ORIGINAL ARTICLE

Morbidities, concordance, and predictors of preterm premature rupture of membranes among pregnant women at the University of Nigeria Teaching Hospital (UNTH), Enugu, Nigeria

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Abstract

Background: Preterm premature rupture of membranes (PPROM) is a challenging complication of pregnancies and an important cause of perinatal morbidity and mortality. Management of morbidities associated with PPROM is fraught with controversy. However, women should be informed of these complications.
Objective: This article aimed to review the morbidities, concordance, and predictors of PPROM over a 10-year period.
Methods: This was a retrospective review of morbidities, concordance, and predictors of PPROM among pregnant women at the University of Nigeria Teaching Hospital, Enugu, Nigeria between January 1, 1999, and December 31, 2008. The morbidities, concordance, and predictors of PPROM were expressed by regression analysis output for PPROM.
Results: Primigravidae had the highest occurrence of PPROM. Increasing parity does not significantly influence the incidence of PPROM. The concordance and predictors of PPROM are maternal age ($P < 0.000$), gestational age at PROM ($P < 0.000$), latency period ($P < 0.000$), and birth weight ($P < 0.001$).
Conclusion: PPROM is a major complication of pregnancies and an important cause of perinatal morbidity and mortality. Management of these morbidities associated with PPROM poses a great challenge. However, women should be informed of these complications.

Key words: Concordance, Enugu, morbidities, Nigeria, predictors, preterm premature rupture of membrane

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Introduction

Preterm premature rupture of membranes (PPROM) complicates 3–8% of all pregnancies and is associated with 20–30% of all preterm deliveries.[1,2] Its prognosis is related primarily to gestational age (GA) at presentation and delivery.[1,2] It is an important cause of perinatal morbidity and mortality.[2,3] PPROM increases maternal risk of sepsis from ascending genital tract infections, placental abruption, and disseminated intravascular coagulation (DIC).[3-8] Adverse perinatal outcomes that accompany PPROM include prematurity, umbilical cord prolapse and compression, neonatal sepsis, respiratory

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distress syndrome, intraventricular hemorrhage, and fetal or neonatal death.[9,10] Morbidities of PPROM in perinatal period are due to brief latency from membrane rupture to delivery, perinatal infection, and umbilical cord compression due to oligohydramnios.[8,11]

To achieve a good prognosis, a timely and accurate diagnosis of PPROM is critical to optimize pregnancy outcome.[2,12,13] It is important to appreciate that PPROM that is remote from term, pregnancy outcome remains dismal and is associated with significant risks of maternal and perinatal morbidity and mortality.[3] Thus, the attending clinician should develop a pregnancy outcome plan to reduce maternal and fetal risks.[12,14] Management of pregnancies complicated by PPROM is challenging, controversial, and should be individualized.[15] Expectant management (a wait and see approach) and immediate delivery (early planned birth) are potential options in these patients, and each has its own merits and demerits. There is a need for expectant management of PPROM. Expectant management of PPROM is associated with prolongation of pregnancy that results in decrease GA-related morbidity associated with prematurity. However, the benefit of this must be balanced with the risks of expectant management such as clinical chorioamnionitis.[3,4,16]

There is a paucity of data on morbidities, concordance, and predictors of PPROM in sub-Saharan African. To address these problems, this study was designed to review the morbidities, concordance, and predictors of PPROM among pregnant women at the University of Nigeria Teaching Hospital (UNTH), Enugu, Nigeria.

Methods

This was a retrospective study of morbidities, concordance, and predictors of PPROM at the UNTH Enugu, Nigeria between January 1, 1999, and December 31, 2008. The criteria for inclusion in this study includes (1) pregnant women who received antenatal care and delivered at UNTH, Enugu, during the study period. (2) The patient must have ruptured fetal membranes spontaneously at GA below 37 completed weeks. (3) Those patients who did not start laboring within 1 h following spontaneous membrane rupture. (4) All cases of artificial rupture of fetal membranes are to be excluded from the study.

Data were retrieved from medical records of pregnant women who had PROM during the study period. Study information sort were sociodemographic characteristics (maternal age, parity, occupation, tribe, and GA). Perinatal/neonatal information such as birth weight, Apgar scores at 1st and 5th min, need for neonatal resuscitation, admission to New Born Special Care Unit (NBSCU), and fetal outcome. Maternal complications that could be assumed to have resulted from PROM such as postpartum endometritis, DIC, maternal sepsis, and Asherman syndrome.

The morbidities, concordance, and predictors of PPROM were expressed by logistic regression. The Chi-squared test for qualitative variables was used to analyze the results. Data were analyzed by descriptive statistics using the statistical package for social science version 15 (SPSS Inc. Chicago, IL, USA). The value $P < 0.05$ is considered statistically significant.

Approval for the study was obtained from the UNTH Ethical Committee. The UNTH, Enugu, is one of the oldest tertiary care centers in Eastern Nigeria. The antenatal clinics hold every working day (Monday to Friday). Patients are seen at every 4 weeks until 28 weeks, fortnightly until 36 weeks, and then weekly until delivery. At booking, obstetric, medical, and surgical histories are obtained. Pregnancy was well-dated with last menstrual period and collaborated with first-trimester ultrasound to ascertain the appropriate GA. Height, weight, and blood pressure were also measured. The following routine investigations were also done, packed cell volume, urinalysis, blood group and rhesus factor, genotype, hepatitis B surface antigen, Venereal Disease Research Laboratory, HIV screening, and ultrasound assessment. Pelvic examination using a sterile speculum was performed. Digital examination was avoided. Diagnosis of PPROM was based on a history and confirmed by the presence of pooled amniotic fluid on a sterile speculum, positive results from a ferning test and transvaginal ultrasonographic evaluation that demonstrated oligohydramnios. Each patient was observed in the labor and delivery room for at least 24 h.

Results

A total of 2798 deliveries occurred during the study period. There were 94 cases of PPROM with a prevalence of 3.3% for PPROM of all deliveries. The case notes of 15 patients were removed from analysis and evaluation due to unbooked status with scanty information documented in them leaving a total of 79 patients out of the 94 that met the criteria for PPROM.

Table 1 shows the demographic characteristics of women with PPROM. PPROM is the highest among reproductive age group of 21–30 years but lowest among reproductive age group 16–20 and 41–45 years. Primigravidae had the highest occurrence of PPROM. Increasing parity does not significantly influence the incidence of PPROM. PPROM is highest at GA 35–37 weeks but lowest at GA 26–30 weeks.

Table 2 shows the relationship of PPROM to maternal morbidity. A total of 16 cases (20%) had complications

Table 1: Demographic characteristics of women with preterm premature rupture of membranes variables

Maternal age group with PPROM	Frequency (%)
<20	2 (2.5)
21-30	46 (58.2)
31-40	29 (36.8)
41-45	2 (2.5)
Total	79 (100.0)
Parity	
0	23 (29.1)
1	15 (19.0)
2	21 (26.6)
3	9 (11.4)
4	8 (10.1)
5+	3 (3.8)
Total	79 (100.0)
GA at PPROM	
26-30	6 (7.6)
31-34	26 (32.9)
35-37	47 (59.5)
Total	79 (100.0)

PPROM=Preterm premature rupture of membranes; GA=Gestational age

Table 2: Maternal morbidity with PPROM

Age	Parity	GA	Latency period	Complications
25	2	33	13 hours	Secondary PPH/Hysterectomy death
26	0	32	14 hours	Psychoses/neonatal death
31	1	34	14 hours	Intra-partum pyrexia
29	0	35	15 hour	Depression
30	2	35	16 hours	Pyrexia
30	2	34	16 hours	Puerperal/cord prolapsed
41	0	34	18 hours	Pyrexia
34	3	32	18 hours	Secondary PPH
30	0	35	23 hours	Secondary PPH/Pyrexia, died
38	1	36	36 hours	Puerperal pyrexia
29	3	33	2 days	Puerperal pyrexia
28	2	36	2 days	Pyrexia
32	2	33	4 days	Secondary PPH
32	0	36	4 days	Pyrexia/offensive vaginal discharge
25	1	32	4 days	Puerperal pyrexia
41	1	31	5 days	Retained placenta/pyrexia

GA=Gestational age; PPH: Postpartum hemorrhage; PPROM: Preterm premature rupture of membranes

which led to prolonged hospital stay. Eleven women out of the 16 patients were febrile, and 7 women out of the 11 women that had febrile illness had secondary postpartum hemorrhage (PPH), and one out of these patients had a total abdominal hysterectomy because of secondary PPH.

Table 3 shows the relationship of the GA at which PROM occurred, the latency period with birth weight and perinatal death. All the babies delivered before GA of 34 weeks weighed <2.5 kg, 20 babies delivered after 35–36 weeks weighed >2.5 kg, and 17 babies delivered after 35–36 weeks still weighed <2.5 kg. Four perinatal deaths occurred in those with GA between 26 and 30 weeks, and 3 perinatal deaths occurred in those with GA between 31 and 34 weeks. No perinatal death was recorded in those with GA between 35 weeks and above.

Table 3: Comparison of GA, PPROM, latency period, birth weight and perinatal death

GA at PPROM	Birth weight (kg)		Perinatal death	No of cases	%	Latency period	
	<2.5 kg	>2.5 kg				<24 hrs	>24 hrs
26-30	6	0	4	6	7.6	2	4
31-34	26	0	3	26	32.9	17	9
35-36+	17	20	0	47	59.5	38	9

GA=Gestational age; PPROM: Preterm premature rupture of membranes

Table 4: Regression analysis output for PPROM

Model	Unstandardized Coefficients		Standardized coefficients	*t*	Sig.
	B	Std. Error	Beta		
1					
Constant	2.211	0.239		9.244	0.000
Maternal age	0.419	0.033	0.751	12.815	0.000
G.A. @ PROM	−0.269	0.056	−0.293	−4.830	0.000
Prenatal death	0.056	0.090	0.027	0.615	0.541
Latency period	−0.261	0.064	−0.201	−4.063	0.000
Birth weight	−0.152	0.042	−0.157	−3.577	0.001
Parity	−0.030	0.015	−0.077	−1.974	0.052

Dependent variable: PPROM. GA=Gestational age; PPROM: Preterm premature rupture of membranes

Table 4 shows the regression analysis output for PPROM. Maternal age, GA at PROM, latency period, and birth weight are significant. The concordance and predictors of PPROM are maternal age ($P < 0.000$), GA at PROM ($P < 0.000$), latency period ($P < 0.000$), and birth weight ($P < 0.001$).

Discussion

In this study, 20% of pregnant women who had PPROM had complications which led to prolonged hospital stay. The rate of maternal morbidity of 20% reported in this study is high compared to the previous study by Sims *et al.*[17] but is in agreement with that reported by Borna *et al.*[8] Previous studies by Verani *et al.*[18] and Davidson[19] reported that use of prophylactic antibiotic in PPROM reduces maternal morbidity. However, despite the fact that prophylactic antibiotic was used liberally in this study: Maternal morbidity rate of 20% and perinatal mortality rate of 8.9% were reported. The lack of effectiveness of prophylactic antibiotic as noted in this study might be due to noncompliance, efficacious, and low socioeconomic status of patients involved.

Infection was the most important complication of PPROM, and a similar observation was noted by Walters and

Mercer[20] in 2009, and Ecevit *et al.*[21] in 2014. Infection rate of 13.9% was noted in this study in the mothers both intrapartum and postpartum. There was an increase in the incidence of infection with increase latency period more than 24 h.

Steroid was used in all cases of PPROM below 34 weeks, and this may be responsible for the low incidence of respiratory distress syndrome, intraventricular hemorrhage, and necrotizing enterocolitis observed in this study. The findings in this study were supported by Oboro *et al.*,[3] Crowley,[22] and Harding *et al.*,[23] that demonstrated the use of corticosteroid in preterm PROM before 34 weeks gestation reduces perinatal morbidity and mortality by reducing the risk of respiratory distress syndrome, intraventricular hemorrhage, and necrotizing enterocolitis.

Problems were encountered regarding the best medical approach or management of PROM remote from term. The problems frequently observed in the management of PPROM such as infection morbidity, prematurity, and its complications. The principal risk to fetus is prematurity while the primary maternal risks are infection morbidity and its complications.[15] The incidence of neonatal complications is high but comparable to that documented by Vermillion *et al.*,[24] Borna *et al.*[8] and Mercer.[25] This high neonatal complication may be related more closely to the effects of premature birth and sophistication of NBSCU rather than PPROM.

Primigravidae had the highest occurrence of PPROM. Increasing parity does not significantly influence the incidence of PPROM. However, maternal age, GA at PROM, latency period, and birth weight are the concordance and the predictors of PPROM.

Limitation of this study was on small scale retrospective hospital-based study which should be interpreted with caution. Morbidities of PPROM among pregnant women were a neglected area in Obstetrics in Nigeria that poses a great challenge in management outcome. However, this is a stepping stone toward further research on morbidities in PPROM among Nigerian women.

Conclusion

PPROM is a major complication of pregnancies and an important cause of perinatal morbidity and mortality. Management of these morbidities associated with PPROM poses a great challenge. However, women should be informed of these complications.

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Conflicts of interest
There are no conflicts of interest.

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