Study of Fetomaternal Outcome in Premature Rupture of Membranes in Pregnancy More Than 34 Weeks

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ABSTRACT

Premature rupture of membranes (PROM) affects approximately 10% of pregnant women. PROM, when unattended or mismanaged may lead to severe maternal and neonatal complications. The present study aims to study the subsequent course of pregnancy and evaluate the maternal, and neonatal morbidity and mortality in PROM patients admitted in our hospital. To study the outcome of PROM and assess the maternal and perinatal morbidity and mortality. It was a prospective observational study. All the patients of PROM admitted in hospital and considered based on inclusion and exclusion criteria were included in the study. They were induced with either oxytocin or misoprostol depending on their Bishop's score. In the group of patients, where PROM delivery interval >18 hours were found to have more maternal complications like puerperal sepsis, chorioamnionitis, wound gape, paralytic ileus, and more neonatal complications like jaundice, sepsis. In our study, maternal morbidity was directly related to the PROM delivery interval. Thus, women diagnosed with PROM should be hospitalised early or referred early to tertiary hospital and actively managed and followed up till delivery. Timely referral and timely intervention can further improve perinatal outcome.

INTRODUCTION

Premature rupture of membranes (PROM) is defined as spontaneous rupture of membrane at any time beyond 28⁹ weeks of pregnancy but before the onset of labour (Arias et al., 2011). Premature rupture of membranes affects approximately 5-10% of pregnant women, and in 60-80% it will occur after 37 weeks of gestation (MN and MS, 2019; Surayapalem et al., 2017). The main complication of PROM is maternal and neonatal infections. So to avoid these complications, labour is usually induced once PROM is confirmed sooner or later depending on the gestational age and fetal maturity. Different views exist regarding the timing and the method of induction of labour (IOL). Although it is well established that the risk of infectious morbidity increases with increasing duration of time of ruptured membranes, some opt for expectant management based on reported associations between increased rates of caesarean sections and some opt for immediate labour induction (Middleton et al., 2017; Devillard et al., 2019). As prevention of PROM is difficult due to its multifactorial aetiology, one has to concentrate more on the management of PROM to reduce its complications (Assefa et al., 2011).
The present study aimed to study the subsequent course of PROM pregnancy and evaluate the maternal and neonatal morbidity and mortality in PROM patients admitted in our hospital. It enriched the pool of knowledge for the obstetrician to ensure the correct management of PROM, which can ultimately reduce the morbidity and mortality caused by it.

Aims and Objective
This study aimed to study the outcome of PROM pregnancy. We also evaluated the maternal and neonatal morbidity and mortality and compared it with the PROM delivery interval.

MATERIAL AND METHODS
It was the prospective observational study, conducted in our hospital for one year period. Patients of PROM admitted in labour room were included in our study as per inclusion and exclusion criteria. Two hundred forty samples were taken, and the sample size was estimated based on the incidence of PROM as 5-10% by the Cochrane formula.

Statistical analysis
The data collected was organised in a separate sheet programme (MSExcel) and analysed with the help of Statistical Package for Social Science (SPSS Inc., Chicago, IL, version 18.0 for Windows) for testing. All statistical analysis were two-tailed, and P-value <0.05 was taken as statistically significant.

Inclusion criteria were gestational age >34 weeks, spontaneous rupture of membranes, singleton pregnancy with a cephalic presentation, free leak of liquor seen on speculum examination and dilatation should be <3 cm and effacement <80 % and membrane absent.

Exclusion criteria were cephalopelvic disproportion, post-dated pregnancy, a medical disorder of pregnancy like pregnancy-induced hypertension, gestational diabetes etc., intrauterine growth restriction, fetal with a congenital malformation, intrauterine death, antepartum haemorrhage or cord prolapse or meconium-stained liquor or signs of sepsis at the time of the first examination, and dai (untrained midwife) handled patient. A detailed history was taken of all admitted patients, and thorough general and systemic examination was done.

Diagnosis of PROM was made on the history of the patient and per speculum examination. All patients of PROM, selected as per inclusion and exclusion criteria, were induced immediately after taking proper informed consent and relevant investigations. If cervix was unfavourable with poor Bishop’s score (<6), then tab misoprostol (prostaglandin E1) 25 microgram sublingually was used to ripen the cervix and induce the labour. Then augmentation was done with oxytocin if required, and if the cervix was favourable (Bishop’s score ≥ 6), then oxytocin was started in titration dose. Prophylactic antibiotics in the form of injection Cefotaxime 1gm intravenous 12 hourly and inj. Metronidazole 500 mg 8 hourly were given (as it was locally available in the hospital, according to the protocol of institution.)

Pregnancy outcomes were studied along the following lines.

Mode of delivery
Vaginal delivery, emergency caesarean section, instrumental delivery.

Labour and delivery outcome
Whether spontaneous or induced.
1. The first stage was studied to see for the progress of labour, and any complication like fetal distress, a non-progression of labour.
2. The second stage for the mode of delivery and any other complications.
3. The third stage for postpartum haemorrhage or any other complications.
4. Signs and symptoms of chorioamnionitis were looked for.

Diagnosis of chorioamnionitis
It was made based on following criteria (Arias et al., 2011; Adhikary et al., 2013).
Maternal fever (>38 degrees Celsius/100.4 F) with two or more of the following
1. Maternal pulse rate >100 per minute
2. Fetal heart rate >160 per minute
3. Uterine tenderness.
4. Foul-smelling vaginal discharge.
5. Leucocytosis ≥ 15000/mm3.

No other site of infection.

Caesarean outcome
Intraoperative complications, postoperative complications if any was noted like postpartum haemorrhage, fever, atelectasis, paralytic ileus, urinary tract infection, serous discharge from the wound, gaping of the stitch line.
Table 1: Age Distribution

| Age      | No. of patients | Percentage |
|----------|-----------------|------------|
| <20 yrs  | 20              | 8.3        |
| 21-25 yrs| 133             | 55.4       |
| 26-30 yrs| 69              | 28.8       |
| >30 yrs  | 18              | 7.5        |

Table 2: Distribution of Gravida

| Gravida | No. of patients | Percentage |
|---------|-----------------|------------|
| 1       | 122             | 50.8       |
| 2       | 64              | 26.7       |
| 3       | 39              | 16.3       |
| ≥4      | 15              | 6.3        |

Table 3: PROM delivery interval

| Hours     | No. of patients | Percentage |
|-----------|-----------------|------------|
| <18 hrs   | 164             | 68.33      |
| >18 hrs   | 76              | 31.66      |

Table 4: PROM delivery interval and maternal complications

| Complications              | <18 hours (164) | >18 hours (76) | P value |
|----------------------------|-----------------|----------------|---------|
| Abruptio placentae         | 3(1.82%)        | 0              | 0.55    |
| Chorioamnionitis           | 5(3.07%)        | 16(21.1%)      | 0.00    |
| PPH                        | 16(9.8%)        | 8(10.5%)       | 0.509   |
| Puerperal sepsis           | 5(3.0%)         | 9(11.8%)       | 0.01    |
| Wound gape                 | 6(3.71%)        | 22(28.9%)      | 0.00    |
| Abdominal Distension       | 0(0)            | 10(13.27%)     | 0.00    |

Table 5: Neonatal complications

| Complications              | No. of fetus | Percentage |
|----------------------------|--------------|------------|
| Birth asphyxia             | 23           | 9.6        |
| TTNB                      | 18           | 7.5        |
| RDS                       | 16           | 6.66       |
| Jaundice                  | 57           | 23.8       |
| Sepsis                    | 14           | 5.8        |
| Blood culture positive sepsis | 6          | 2.5        |
| Meningitis                | 4            | 1.7        |
| Antibiotics required       | 50           | 20.8       |
| NICU admission            | 13           | 5.4        |
| Neonatal death            | 3            | 1.3        |
Table 6: PROM delivery interval and neonatal complications

| Complications             | < 18hrs (164) | >18hrs (76) | P value |
|---------------------------|---------------|-------------|---------|
| Birth asphyxia            | 14(8.5%)      | 9(11.8%)    | 0.278   |
| TTNB                     | 4(2.4%)       | 14(18.4%)   | 0.00    |
| RDS                      | 9(5.5%)       | 7(9.2%)     | 0.210   |
| Jaundice                  | 30(18.3%)     | 27(35.5%)   | 0.003   |
| Sepsis                    | 0(0)          | 14(18.4%)   | 0.00    |
| Blood culture positive    | 0(0)          | 6(7.89%)    | 0.001   |
| Meningitis                | 1(0.6%)       | 3(3.9%)     | 0.095   |
| Antibiotics required      | 24(14.6%)     | 26(34.2%)   | 0.001   |
| NICU admission            | 7(4.3%)       | 6(7.9%)     | 0.196   |
| Neonatal death            | 2(1.2%)       | 1(1.3%)     | 0.683   |

Diagnosis of maternal puerperal sepsis was made on presence of following

1. Pyrexia (>38 degrees Celsius/100.4 F)
2. Offensive lochial discharge
3. Lower abdominal tenderness.

Fetal outcome
Following neonatal outcome were noted- Apgar score at 1 and 5 minutes, birth weight, transient tachypnea of newborn, meconium aspiration, neonatal sepsis and other associated complications.

Neonatal sepsis management
Investigations of sepsis of baby were sent for cases with PROM of >18 hours, foul-smelling liquor; maternal fever and baby having signs and symptoms of sepsis (lethargy, temperature instability, unable to feed etc.). Investigations of sepsis included c-reactive protein, micro ESR, absolute neutrophilic count, immature to total lymphocyte count (I/T ratio), and blood culture. The paediatrician started antibiotics if sepsis workup was positive. Those whose blood culture was negative were given antibiotics for seven days, and those with culture-positive were given antibiotics for 14 days (as per the protocol of institute). Neonates were followed till discharge.

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RESULTS

Patients enrolled in our study were between the age of 18 years (minimum age) to 40 years (maximum age) with a mean age of 25.13 ± 3.64. Table 1. Majority of patients, i.e. 50.8% (122 patients) were primigravida, 64 patients (26.7%) were the second gravida, 39 patients (16.3%) were the third gravida, and 15 patients (6.3%) were fourth gravida or more Table 2. Thirty-two patients (27.12%) had a history of PROM in a previous pregnancy. (excluding 122 patients, as they were primigravida.). In our study, 20 patients (8.3%) had spontaneous onset of labour, 220 patients (91.7%) required induction of labour either with misoprostol or oxytocin. One hundred twenty-two patients were induced with oxytocin. In contrast, the remaining 98 patients were induced with misoprostol 25 microgram sublingual every 4-6 hours according to their bishops score at the time of examinations.

In our study, 164 patients (68.33%) were delivered within 18 hours of PROM and 76 patients (31.66%) delivered after 18 hours of PROM. Mean duration of PROM delivery interval was 15.27 hours ± 7.218 Table 3. 158 patients (65.8%) had normal vaginal delivery (NVD), 71 patients (29.6%) had caesarean section and 11 patients (4.6%) required instrumental delivery. Thus the majority of PROM patients of our study were delivered vaginally.

In our study, three patients (1.25%) had abruptio placentae, 21 patients (8.8%) developed chorioamnionitis, 24 patients (10%) developed postpartum haemorrhage (PPH). Puerperal sepsis was developed in 14 patients (5.8%), 28 patients (11.7%) were having wound gape, either of caesarean stitch line or episiotomy and ten patients (4.2%) developed abdominal distension. There was no maternal mortality in our study. It is seen that maternal complications like chorioamnionitis, puerperal sepsis, wound gape, abdominal distension was significantly increased when PROM delivery interval was >18 hours (p value<0.05). However, abruptio placentae and PPH was not seen considerably different in both groups of PROM delivery interval (p value>0.05). (Table 4, Figure 1)

In our study, 23 neonates (9.6%) had birth asphyxia, whereas 18 neonates (7.5%) were having TTNB (transient tachypnoea of newborn). RDS (respiratory distress syndrome) developed in16 neonates (6.66%). Fifty-seven neonates (23.8%) developed jaundice, and 14 neonates (5.8%) had sepsis, whereas blood culture positive sepsis in 6 neonates (2.5%). Four neonates (1.7%) developed meningitis, 50 neonates (20.8%) required antibiotics and 13 neonates (5.4%) had to be kept in NICU. Three neonatal deaths (1.3%) occurred in our study Table 5.

It was seen that neonatal complications like TTNB, jaundice, sepsis, positive blood culture sepsis, the requirement of antibiotics were significantly more in PROM delivery interval > 18 hours (p value<0.05). Other complications like birth asphyxia, RDS, meningitis, NICU admission and neonatal death were not significantly different in
DISCUSSION

Premature rupture of membranes is a common complication of pregnancy and can lead to increased maternal complications, operative deliveries, neonatal morbidity and mortality. Increasing the obstetrician’s trouble is the fact that much of the literature available pertains to the studies in developed countries. In developing countries like India, the incidence of maternal and perinatal morbidities is still higher, especially in a resource-poor setting. Early diagnosis and careful management with appropriate use of labour induction agents can help decrease maternal and perinatal morbidities.

Mean age of our study population was 25.13 ± 3.64 years. Our results were comparable with the studies of Surayapalem et al. (2017) and Gandhi et al. (2012), where the majority of patients were between 20-25 years of age group. It may be because being a high fertility age group, so accompanied by more obstetric complications, including PROM.

In our study majority of patients of PROM were primigravida (50.8%), similar to study population of Gandhi et al. (2012), Adhikary et al. (2013) where primigravida comprises a significant group of 58%, 60.7% and 53.5% respectively.

In our study, 27.12% had a history of PROM in previous pregnancy which is comparable to the study of Noor et al. (2010) and Mohamed et al. (2005) where the history of PROM in previous pregnancy was 30% and 20% respectively.

In our study, majority of patients were delivered within 18 hours (68.33%), which are comparable to the study of Gandhi et al. (2012), Shah and Sandesara (2011) where 55% patients delivered within 18 hours and 92.5% delivered within 20 hours respectively. Mean duration of PROM delivery interval in our study was 15.27 hours ± 7.218 which was lesser when compared to mean PROM delivery interval in the study of Surayapalem et al. (2017) and Kadikar et al. (2014), where mean PROM delivery interval was 20.2 hours and 24 hours respectively. Short PROM delivery interval in our study can be attributed to the immediate induction of patients.

In our study, the majority of PROM patients were delivered vaginally (65.8%). In contrast, caesarean section occurred in 29.6% of cases and 4.6% required instrumental delivery, which is comparable with the results of a study of MN and MS (2019) and Surayapalem et al. (2017), where NVD occurred in 80% and 70% cases and caesarean section occurred in 20% and 27.5% of study subject respectively.

In our study, chorioamnionitis was significantly more in patients with PROM delivery interval > 18 hours which is comparable with the results of Tran et al. (2008) which showed that risks of PPH, chorioamnionitis and endometritis are significantly increased at 8 hours, 12 hours and 16 hours, respectively after rupturing of membranes. Similar results were also seen in the study of Ramsey et al. (2005), which showed that maternal morbidity increases when PROM delivery interval is > 18 hours (p value<0.05).

In our study, it was found that the incidence of puerperal sepsis, wound gape, abdominal distension was significantly more when PROM delivery interval was > 18 hours (p value<0.05). However, abruption placent and PPH were not seen significantly different in both groups of PROM delivery interval of > 18 hours and < 18 hours (p value>0.05).

In our study, it was seen that neonatal complications like Apgar at 1 minute <7, TTNB, jaundice, sepsis, blood culture positive sepsis, the requirement of antibiotics were significantly more in patients PROM delivery interval > 18 hours (p value<0.05). These results were similar to the study of Kadikar et al. (2014), where neonatal morbidity and mortality was directly related to the latent period and PROM delivery interval. Similarly, in the study by Lokhande and Nistane (2016), 11.7% neonates having PROM delivery interval > 18 hours showed growth in blood culture and 8.3% neonates showed signs of septicaemia which was significantly high than the neonates with short PROM delivery interval.

In our study, all three neonatal mortality was in < 18 hours PROM delivery interval group. It was since, and all neonatal deaths occurred for either cord prolapse and RDS and sepsis, which presented intranasally as fetal distress and were taken for caesarean section, immediately.

Since PROM increases the maternal and perinatal morbidity and mortality, thus decreasing the duration of PROM delivery interval can significantly improve the maternal and perinatal outcome.

CONCLUSION

Every obstetrician aims for healthy mother and healthy baby. But PROM is encountered to be one of the most common clinical events which turn normal pregnancy into a high risk one. In our study, we
found that PROM affects both maternal and neonatal outcome such as infection, increased operative delivery, neonatal infection and intensive care. In our study, maternal morbidity was directly related to the PROM delivery interval. Thus, early and accurate diagnosis of PROM is essential and then diagnosed women with PROM should have prompt hospitalisation or early referral to the tertiary care centre and timely intervention, which can decrease the incidence of PROM related complications and thereby improve maternal and fetal outcome. Since our study population mainly comprised of referrals from a rural area and were of low socioeconomic class, and most of the available guidelines are based on the studies that were conducted in developed countries, there is need to develop modifiable guidelines for the management of PROM pregnancy in developing countries like India. A nationwide study should provide in-depth knowledge about the prevalence and impact of PROM on pregnancy and maternal and neonatal outcome.

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Ethical approval
This was a prospective observational study and it was approved by the ethical committee of the institute and has been performed with the ethical standards described in an appropriate version of the 1975 Declaration of Helsinki, as revised in 2000.

Informed consent
We have taken informed consent of patients for including them in our study and using their treatment details for publishing in journal, without breaching the respect and confidentiality of our case. We have not caused any harm to the patients.

Conflict of interest
The authors declare that they have no conflict of interest for this study.

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