

## Foeto-Maternal Outcome of Premature Rupture of Fetal Membranes At A Tertiary Hospital: A 5 – Year Study

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### Abstract

**Background:** Premature rupture of foetal membrane is a complication of pregnancy, leading to maternal and foetal morbidity, it could occur at any gestational age. Rupture to delivery interval varies. Outcome is dependent on the duration of rupture and causative mechanism. The aim of this study was to identify the foeto-maternal outcome of premature rupture of foetal membrane in UATH.

**Material and Methods:** This is a retrospective analysis of one hundred and ninety-two women who was diagnosed and managed for premature rupture of membranes. Data was analysed in simple percentages.

**Results:** The prevalence of premature rupture of foetal membranes in this study was 2.1% and Mean age of women was 30.6 years, about fifty nine percent of patients had identifiable risk factors for PROM and previous history of PROM accounted for the highest factor. There were no maternal and foetal complications in 83% and 55% respectively.

**Conclusion:** Premature rupture of foetal membranes is a cause of perinatal and maternal morbidity, prompt management and intervention is key in ensuring good outcomes.

**Key words:** Premature. Foetal membranes, rupture, prelabour, preterm.

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### I. Introduction

Premature rupture of foetal membranes refers to spontaneous rupture of membranes any time before the onset of labour<sup>1,2</sup>. It can occur at any gestational age. Rupture of membrane occurring at term (after 37 weeks) is known as *prelabour rupture of foetal membranes*, while rupture occurring earlier than 37 weeks is known as *preterm premature rupture of foetal membrane*.

Premature rupture of foetal membrane is a major complication of pregnancies and an important cause of perinatal morbidity and mortality<sup>3,4</sup>. Women should be well informed regarding maternal, foetal and neonatal complications. Latency period refers to the period between the rupture of membranes and the onset of labour. When the latency period exceeds 24 hours, it is known as prolonged prelabour rupture of membrane<sup>1</sup>.

Not much study have been reported about premature rupture of foetal membranes in Nigeria. And none have been reported in our Centre, hence the need for this study. Premature rupture of foetal membranes occurs in 3-8% of all pregnancies, with 8-10% occurring at term<sup>3-5</sup>. Premature rupture of foetal membranes accounted for 3.3% in UNTH Enugu<sup>3</sup>. About 2-5 % of all women with premature rupture of foetal membranes will subsequently develop prolonged premature rupture of foetal membranes. Preterm Premature rupture of foetal membranes accounts for about 30-40% of preterm deliveries<sup>1</sup>. It is a leading cause of premature births globally. About 50% will go into labour on the first week, 75% second week, and 85% within a month<sup>6</sup>.

The aetiology of premature rupture of foetal membranes is unknown<sup>4</sup>. Spontaneous rupture of membranes is said to be a physiologic process in normal labour, due to extracellular matrix degradation in the chorionic membrane due to increase in extracellular matrix degrading enzymes such as collagenases and matrix metalloproteinase<sup>1</sup>. Poor assembly of collagen that binds to increase its tensile strength have been implicated. However, it has not been established whether premature rupture of foetal membranes before term is the result of collagen deficiency<sup>7</sup>. Multiple Pathological processes are probably involved in this happening before labour<sup>1</sup>. These are inflammation and infection with polymicrobial organism such as bacteroides fragilis, neisseria gonorrhoea, escherichia coli and other anaerobes. Antiangiogenic factors may also play a role and was further supported by the low amniotic fluid concentration of vascular endothelial growth factor receptor 1 (VEGFR-1) found in women with PROM<sup>1</sup>.

Most cases of premature rupture of foetal membranes occur in an otherwise healthy woman without any identifiable factor<sup>8</sup>. Other risk factors are Maternal subclinical infections: previous history of premature

rupture of foetal membranes, maternal infections such as urinary tract infection, malaria, bacteria vaginosis, cervicovaginitis, direct abdominal trauma, chronic steroid use, collagen vascular disorders, poor nutrition, and low socioeconomic class. Uteroplacental factors are uterine anomalies, cervical insufficiency, and previous cervical cerclage<sup>1,8</sup>.

Diagnosis is based on symptoms: the presence of a gush of fluid<sup>1,2,4,6</sup>, continued leakage of fluid<sup>1,2,4,6</sup>, presence of flecks of vernix or meconium<sup>2</sup>. Examination findings include the presence of pooling of fluid in the posterior fornix of the vagina<sup>1,2,4,6,9</sup> which is diagnostic. Several tests are also carried out to confirm the presence of rupture, this include: nitrazine test<sup>9</sup>, amniodye test<sup>9</sup>, amniosure test and use of amniosure pant. Several markers in the cervicovaginal discharge have also been seen in the presence of PROM vis a vis: alpha foetoprotein, insulin like growth factor<sup>9</sup>, beta HCG, creatinine, urea lactate, placenta alpha macroglobulin 1(PAMG-1)<sup>6,9</sup>.

Several maternal and foetal complications have been noticed following premature rupture of foetal membranes. Neonatal complications are respiratory distress syndrome<sup>8</sup> which can account for 40-70% of neonatal death, infection leading to 3-20% of neonatal death, intraventricular haemorrhage<sup>8</sup>, foetal pulmonary hypoplasia<sup>6</sup>, skeletal deformities cord prolapse. Maternal complications are chorioamnionitis<sup>4</sup> which can subsequently lead to maternal sepsis and maternal death from septic shock, postpartum endometritis, and increased risk of caesarean delivery.

Management of premature rupture of foetal membranes should be individualized due to its challenging and controversial nature<sup>5,10</sup>. It is a balance between the risk of prematurity if delivery is encouraged and the risks of maternal and foetal infection if conservative management is instituted<sup>6</sup>. Thorough assessment to confirm the gestational age and to rule out complications of infections is important.

It can be managed in one of several ways: termination of pregnancy, given the high risk of adverse pregnancy outcome and prematurity, and conservative or expectant management. The benefit of expectant management should be balanced with the risk such as chorioamnionitis.

Patient should be delivered regardless of gestational age if there is any evidence of chorioamnionitis<sup>4</sup>. Expectant management is instituted when gestational age is < 34 weeks, and there are no signs of chorioamnionitis<sup>4,6</sup>. Expectant management entails the use of antibiotics, corticosteroids, screening for infection, foetal monitoring, and serial ultrasound scan for liquor volume assessment<sup>4</sup>. Corticosteroids have been found to improve survival in preterm premature rupture of membrane<sup>11,12</sup>.

After 34 weeks gestation, the risk of infection developing is probably higher than the benefit of further maturity and induction of labour is usually recommended<sup>13</sup> and there have been no evidence that antibiotics, corticosteroids or tocolysis improve outcome<sup>4</sup>.

The objectives of the study is to determine the maternal and foetal outcome of premature rupture of foetal membranes

## **II. Materials And Method**

This was a retrospective study of women that were diagnosed and managed for premature rupture of foetal membranes at the University of Abuja Teaching Hospital Gwagwalada, between 1st January 2014 and 31st December 2019. It was only 196 out of the 216 case notes that were available for review as 20 of the 216 case notes of women who had PROM could not be found.

**Study design:** This is a retrospective study

**Study Location:** The study was conducted at the Department of Obstetrics and Gynaecology, University of Abuja Teaching Hospital, Abuja, Nigeria. It is a 500 bedded hospital serving the Nation's capital and the surrounding states of Kogi, Nasarawa and Niger.

**Study Duration:** January 1<sup>st</sup>, 2014 to December 31<sup>st</sup>, 2019.

**Sample size:** 192 cases.

**Subjects & selection method:** The hospital numbers of patients who had PROM within the years of review were collected from the Labour Ward register and Obstetric theatre register as well as Special Care Baby Unit register. The case notes were retrieved from the Medical Records Department. The information extracted from the case notes of patients who met the inclusion criteria were; age, booking status, gestational age, identifiable risk factors for PROM, duration of PROM, mode of delivery, indication for caesarean section, birth weight, APGAR Scores, maternal complication such as chorioamnionitis, surgical site infection, sepsis as well as foetal complication such as IUFD and admission into SCBU. Relevant data listed above were retrieved, documented and analysed using Statistical Package for Social science (SPSS) version 20. Statistical analysis was by simple percentage.

The diagnosis of premature rupture of foetal membranes was made on the confirmation of a pool of liquor in the posterior fornix of the vagina, and a positive pad test.

Unbooked patients were women who did not attend antenatal care, while booked elsewhere were for women who had antenatal care in another facility, and were referred to us. Booked patients had antenatal care in our facility.

Management of premature rupture of membrane depends on the gestational age at presentation. Each woman was assessed and decision for expectant, conservative or immediate delivery was made with consent from the women. Antenatal corticosteroids were administered to women whose gestational age was <34 weeks and who had no risk of chorioamnionitis. Gestational age >34 weeks had induction of labour and caesarean section as the case may be.

**Inclusion criteria**

1. All women with history of drainage of liquor which were confirmed by a pool of liquor in the posterior fornix of the vagina
2. Women with a history of drainage of liquor with or without pool of liquor in the posterior fornix of the vagina, but with a Positive pad test

**Exclusion criteria**

1. All women without a confirmed pool of liquor in the posterior fornix of the vagina and a negative pad test
2. Women with Multiple gestation
3. Women who had congenitally abnormal foetus

**Data analysis**

The Data were analyzed by descriptive statistics using the statistical package for social science version 15 (SPSS Inc. Chicago, IL, USA) and the results expressed in descriptive statistics by simple percentages.

**III. Results**

A total of 196 case notes were retrieved, 4 women signed against medical advice with accompanied incomplete information; hence, they were excluded leaving only 192 cases available for documentation and analysis. There were 10416 deliveries in the study period, two hundred and sixteen had premature rupture of foetal membranes, giving a prevalence of 2.1%.

Table 1 shows the ages of women ranged from 15-45 years with a mean age of 30.6 years. The number of women booked in our facility was 25 (13.0 %), it was less than the number that were unbooked 48(25%) and those booked elsewhere 119(62.0 %). Most women were in the 30-33 weeks gestation 79 (41.1 %); hence, preterm PROM recorded more numbers of PROM. About fifty nine percent of patient had identifiable maternal risk factors for PROM and previous history of PROM accounted for the highest factor. (Table 1)

**Table 1 Socio-demographic distribution of Women with PROM**

Parameters	Number (n)	Percentage (%)
<i>Age</i>		
15-19	1	0.5
20-24	24	12.5
25-29	59	30.7
30-34	57	29.7
35-39	42	21.9
40-45	9	4.7
<i>Booking Status</i>		
Booked	25	13.0
Booked elsewhere	119	62.0
Unbooked	48	25.0
<i>Gestational Age</i>		
26-29	51	26.6
30-33	79	41.1
34-36	26	13.5
>37	36	18.8
<i>Maternal risk factors</i>		
None	78	41
Previous PROM	41	21
Abnormal Vaginal discharge	26	14
Urinary tract infection	22	11
Previous abortions	13	7
Malaria	12	6

Total	192	100
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*Table 2:* Fifty nine percent of women with PROM presented within 24hours while the remaining 41% of cases came after 24hours of ruptured foetal membranes. Caesarean section was the highest mode of delivery, 99(51.6%) women, vaginal delivery was 93(48.4%) with previous caesarean section being the commonest indication for caesarean section. Majority of women with PROM (83.3%) had no complications while chorioamionitis accounted for 12.5% (Table 2).

**Table 2: Maternal outcome**

Parameters	Number (n)	Percentage (%)
<b>Duration of rupture</b>		
<24 hours	113	58.9
>24 hours	79	41.1
<b>Mode of delivery</b>		
Spontaneous vaginal delivery	93	48.4
Caesarean section	99	51.6
<b>Indication for caesarean</b>	<b>Section</b>	
Previous caesarean section	45	45.5
Foetal distress	17	17.1
Malpresentation	16	16.2
Cord prolapse	7	7.1
Hypertensive disorders	4	4.0
Placental factors	4	4.0
Others	6	6.1
<b>Complications</b>		
No complications	160	83.3
Chorioamnionitis	24	12.5
Surgical site infection	4	2.1
Sepsis	4	2.1
<b>Total</b>	<b>192</b>	<b>100</b>

*Table 3:* One hundred and seventy-four (90.6%) live births were recorded during the period of study while 18 (9.4%) had intrauterine foetal death. 54.7% of babies born with PROM had no complication with good Apgar scores of more than 7 recorded. Nine out of sixty-nine prematured babies admitted into SCBU had early neonatal death (Table 3)

**Table 3: Foetal outcomes**

Parameters	Number (n)	Percentage (%)
<b>Birth weights</b>		
<1kg	3	1.6
1.1-1.5kg	61	31.8
1.6-2kg	54	28.1
2.1-2.5	27	14.0
>2.5kg	47	24.5
<b>Apgar scores &lt; 7</b>		
At 1 minute	62	66.0

At 5 minute	27	28.7
At 10 minute	5	5.3
<b><i>Foetal complications</i></b>		
No complications	105	54.7
Intrauterine foetal death	18	9.4
SCBU admissions	69	35.9

#### IV. Discussion

The prevalence of 2.1% in this study, was higher than 1.6% reported by Adamou et al in Aminu Kano<sup>14</sup>, and 1.3% reported in Maiduguri<sup>15</sup>, but lower than 3.3% reported in Enugu<sup>3</sup>. This could be as a result of the different gestational age groups that was used in the study, and the different environmental conditions in the study population.

The women were aged between 15-45years, with a mean age range of 30.6 years. Most of the women 59(30.7%) were in the 25-29 year age range. This was similar to what was reported by Adamou et al<sup>14</sup>. This may be due to the fact that most deliveries occur in this age group.

In this study, majority of those that had premature rupture of membranes originally booked for antenatal care elsewhere 119(62.0%) while the unbooked women accounted for 48(25%). Nagaria et al reported similar findings<sup>16</sup>. This is however contrary to findings observed by Idrisa et al<sup>15</sup> who reported that most of the women who had PROM were booked. The reason could be because of differences in methodology and/or because our centre serves as a major referral centre not only in Federal Capital Territory (FCT) but surrounding 4 States see Table 1.

The cause of PROM is unknown, but predisposing risk factors abound<sup>4,8</sup>. In this study, most of the women had no identifiable risk factor 78(41.0%). This was similar to the study by Lovereenet al<sup>17</sup>. The commonest Identifiable risk factor however was a history of previous PROM in 41 (21.0%) women, and was similar to the study in University of Calabar teaching Hospital<sup>18</sup> and University of Maiduguri Teaching Hospital<sup>19</sup> in Nigeria. A study in Ethiopia reported that pregnant women who had a history of PROM were 3.31% times more likely to develop PROM<sup>20</sup>. PROM in these women could be due to untreated genitourinary infection and a short cervical length (cervical incompetence). In addition, obstetric complications are highly recurrent by nature.

In this report, 75% of the women had one form of antenatal care or the other and also presented in time compared to women without antenatal care. 51.6% were delivered by caesarean section after commencement of corticosteroids and antibiotics. Previous caesarean section accounted for 45.5% of case. These findings corroborated with similar work by Wang et al<sup>21</sup> who documented 54.8% of the mothers were delivered via emergency caesarean sections due to previous scar and/or failed trial of labour. These documented findings however differs from the rate reported from previous studies in Kano and Anambra<sup>23,24,25</sup>. The difference in these findings may be due to gestational age at presentation as well as other clinical findings in addition to PROM. 48.4% had spontaneous vaginal delivery.

A total number of 160 (83.3%) had no complications while the remaining 16.7% had complications that centered on infection. Chorioamnionitis accounted for majority of the case (12.5%), similar to the study by Emechebe et al<sup>18</sup>. No maternal mortality was recorded amongst women with PROM probably due to prompt administration of antibiotic to the parturient women admitted with PROM See Table 2

Neonatal outcomes were shown in table 3. Total of 105 representing 54.7% had good APGAR scores with no complication. This similar outcome was reported by Nagaria et al<sup>16</sup> while 69 (35.9) of neonates required NICU admission. Nine neonates suffered early neonatal death. Thus stillbirth rate of 14.1%. Overall, these reports neonatal mortality is far higher than 9.6% reported by Idrisa et al.

#### V. Conclusion

In conclusion, the prevalence of PROM in this study was low and majority of the patients had active management with good neonatal outcome. These documentations may not be true representative statistics of the subject matter in our environment and so should be applied with caution; however, that there are lessons to learn from these findings.

**Abbreviations:**

UATH – University of Abuja Teaching Hospital

PROM – Premature Rupture of Membranes

SCBU – Special Care Baby Unit

IUFD – Intrauterine Fetal Death

**Competing interest:** The authors declare that they have no competing interests

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**Ethical Approval:** No ethical approval required for retrospective study by the institution Review board

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