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Crescent Journal of Medical and Biological Sciences
Vol. 7, No. 4, October 2020, 564–567
eISSN 2148-9696

Indications of Pregnancy Termination in Patients With Preterm Premature Rupture of Membranes and Relationship Between the Latency of Rupture and Pregnancy Outcomes

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Abstract

Objectives: Evidence indicates that maternal and neonatal complications increase in pregnancies with preterm premature rupture of the membranes (PPROM). Therefore, the present study aimed to evaluate the indications of pregnancy termination with PPROM and the effect of PPROM latency on maternal and neonatal outcomes.

Materials and Methods: This prospective study was conducted on pregnant women who were admitted with PPROM. The patients were divided into two groups based on their gestational age. The first group consisted of women with less than 30 weeks of gestation and the second group included those with 30 to 33 weeks and 6 days of gestation. The data on the indications of termination, amniotic fluid index, and latency and their relation to neonatal and maternal complications were evaluated based on the aim of the study.

Results: The study included 199 patients with a mean (standard deviation) age of 29.6±3.4. Based on the results, the most frequent indications for pregnancy termination were reaching 34 weeks of gestation and labor onset. In addition, the chorioamnionitis in 3 cases (1.5%) was the most common maternal complication. Finally, the median of latency was 5 (3-10) and 3 (1-6) days in groups 1 and 2, (P=0.001).

Conclusions: In general, the results of the present study suggest that the latency of PPROM in less than 30 weeks of gestational age improves the neonatal mortality rate without increasing maternal and neonatal adverse outcomes.

Keywords: Latency, Preterm premature rupture of membrane, Neonatal complication, Maternal complication

Introduction

Preterm premature rupture of the membranes (PPROM) occurs only in 1 to 2% of pregnancies and it is the main cause of 40%-60% of preterm births and 20% of perinatal deaths (1). Further, fetal complications are directly associated with the gestational age at the time of the rupture of the membranes. There is an inverse ratio between the hospitalization period before labor and gestational age at delivery (2).

The management approach for stable patients with PPROM before 34 weeks is expectant management and administration of antibiotics in order to increase latency (3). The rupture of membranes can lead to the loss of the barrier for vaginal infections. Furthermore, a prolonged latency to delivery is an independent risk factor for infection and complications such as umbilical cord prolapse, placental abruption, and fetal demise. Moreover, infection, maternal, and neonatal complications are the major concerns during latency. Although some studies have supported the relationship between maternal and neonatal adverse outcomes and prolonged latency (4), others have failed to reach such a relationship (5). Thus, the relation between PPROM latency, gestational age, and maternal and neonatal outcomes merit consideration.

Accordingly, the present study aimed at reviewing the causes of pregnancy termination in patients with PPROM and determining whether the prolonged latency of PPROM increases maternal and fetal complications.

Materials and Methods

This was a prospective cohort study of pregnant women with PPROM between 26 and 33 weeks and 6 days of gestation and before the onset of labor who were admitted to Alzahra and Taleghani hospitals. Gestational ages were calculated based on the first-trimester ultrasounds. Additionally, the diagnoses of rupture of membranes were confirmed with speculum examinations, and nitrazine or AmnioSure tests were carried out in cases without obvious spillage (6).

The exclusion criteria were uterine contractions and chorioamnionitis in admission, the use of corticosteroids due to maternal illnesses, auto-immune diseases, allergy to penicillin, fetal anomaly, multi-fetal gestation, pre-eclampsia, and intrauterine growth restriction. In

Received 10 March 2020, **Accepted** 16 May 2019, **Available online** 5 October 2020

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addition, the sample size was calculated as 123 patients although 199 patients consecutively enrolled from May 2018 to May 2019.

The patients diagnosed with PPROM were evaluated after admission, and their fetal heart rates and maternal vital signs were monitored as well. Whenever fetal non-stress test results were non-reassuring, further steps were taken following fetal distress protocols. Then, a single dose of oral erythromycin (500 mg), and intravenous ampicillin for 48 hours (1 g every 6 hours) and oral amoxicillin (500-mg for every 8 hours) for total 7 days were administered based on the aim of the study (7). Furthermore, 12-mg betamethasone was injected intramuscularly in 2 doses every 24 hours (8). After hospitalization, if there was no contraindication, intravenous magnesium sulfate 4 g as a bolus dose and then 2 g/h were infused for 12 hours, as fetal neuroprotection (9).

The indications for pregnancy termination were the onset of labor onset, observation of fetal distress during fetal monitoring, 34 weeks of gestation, and chorioamnionitis. The route of delivery was due to obstetrics indications. Then, patients were divided into 2 groups based on their gestational age, including those in their 26-29 weeks and 6 days (group 1) and 30-33 weeks and 6 days (group 2).

The two groups were compared in terms of their demographic characteristics, amniotic fluid index, cause of termination, fetal presentation, gestational age at delivery, latency until delivery, maternal complications (i.e., chorioamnionitis and postpartum fever), and neonatal complications (i.e., seizure, intraventricular hemorrhage [IVH], birth weight). IVH was diagnosed with neonate brain ultrasound during the first week (10). Moreover, the neonatal seizure was diagnosed by a neonatologist and recorded in the medical document. According to (11), chorioamnionitis is described as either the uterine tenderness or the maternal fever >38°C (2 times with a 4-hour interval) or fetal tachycardia (>160 bpm). Additionally, postpartum endometritis was diagnosed with a maternal fever after delivery and uterine tenderness (11).

Next, patients' demographic variables and other characteristics were compared using the chi-squared test and the student's *t* test for categorical and continuous variables, respectively. All statistical analysis was analyzed using SPSS software, version 16. In addition, the distribution of the data was assessed by the Kolmogorov-Smirnov test. Eventually, the Mann-Whitney U test was substituted when the measures exhibited departure from statistical normality, and the significance level was set at <0.05.

Results

In general, 199 pregnant women with PPROM, who were admitted to Alzahra and Taleghnai hospitals of Tabriz University of Medical Sciences, were enrolled in the study and evaluated during May 2018-2019. The gestational age of patients was between 26 and 34 weeks. Upon admission to the hospital, the gestational age of 62 patients, who were in less than 30 weeks, were assigned to group 1 and 137 of them were in their 30-33 weeks and 6 days included in group 2. Tables 1 and 2 present the demographic data of both groups and maternal and fetal outcomes, respectively. The comparison of the pregnancy termination indications between the two groups did not yield any significant differences (Table 3) except for the indication of reaching 34 weeks of gestation which was significantly higher in group 1 (P<0.001).

Based on the results, maternal complications were evident in 7 patients and more prevalent in group 1. Further, chorioamnionitis was the most frequent maternal complication. Further, 2 cases of chorioamnionitis (3.2%) and 3 cases of postpartum fever (4.8%) were among the observed maternal complications in group 1. Meanwhile, the most observed maternal complications in group 2 were 1 case of chorioamnionitis (0.7%) and 1 case of uterine atony (0.7%). The comparison of complications suggested that postpartum fever in group 1 was significantly more frequent compared to group 2 (P = 0.02). Furthermore, the relationship between maternal complications and latency after PPROM revealed P = 0.40.

Moreover, the relationship between the latency interval (Table 1) before delivery and neonatal mortality demonstrated significant (P = 0.008) and non-significant (P = 0.38) relationships in groups 1 and 2, respectively. As

Table 1. Demographic Variables

Variable	Group 1	Group 2	*P* Value
Maternal age	29.9±5.8	29.0±6.6	NS
Parity	0.9±1.0	0.6±0.8	NS
BMI (kg/m²)	28.1±4.1	28.4±4.7	NS
Gestational age at admission	27.6 (26.3-28.8)	32.7 (33.4-31.5)	0.002
Latency	5 (3-10)	3 (1-6)	0.001
Gestational age at delivery	27.6 (26.4-28.9)	32.7 (31.6-33.4)	0.009
AFI <5 cm in first ultrasound	25 cases (40.3)	40 case (29.2)	NS
Cephalic presentation	39 cases (62.9%)	108 (78.8%)	NS

Note. NS: non-significant; BMI: body mass index; AFI: amniotic fluid index.

Table 2. Maternal and Neonatal Outcome in Two Groups

Variable	Group 1 n (%)	Group 2 n (%)	*P* Value
C/S rate	109 (54.8)	74 (54.0)	NS
Maternal morbidity	5 (8.0)	2 (1.4)	NS
Neonatal death	12 (19.3)	12 (8.6)	0.03
Birth weight	1266.9 (±471.1)	2003.8 (±310.1)	NS
IVH	13 (20.9)	5 (2.9)	0.03
Seizure	0	2 (1.4)	NS

Note. C/S: Cesarean section; NS: Non-significant; IVH: Interventricular hemorrhage.

Table 3. Indications of Pregnancy Termination

	Group 1 n (%)	Group 2 n (%)	*P* value
Labor onset	36 (1/58%)	68 (49.6%)	NS
Reach 34 weeks of gestation	(6.5%)4	46 (33.7%)	<0.001
Fetal distress	(16.1%)10	14 (10.2%)	NS
Placenta abruption	(9.7%)6	7 (5.1%)	NS
Cord prolapse	(3.2%)2	1 (0.7%)	NS
Chorioamnionitis	(3.2%)2	1 (0.7%)	NS
IUFD	2 (3.2%)	0 (0%)	NS

Note. NS: Non-significant; IUFD: Intrauterine fetal death.

regards the relationship between hospitalization days and maternal complications, $P=0.36$ was calculated for group 1 and $P=0.28$ for group 2.

The assessment of the relationship of gestational age in admission and neonatal mortality resulted in $P=0.013$ and $P=0.002$ for groups 1 and 2, respectively. Furthermore, the relationship between gestational age at delivery and the neonatal mortality yielded $P=0.001$ and $P=0.002$ for groups 1 and 2, respectively. The data related to latency are shown in Table 1.

Table 2 provides data related to neonatal complications. The occurrence of IVH among the infants was significantly higher in group 1 ($P=0.03$), and 2 cases of neonatal mortality in group 1 happened in chorioamnionitis patients. However, there was only 1 case of chorioamnionitis in group 2 which did not result in neonatal death. Based on the findings, there were 3 cases of intrauterine fetal death (IUFD); 2 cases (3.2%) in group 1, and 1 case in group 2 (0.7%). There were no significant differences in the occurrence of IUFD between the two groups ($P=0.22$).

Finally, reviewing the association between the amniotic fluid index (AFI) < 5 cm and the latency suggested that the median of latency in patients with AFI > 5 cm and those with AFI < 5 cm was 4 (2-7) and 3 (1-6) days ($P=0.03$).

Discussion

The present study assessed pregnancy termination indications in hospitalized women with PPROM and the effects of PPROM latency as a high-risk period for ascending infection on maternal and neonatal complications.

In both groups, the onset of labor pain was the most common indication for pregnancy termination. The rate of cesarean section (C/S) was not different between the two groups. According to previous research, PPROM does not lead to an increase in the C/S rate (12). However, the findings of another study (13) demonstrated a higher probability of C/S in PPROM cases (20.3%), which was less than the present study. The difference can be due to the fact that Iranian women have a higher desire for C/S.

In the present study, maternal complications were reported in 7 cases and were more frequent in group 1. Furthermore, the most common complication was chorioamnionitis. The diagnosis of chorioamnionitis is usually based on clinical findings. According to (11), the main criterion is maternal fever without any other origin, and anther criterion is fetal tachycardia (>160 bpm for 10 minutes). In other studies, the rate of chorioamnionitis in premature births was reported 8.5-25.5% (14, 15). It seems that antibiotic usage and diagnostic criteria affect the rate of chorioamnionitis in pregnant women with PPROM.

The assessment of the neonatal complications represented that IVH and seizure are among frequent complications, respectively, and IVH was more common in group 1 (20.9%). In another study (16), the incidence of IVH in neonates born less than 30 weeks was 23%, which is comparable with the findings of the present study. Higher incidences were observed in infants that were more premature although they decreased by an increase in the gestational age increased in delivery.

Based on the results of the present study, the neonatal death rate was 19.3% and 8.6% for the first and second groups, respectively. In another study, the incidence of neonatal death in less than 30 weeks of pregnancies was 8.3% (16). In our study, there was a significant relationship between gestational age in admission and delivery with neonatal death. More precisely, there was less neonatal death in advanced gestational ages. The findings of a systematic review also revealed that the infant mortality rate reduces in advanced gestational ages (1). Moreover, the infant mortality rate was reported 7% and 3% in deliveries with gestational ages less than 30 and 34 weeks, respectively (1). In the present study, the neonatal mortality rate was higher.

In group 1, a significant relation was found between the latency and the incidence of infant death. In other words, neonatal mortality decreased by an increase in latency. Conversely, no significant relationships were observed between chorioamnionitis and neonatal complication in neither group of the present study, which was predictable due to the small number of complications. Other studies reported that chorioamnionitis is accompanied by an increase in neonatal complications (17, 18).

Additionally, there was no significant relationship between AFI < 5 cm and neonatal complications in the groups. However, the median of hospitalization days was significantly higher in patients with AFI > 5 cm as

compared to those with AFI < 5 cm. The results of another study demonstrated a significant relationship between oligohydramnios and adverse pregnancy outcomes (19). Finally, Tavassoli et al(20) reported that the hospitalization period was significantly shorter in patients with AFI < 5 cm.

Conclusions

Overall, the findings of the present study suggested that the indications of pregnancy termination do not differ in patients with PPROM in pregnancies with the gestational age of less and more than 30 weeks. Eventually, it was revealed that the increase in latency results in less neonatal mortality.

Conflict of Interests

Authors have no conflict of interests.

Ethical Issues

The study was approved by the Institutional Review Board of Tabriz University of Medical Sciences (Ethics No. IR.TBZMED.REC.1397.1001).

References

1. Newton ER. Preterm labor, preterm premature rupture of membranes, and chorioamnionitis. Clin Perinatol. 2005;32(3):571-600. doi:10.1016/j.clp.2005.05.001
2. Carroll SG, Blott M, Nicolaides KH. Preterm prelabor amniorrhexis: outcome of live births. Obstet Gynecol. 1995;86(1):18-25. doi:10.1016/0029-7844(95)00085-6
3. Practice bulletins No. 139: premature rupture of membranes. Obstet Gynecol. 2013;122(4):918-930. doi:10.1097/01.AOG.0000435415.21944.8f
4. Gyamfi-Bannerman C, Son M. Preterm premature rupture of membranes and the rate of neonatal sepsis after two courses of antenatal corticosteroids. Obstet Gynecol. 2014;124(5):999-1003. doi:10.1097/aog.0000000000000460
5. Frenette P, Dodds L, Armson BA, Jangaard K. Preterm prelabour rupture of membranes: effect of latency on neonatal and maternal outcomes. J Obstet Gynaecol Can. 2013;35(8):710-717. doi:10.1016/s1701-2163(15)30861-6
6. Tchirikov M, Schlabritz-Loutsevitch N, Maher J, et al. Mid-trimester preterm premature rupture of membranes (PPROM): etiology, diagnosis, classification, international recommendations of treatment options and outcome. J Perinat Med. 2018;46(5):465-488. doi:10.1515/jpm-2017-0027
7. Kenyon S, Boulvain M, Neilson JP. Antibiotics for preterm rupture of membranes. John Wiley & Sons, Ltd; 2003. doi:10.1002/14651858.CD001058
8. Roberts D, Brown J, Medley N, Dalziel SR. Antenatal corticosteroids for accelerating fetal lung maturation for women at risk of preterm birth. Cochrane Database Syst Rev. 2017;3(3):CD004454. doi:10.1002/14651858.CD004454.pub3
9. Usman S, Foo L, Tay J, Bennett PR, Lees C. Use of magnesium sulfate in preterm deliveries for neuroprotection of the neonate. Obstet Gynaecol. 2017;19(1):21-28. doi:10.1111/tog.12328
10. Plaisier A, Raets MM, Ecury-Goossen GM, et al. Serial cranial ultrasonography or early MRI for detecting preterm brain injury? Arch Dis Child Fetal Neonatal Ed. 2015;100(4):F293-300. doi:10.1136/archdischild-2014-306129
11. Committee opinion no. 712: intrapartum management of intraamniotic infection. Obstet Gynecol. 2017;130(2):e95-e101. doi:10.1097/aog.0000000000002236
12. Kunze M, Hart JE, Lynch AM, Gibbs RS. Intrapartum management of premature rupture of membranes: effect on cesarean delivery rate. Obstet Gynecol. 2011;118(6):1247-1254. doi:10.1097/AOG.0b013e3182351b0c
13. Tucker Edmonds B, Fager C, Srinivas S, Lorch S. Predictors of cesarean delivery for periviable neonates. Obstet Gynecol. 2011;118(1):49-56. doi:10.1097/AOG.0b013e31821c4071
14. Seo K, McGregor JA, French JI. Preterm birth is associated with increased risk of maternal and neonatal infection. Obstet Gynecol. 1992;79(1):75-80.
15. Gilson GJ, O'Brien ME, Vera RW, Block A, Grubb PN. Expectant management of premature rupture of membranes at term in a birthing center setting. J Nurse Midwifery. 1988;33(3):134-139. doi:10.1016/0091-2182(88)90109-7
16. Stoll BJ, Hansen NI, Bell EF, et al. Neonatal outcomes of extremely preterm infants from the NICHD Neonatal Research Network. Pediatrics. 2010;126(3):443-456. doi:10.1542/peds.2009-2959
17. García-Muñoz Rodrigo F, Galán Henríquez GM, Ospina CG. Morbidity and mortality among very-low-birth-weight infants born to mothers with clinical chorioamnionitis. Pediatr Neonatol. 2014;55(5):381-386. doi:10.1016/j.pedneo.2013.12.007
18. Alexander JM, Gilstrap LC, Cox SM, McIntire DM, Leveno KJ. Clinical chorioamnionitis and the prognosis for very low birth weight infants. Obstet Gynecol. 1998;91(5 Pt 1):725-729. doi:10.1016/s0029-7844(98)00056-8
19. Borna S, Borna H, Khazardoost S, Hantoushzadeh S. 'Perinatal outcome in preterm premature rupture of membranes with Amniotic fluid index < 5 (AFI < 5). BMC Pregnancy Childbirth. 2004;4(1):15. doi:10.1186/1471-2393-4-15
20. Tavassoli F, Ghasemi M, Mohamadzade A, Sharifian J. Survey of pregnancy outcome in preterm premature rupture of membranes with amniotic fluid index <5 and ≥5. Oman Med J. 2010;25(2):118-123. doi:10.5001/omj.2010.32