted to the NICU due to prematurity, most (74%) were delivered by vaginal delivery (VD). Besides, only 26% of women needed emergency C/S due to the indications already being used for C/S, such as previous C/S, fetal distress, or tachycardia (Table 2). However, the indication in a study done by Larcade et al.[24] was partly in agreement; the indications included prior C/S, failure of progress, and maternal choice. Further, because the number of C/Ss performed is rising, the frequency of C/S for PPROM increases—they showed 66.8% of women who underwent C/S.

The rate of CS needed in the current study is in agreement with the study done in Kosovo by Ibishi et al.,[25] in which they found a 28% of the need to do C/S with indications. Also, the current study showed less than the study of Kayiga et al.[23] found that 30% needed C/S. Kayiga et al.[23] found 4.8% chorioamnionitis, which is more than double the current study (Table 2). Therefore, although this association in the

current study was insignificant, most women could be managed by watchfulness and VD, as Kayiga et al.[23] suggested. Also, in the current study, we found that the association of the gestational age at birth with the delivery outcome was insignificant. The finding of the current study was not in agreement with the findings of the study done by Larcade et al.,[24] in which they found a significant association (p-value of <0.001) of gestational age at birth with the mode of delivery, they found an increased number of C/S performed among the group who had an earlier the gestational age at PPROM.

Besides, most babies were delivered with normal birth weight by VD, although the association between fetal weight and the delivery outcome was insignificant. Conversely, the study in Uganda also found one of the leading causes of perinatal mortality as gestational ages (28-33 gestational weeks);[23] however, in the current study, we could not find a such association, the association was insignificant (Table 3) and the gestational age was between 32 to 36 weeks.

The current study also found a statistically significant association of the gender of the babies with the delivery outcomes (p-value = 0.05) with a predilection toward the female gender, mothers of female babies were more in need of C/Ss (Table 4). In contrast, the study by Antonakou et al.[26] showed contradictory findings to the current study; the C/S delivery rate in women who gave birth to male babies was higher than in those who gave birth to female babies with a significant association (p-value = 0.029). Although the association between gender and delivery outcome in the study of Antonakou et al.[26] and the current study was significant (*p*-values of 0.029 and 0.05, respectively). The female gender frequency was 14% out of 32%, and the frequency of the male gender was 12% out of 68% in C/Ss (Table 4). Although the significance of the associations between them in the current study was near borderline (p-value of 0.050), the difference between the current study and the study of Antonakou et al.[26] can be because they included post-date pregnancy, fetal growth restrictions, reduced fetal movements, preeclampsia and eclampsia, gestational diabetes, and term pre-labor rupture of membrane. We could only find the study of Antonakou et al.[26] that mentioned the association between gender and rupture of membrane before actual labor. Therefore, we suggest performing new research with a larger sample size to validate our findings to let the obstetricians prepare themselves for the decision of C/S when they confirm the gender of the baby through ultrasonography results.

Conclusions

The preferred mode of delivery in pregnant women with PPROM between 32 to 37 gestational weeks is VD if pure indications of C/S are not present. Further, the current study showed that the associations of C/S indications and fetal gender with delivery outcomes were statistically significant; female babies needed C/S more frequently.

Conflict of Interest

The authors had nothing to declare.

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