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Original Research Article

## A prospective study of maternal outcome of labor and perinatal outcome in premature rupture of membranes

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### ABSTRACT

**Background:** Premature rupture of membranes refers to rupture of fetal membranes prior to the onset of labor. PROM is of two types viz. term PROM and preterm PROM. The incidence of PROM is at an average of 10%. In 70% of the cases, it occurs in pregnancies at term. Preterm PROM- defined as PROM prior to 37 weeks of gestation- complicates 2% to 4% of all singleton and 7% to 20% of twin pregnancies. It is the leading identifiable cause of premature birth and accounts for approximately 18% to 20% of perinatal deaths.

**Methods:** This study was conducted in the tertiary care teaching institute in the state of Jammu and Kashmir, India. After taking an informed consent, a proforma was filled on subject history, examination and investigations. These subjects were followed until delivery and then neonates were also followed.

**Results:** Incidence of PROM was 8.76% of which 54.7% were primigravida and 45.3% were multigravida. Most of the patients (70.4%) were term, only 29.6% were preterm with gestational age of <37 weeks. Incidence of PPH was 2.8%, puerperal pyrexia occurred in 9.8%. The incidence of RDS in neonates was 8.9% while the incidence of neonatal sepsis was 6.7%. There was 1.1% perinatal mortality.

**Conclusions:** From this study it can be concluded that basic aim of obstetrician should be to identify the risk factors leading to PROM, to treat complications and implement strict aseptic precautions to prevent maternal and neonatal morbidity.

**Keywords:** Maternal morbidity, Perinatal period

### INTRODUCTION

Premature rupture of membranes refers to rupture of fetal membranes prior to the onset of labor.<sup>1,2</sup> It can occur at any gestational age. PROM is of two types viz. term PROM and preterm PROM. Preterm PROM: Preterm premature rupture of the membranes (PPROM) is the rupture of membranes prior to the onset of labor in a patient who is at less than 37 weeks of gestation.<sup>3</sup> Term PROM: PROM at term is defined as rupture of the membranes prior to the onset of labor in women at or over 37 weeks gestation.<sup>4</sup> The incidence of PROM varies from 2 to 18% with an average of 10%.<sup>5</sup> In 70% of the cases it occurs in

pregnancies at term.<sup>6</sup> Preterm PROM occurs in 3% of all pregnancies. It is responsible for approximately 30% of all preterm deliveries. Prolonged PROM: Prolonged PROM refers to PROM greater than 24 hours and is associated with an increased risk of ascending infection.<sup>1,2</sup>

The fetal membranes serve as a barrier to ascending infection. Once the membranes rupture, both the mother and fetus are at risk of infection and of other complications. Chorioamnionitis is seen more commonly in women with prolonged preterm PROM, severe oligohydramnios, multiple vaginal examinations and preterm PROM at an early gestational age. The genital

mycoplasmas, ureaplasma urealyticum and mycoplasma hominis constitute the most frequent microbes occurring in upto 47% and 30% respectively of cases of culture confirmed chorioamnionitis.<sup>7,8</sup> When PROM occurs at term, labor typically ensues spontaneously or is induced within 12 to 24 hours. The management of pregnancies complicated by preterm PROM, however, is more challenging.

## METHODS

### *Aims and objectives of our study*

To study the incidence of patients with premature rupture of membranes. To assess the outcome of labor and its effect on maternal morbidity. To analyse fetal/neonatal outcome in patients of premature rupture of membranes.

The study was conducted on patients with premature rupture of membranes admitted in the department of obstetrics and gynecology of Sher-i-Kashmir Institute of Medical Sciences, Soura, Srinagar, Jammu and Kashmir, India. The study was conducted over a period of one year, in accordance with the guidelines approved by the ethics committee of our institute. From March 2016 to March 2017 a total of 410 patients were diagnosed with PROM and out of these patients 358 were enrolled in our study and the rest were excluded. The study included a standardized interview, relevant physical examination and required investigation profile of the patients meeting the following criteria:

### *Inclusion criteria*

Women with PROM over 28 week of gestation with Singleton pregnancy and with vertex presentation.

### *Exclusion criteria*

Women with medical disorders and Women with obstetric high risk factors like diabetes, pregnancy induced hypertension, heart disease complicating pregnancy and antepartum hemorrhage.

Diagnosis was based on clinical history of passage of liquor and subsequent pooling of fluid in posterior fornix as seen on sterile speculum examination with pressure on uterine fundus.

All patients diagnosed with premature rupture of membranes were admitted to labor room. On admission a detailed history regarding age, parity, menstrual history, exact time of rupture, its duration, amount of leaking and association of pain and past history of were evaluated.

In examination vitals were recorded and detailed obstetric examination done. All parameters of maternal and foetal wellbeing were noted and pelvic examination was done to note the Bishop's score, presence or absence of membranes, presenting part and its station, to rule out cord

prolapse and also pelvic assessment. All base line investigations and obstetric USG was done.

All patients with leaking received prophylactic antibiotics and Patients with gestational age below 37 weeks were given antenatal corticosteroids to enhance fetal maturity. Induction was planned in suitable cases. Labor was monitored by partogram till delivery. Cases with foetal distress and failure to progress were delivered by emergency caesarean section.

Baby was examined in relation with: Apgar score, neonatal sepsis, RDS and other complications.

### *Statistical analysis*

The recorded data was compiled and entered in a spreadsheet (Microsoft Excel) and then exported to data editor of SPSS version 20.0 (SPSS Inc., Chicago, Illinois, USA). Continuous variables were summarized in the form of means and standard deviations and categorical variables were expressed as frequencies and percentages. Graphically the data was presented by bar and pie diagrams. Student's independent t-test was employed for comparing continuous variables. Chi-square test or Fisher's exact test, whichever appropriate, was applied for comparing categorical variables. A p value of less than 0.05 was considered statistically significant. All p values were two tailed.

## RESULTS

The incidence of PROM in our study was 8.76%.

**Table 1: Incidence of premature rupture of membranes in studied population.**

<b>Total admissions</b>	<b>4680</b>
<b>Number of cases with PROM</b>	<b>410</b>
<b>Incidence</b>	<b>8.76%</b>

The mean age of our patients was 28.9±2.01. Most of the patients (58.7%) were in the age group of 27-29 years.

**Table 2: Age distribution of study patients.**

Age (years)	Number	Percentage
<b>24-26</b>	32	8.9
<b>27-29</b>	210	58.7
<b>30-32</b>	98	27.4
<b>33-35</b>	18	5.0
<b>Total</b>	<b>358</b>	<b>100</b>
<b>Mean±SD=28.9±2.01</b>		

Majority of patients (54.7%) were primigravida and 45.3% were multigravida.

Most of the patients (70.4%) were term with gestational age of ≥37 weeks at the time of rupture of membranes,

only 29.6% were preterm with gestational age of <37 weeks.

**Table 3: Distribution of study patients as per gravidity.**

Gravidity	Number	Percentage
Primigravida	196	54.7
Multigravida	162	45.3
<b>Total</b>	<b>358</b>	<b>100</b>

**Table 4: Gestational age (weeks) of study patients.**

Gestational age (weeks)	Number	Percentage
<37	106	29.6
≥37	252	70.4
<b>Total</b>	<b>358</b>	<b>100</b>
<b>Mean±SD=37.5±1.94</b>		

Most of the patients (69.8%) were delivered via LSCS, only 30.2% patients delivered by vaginal route.

**Table 5: Mode of delivery in study patients.**

Mode of delivery	Number	Percentage
Vaginal	108	30.2
LSCS	250	69.8
<b>Total</b>	<b>358</b>	<b>100</b>

Indication for LSCS was fetal distress in 25.6% patients, oligohydramnios in 24.8% patients, cephalopelvic disproportion in 14.4% patients, failure of induction in 19.2% patients, previous 2 LSCS in 6.4% patients and other indications constituted 9.6%.

**Table 6: Indications for LSCS in study patients.**

Indications for LSCS	Frequency	Percentage
Fetal distress	64	25.6
Oligohydramnios	62	24.8
Cephalopelvic disproportion	36	14.4
Failure of Induction	48	19.2
Previous two cesarean	16	6.4
Other Indications	24	9.6
<b>Total</b>	<b>250</b>	<b>100</b>

**Table 7: Incidence of maternal morbidity in study patients.**

Parameter	Frequency	Percentage
PPH	Present	10
	Absent	258
Puerperal pyrexia	Present	35
	Absent	323
Puerperal sepsis	Present	0
	Absent	358

Incidence of PPH in our study was 2.8%, puerperal pyrexia occurred in 9.8% patients and there was no case of puerperal sepsis.

16.8% neonates in our study required admission to NICU.

**Table 8: Distribution of neonates according to NICU admission.**

Parameter	Number	Percentage
NICU admission	Yes	60
	No	298
<b>Total</b>	<b>358</b>	<b>100</b>

The incidence of respiratory distress syndrome in neonates was 8.9% in our study, while the incidence of neonatal sepsis was 6.7%.

**Table 9: Incidence of RDS and neonatal sepsis.**

Parameter	Frequency	Percentage
RDS	Present	32
	Absent	326
Neonatal sepsis	Present	24
	Absent	334

There was 1.1% perinatal mortality in our study.

**Table 10: Perinatal mortality.**

Perinatal mortality	Frequency	Percentage
Yes	4	1.1
No	354	98.9

## DISCUSSION

Premature rupture of membranes or prelabor rupture of membranes (PROM) is one of the most common complications of pregnancy with significant impact on maternal and perinatal outcome. It occurs in 1 out of every 10 pregnancies.<sup>9</sup> 80% of women who present with PROM are term. It is also one of the commonest events where a normal pregnancy can turn into a high-risk situation for the mother as well as for the fetus. Despite the relative frequency of this event, clinical management is one issue unresolved by the clinical research to date.<sup>2</sup>

This study was carried out in Sheri Kashmir Institute of Medical Sciences Soura Srinagar, Jammu and Kashmir, India. The incidence of PROM in our study was 8.76%, which is comparable to the incidence of PROM in studies conducted by Madena et al (9-10%) and Eslamian study (7.5%).<sup>10,11</sup> The incidence of PROM reported by Revathi et al was 7.86% in term patients which is in agreement with results of our study.<sup>12</sup>

In our study PROM was more frequently seen in younger age group, most patients being in the age group of 27-29 years with mean age of 28.9±2.01 years. This is

comparable to study done by Yildiz et al in which 57% patients were in age group of 25-34 years with mean age of  $28.33 \pm 5.57$  years.<sup>13</sup>

The incidence of PROM was more in primigravida patients as compared to multigravida patients. In our study 54.7% patients were primigravida and 45.3% were multigravida, these results were comparable to study by Patil et al in which 53% patients were primigravida.<sup>14</sup> Study results by Prechappanich et al showed that incidence of PROM was 8.8% in primigravidas and 5.1% in multigravida patients in their hospital.<sup>15</sup>

PROM occurs in approximately 5-10% of all pregnancies of which 80% occur at term.<sup>16</sup> In our study the incidence of term PROM was more as 70.4% patients had a gestational age of 37 weeks which is comparable to study by Gahwagi et al where 83% patients were between gestational age of 37-41 weeks and only 17% patients were between gestational age of 30-36 weeks.<sup>17</sup> Results of study by Patil also showed that percentage of PROM with gestational age <32 weeks corresponded to 7% and those near term corresponded to 75%.<sup>14</sup>

In our study the mode of delivery in majority of the patients was LSCS (69.8%) which is in contrast to studies by Minnalkodi et al where 87% patients delivered by vaginal route and only 19% patients required LSCS.<sup>18</sup> According to study done by Gahwagi et al vaginal delivery occurred in 72% and LSCS in 28% patients of PROM.<sup>17</sup> The reasons for increased rate of LSCS in our hospital could be failure of induction and persistent maternal insist for cesarean section due to fear of oligohydramnios. The indications for cesarean section vary from hospital to hospital and study to study and sometimes from time to time in the same hospital and depend on the hospital set up. Study results by Gahwagi et al showed that indication for cesarean was failure of induction in 50% patients in their study while as study by Patil et al showed that indications for cesarean was fetal distress in 50% patients and cephalopelvic disproportion in 14.8% patients in their study.<sup>14,17</sup> In our study the indications for LSCS were fetal distress in 25.6%, oligohydramnios in 24.8%, failure of induction in 19.2%, cephalopelvic disproportion in 14.4%, previous 2 cesarean in 6.4% and other indications like cord prolapse, placental abruption and maternal request constituted for 9.6%.

In our study PPH complicated 2.8% cases which was comparable to study done by Endale et al in which PPH complicated 3.7% cases.<sup>19</sup> The incidence of puerperal pyrexia was 9.8% in our study which is comparable to the incidence of 9% given by Minnalkodi et al and 11% by Patil et al.<sup>14,18</sup> There was no case of puerperal sepsis in our study likely due to proper antibiotic prophylaxis, restricted PV examinations and early intervention of leaking cases. The maternal morbidity reported in our study is low compared to previous studies. This positive maternal outcome may be due in part to the consistent use of

antibiotics among the study group once diagnosis of PROM was made.

The incidence of RDS in our study was 8.9% as the study included patients with term as well as preterm PROM cases. The incidence is slightly less than the incidence given by Minnalkodi et al, in which only term PROM cases were studied and incidence of RDS was 13%.<sup>18</sup> In our study the incidence of RDS was 26.4% in neonates born before 37 weeks of gestation which is well consistent with study done by Patil et al where incidence of RDS was 26% in PPRM cases.<sup>14</sup> Only 1.6% babies with gestational age more than 37 weeks developed RDS in our study.

In our study the incidence of neonatal sepsis was 6.7% as our study included both term as well as preterm neonates. This was comparable with study results given by Minnalkodi et al which included term PROM cases and the incidence of neonatal sepsis was 2% and study results by Patil et al which included only PPRM cases and incidence of neonatal sepsis was 14%.<sup>14,18</sup>

In our study 16.8% neonates required NICU admission. This is comparable to study by Endale et al where they found NICU admission rate of 25.4% in term PROM cases.<sup>19</sup> The increased rates of NICU admission in their study could be prolonged latent period of >24 hours in majority (53.7%) of patients. The cause for NICU admission in our study was perinatal asphyxia, transient tachypnea of newborn, respiratory distress syndrome and neonatal sepsis. In our study the rate of NICU admission decreased as gestational age improved. In our study 52.8% babies born before 37 weeks needed admission in NICU and only 1.6% babies born at  $\geq 37$  weeks needed NICU admission. In study results by Patil et al, of all cases 36% babies were admitted in NICU, out of which 64% were of less than 35 weeks gestation showing that prematurity is a risk factor for NICU admission which is well consistent with the results of our study.<sup>14</sup>

Perinatal mortality has decreased in the past few years due to better obstetric care, better hygiene and proper antibiotic prophylaxis to prevent chorioamnionitis and increased NICU facilities. In our study there were 4 early neonatal deaths out of 358 which constituted only 1.1% of studied group. All the neonatal mortalities were seen in neonates born before 37 weeks of gestation which is comparable with the study by Minnalkodi et al where the incidence of perinatal mortality was 1% in term PROM cases.<sup>18</sup> In our study there was 3.8% perinatal mortality in neonates with gestational age <37 weeks and no perinatal mortality in neonates born at  $\geq 37$  weeks. The reason for early neonatal death in our study was low birth weight, respiratory distress syndrome and septicemia. There was no case of maternal mortality in our study.

The study was done over a short span of time and included a small number of patients, for proper validation of conclusions a large sample size is required.

## CONCLUSION

The present study shows the incidence of PROM as 8.76% in our hospital. Majority (58.7%) of patients were in age group of 27-29 years and majority (69.8%) of them required LSCS. The maternal problem associated with PROM are risks of infection, cord prolapse, abruptio placentae and unfavourable cervix for induction. The latter is associated with high risk of dysfunctional labor, chorioamnionitis, an increased rate of cesarean section, PPH and endomyometritis. RDS and neonatal sepsis were the main neonatal complication seen in 8.9% neonates and 6.7% neonates respectively. From this study it can be concluded that basic aim of obstetrician should be to identify the risk factors leading to PROM, to treat complications and implement strict aseptic precautions to prevent maternal and neonatal morbidity. The decision for appropriate management depends on the assessment of the gestational age, the likelihood of infection and the availability of neonatal intensive care facilities.

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