



Original Research Article

Maternal and perinatal outcomes: Preterm premature rupture of membrane between 34 – 37 weeks

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Abstract

Background: This is an Prospective observational analytical study carried out in department of obstetrics and Gynecology, Hi-Tech Medical College & Hospital, Bhubaneswar, in a tertiary care center to determine the factors influencing fetal and maternal outcome, prognosis, morbidity and mortality in preterm premature rupture of membrane cases.

Methods: The present study is a prospective observational study of perinatal and maternal outcome in 100 cases of preterm premature rupture of membranes in between 34-37 weeks gestation with singleton pregnancy, from 1st Nov 2016 to 31st Oct 2018. Patients with medical complications like anemia, preexisting hypertension, diabetes, vascular or renal disease, multiple gestations, uterine or fetal anomalies etc. are excluded from the study. Detailed history, physical examinations were carried out and appropriate management instituted as per individual patients need.

Results: In this study maternal morbidity was 35%. Perinatal morbidity was 68% and most common causes were hyperbilirubinemia (23%), Sepsis (15%). Perinatal mortality was seen in 1% and mainly due to very LBW. Fifty Eight (58%) neonates were delivered by cesarean. The main indications for cesarean being fetal distress (43.3%) followed by non progress of labour (36%).

Conclusions: PPRM is one of the important causes of preterm birth that can result in high perinatal morbidity and mortality along with maternal morbidity. Looking after a premature infant puts immense burden on the family, economy and health care resources of the country. An understanding of gestational age dependent neonatal morbidity and mortality is important in determining the potential benefits of conservative management of preterm PROM at any gestation.

Keywords: PPRM, Perinatal morbidity.

Introduction

Premature rupture of membranes (PROM) is defined as the spontaneous rupture of amniotic membrane with a release of amniotic fluid at

least one hour before the onset of labor. If the membranes rupture after 37 weeks of gestation it is called term PROM. If the rupture of membranes (ROM) occur after 28 weeks but

before 37 weeks of gestation is termed as the preterm premature rupture of membrane (PPROM).¹

Latent period: It is the time interval between the rupture of membranes and the onset of uterine contractions.²

Prolonged PROM: It is the term used when more than 24 hours have elapsed before the labor ensues.²

High rupture of Membranes- It is due to the rupture of amniochorion at a site distant from internal OS and spontaneous cessation of leakage can occur.²

PROM is usually followed by labor. The onset of labor after PROM is directly related to the gestational age at the time of rupture. Labor started within 24 hours of PROM in 81% of patients carrying babies larger than 2500 grams.

Only 48% of the patients develop labor within three days of PROM.² It is an obstetric conundrum which is poorly defined, with an obscure etiology, difficult to diagnose and is associated with significant maternal and neonatal morbidity and mortality and has diverse and controversial management strategies.²

Incidence of Prom

PROM occurs in approximately 10 % of all pregnancies and in 70% of the cases at term. Although there is some morbidity when PROM occurs in term pregnancies, the fundamental clinical problem is preterm PROM, a condition that occurs in 3% of all pregnancies and is responsible for approximately 30 % of all preterm deliveries.¹

Preterm PROM complicates 3-8% of pregnancies and leads to one third of preterm deliveries.² It increases the risk of prematurity and leads to other perinatal and neonatal complications with 1-2% risk of fetal death. PROM is associated with increased risk of chorioamnionitis, dysfunctional labor, increased cesarean rates, postpartum hemorrhage and endometritis in the mother. In the fetus, there is increased occurrence of hyaline

membrane disease, intraventricular hemorrhage, sepsis, cord prolapse, fetal distress and increased fetal wastage.

Thus, earlier the gestational age at the time of PROM, longer is the latency and more the complications. Management of PROM remains controversial and challenging.² Controversy surrounds the role of tocolytics, steroids and antibiotics.³

The aim of the study was to observe the maternal and perinatal outcome in patients with preterm premature rupture of membranes; to study the maternal complications in preterm premature rupture of membranes; to find out the perinatal morbidity and mortality in preterm premature rupture of membranes and to study mode of delivery in preterm premature rupture of membranes.

Material and Methods

Source of data: 100 patients of preterm premature rupture of membranes in between 34 - 37 weeks gestation admitted in labor room were studied after considering inclusion and exclusion criteria.

Study design: Hospital based prospective observational study.

Study period: Over a period of two year from Nov 2016 to October 2018.

Study place: Tertiary care hospital. Sample size: 100.

As per statistical formula sample size was 100.

Inclusion criteria

- All pregnant women with a singleton pregnancy between 34-37 weeks of gestational age with preterm premature rupture of membranes.

Exclusion criteria

- Multiple pregnancies
- Intrauterine growth restriction
- Uterine anomalies
- Fetal anomalies
- Myomauteri
- Hypertensive disorders and pregnancy

induced hypertension

- Gestational diabetes mellitus
- Antepartum hemorrhage
- Chronic renal failure
- Class II to IV cardiac diseases

Method of collection of data

A detailed history was taken including age, booking, socio-economic status, time of onset of leaking, amount of fluid lost, its colour, odour, association with pain or bleeding per vagina and perception of fetal movements.

General examination, height and weight were recorded. Systemic examination included cardiovascular, respiratory systems and CNS systems.

In the obstetric examination, following were noted. Height of uterine fundus, lie, presentation and position of fetus, engagement of presenting part, condition of uterus whether contracted or relaxed.

Uterine tenderness was looked for as a sign of chorioamnionitis. Fetal heart sound was auscultated and its rate, rhythm and tone were noted. A sterile speculum examination was done and amniotic fluid pooling in posterior fornix was observed. The colour and smell of fluid was noted. If no fluid was seen, the patient was asked to cough, and drainage of fluid was looked for. In doubt, vaginal fluid specimen was collected and subjected to litmus paper test. Cervical swab was taken and sent for Gram stain and culture sensitivity.

A single pelvic examination was done to note the Bishop's score, adequacy of pelvis, assessment of CPD and to rule out cord prolapse. Investigations like total count, differential count and C-reactive protein were done. Prophylactic antibiotic in the form of injection ampicillin 1 gm IV every 6 hourly was given.

Depending upon the gestation age and Bishop's score labour was induced with prostaglandins or augmented with oxytocin. Time of induction was noted. Progress of labor was monitored, Induction to delivery interval and PROM to delivery

interval were noted. Maternal pulse, blood pressure, fetal heart rate and its variations were checked frequently.

The onset of any complications like fetal distress, fetal heart rate variations, chorioamnionitis (clinical) were looked for. Progress of labour was monitored. If there was any evidence of fetal jeopardy or any other obstetrical complications, labour was cut short by instrumental delivery or cesarean section as required.

Following facts were noted:

- Soon after delivery, APGAR score at 1- and 5- minutes birth weight, sex, congenital anomalies, immediate complications and birth injuries, signs of asphyxia, meconium aspiration, sepsis and other associated complications were recorded.
- The babies were followed up in the postnatal period. Neonatal morbidity and mortality were noted.
- Mothers were watched for third stage complications like PPH and retained placenta.

They were followed up in puerperal period. Vital parameters like temperature, pulse, blood pressure were frequently monitored. Women were specifically asked for foul smelling lochia and the presence of febrile morbidity. Episiotomy wound, and cesarean section wound was observed, and regular Follow-up was done. Maternal morbidity like puerperal sepsis, urinary and respiratory tract infection and wound infection were looked for.

Both mother and the baby were followed up till their stay in the hospital.

Statistical analysis

All relevant data will be compiled and entered into computer using computer-based software SPSS for appropriate analysis. Quantitative data will be analyzed by proportion and Chi square test at $p < 0.05$ level of significance.

Results

It is observed that as the duration of PPRM increases the maternal morbidity also increases. In this study 77.17% patients had maternal morbidity when duration of PROM exceeded 24hours

Table 1: Duration of PPRM and maternal morbidity

Duration of PPRM in hours	No. of cases	Percentage
<12	2	5.71%
13-24	6	17.14%
>24	27	77.14%

But no maternal mortality was seen in this study. In this study maternal morbidity was 35%. There are various causes of maternal morbidity including fever, wound infection, lower respiratory tract infection (LRTI) retained placenta which required manual removal of placenta (MROP) and post-partum hemorrhage (PPH).

Table 2: Maternal morbidity causes

Morbidity	No.	%
Puerperal pyrexia	7	20
Chorioamnionitis	7	20
PPH	6	17
UTI	7	20
Wound infection	6	17
Sepsis	2	6

Out of this, in this study Puerperal pyrexia, Chorioamnionitis, UTI, each contributes 20% causes of maternal morbidity.

Table 3: Mode of delivery and parity

Mode of delivery	No of cases	34 wks	%	35 wks	%	36 wks	%
NVD	42	12	28.5	11	26.1	19	45.2
LSCS	58	23	39.6	16	27.5	19	32.7

In above table mode of delivery is categorized according to parity. The total number of cases of LSCS in this study was 58% in comparison to NVD 42 %.

In this study shows normal vaginal delivery percentage increases as gestational age increases from 34 to 36 weeks.

Table 4: Indications for LSCS in PPRM

Indications	No. of cases	Percentage
Fetal distress	26	44.9 %
Non Progress Of Labour	21	36.2 %
Mal position	6	10.3 %
CPD	5	8.6 %
Total	58	100 %

In this study LSCS was done in 58% of the cases, the main indications being fetal distress 44.9% followed by non progress of labour in 36.2%, malposition in 10.3%, CPD in 8.6%.

Table 5: Perinatal morbidity

Causes	No. of cases	Percentage
Hyperbilirubinemia	22	31.88 %
Sepsis	15	21.73 %
Birth Asphyxia	12	17.39 %
Conjunctivitis	07	10.14 %
RDS	07	10.14 %
Skin Infection	02	2.89 %
Hyaline Membrane Disease	01	1.44 %
Neonatal Meningitis	03	4.34 %

In this study perinatal morbidity was 69%. There are various causes including hyperbilirubinemia (31.88%), sepsis (21.7%), Birth Asphyxia (17.39%) .

Other causes being conjunctivitis, Respiratory distress syndrome (RDS), Neonatal meningitis, skin infection, Hyaline membrane disease.

Only one (1%) baby died because of very low birth weight

Table 6: Perinatal morbidity and mortality in relation to duration of PPRM

Duration of Prom	No of cases	Perinatal morbidity	Percentage
<12 hrs	29	3	10.34
12-24 hrs	19	9	36.84
24-36 hrs	24	17	25
>36 hrs	28	23	60.71

Table 7: Perinatal morbidity according to birth weight

Birth weight	No. of cases	Perinatal morbidity	Percentage
< 1800 g	24	23	95.8 %
1801-2000 g	10	08	80 %
2001-2200 g	12	11	91.6 %
2201-2500 g	34	19	55.8 %
>2501 g	20	08	40 %

Discussion

Preterm PROM complicates 3-8% of pregnancies and leads to one third of preterm deliveries.² It increases the risk of prematurity and leads to other perinatal and neonatal complications with 1-2% risk of fetal death. It is an observational study done in tertiary care hospital including 100 patients of preterm premature rupture of membranes in between 34-37 weeks gestation admitted in labor room for a period of one year were studied.

Maternal age

In this study PPRM was present in 84% of cases in the age group of 21-30 years.

Socio-economic status

In this study the patients of low socioeconomic status were 67% and middle socioeconomic status were 28% which is comparable with the study by Shehla which is 68.23% and 31.77% respectively.⁴ Studies have shown that defects in the amniotic membranes occur due to low socioeconomic status associated with factors like malnutrition, over exertion, poor hygiene, stress, high parity, recurrent genitourinary infection and anemia. The risk of PPRM increases with decrease antibacterial activity in the amniotic fluid of patients with low socio- economic status.

Booked and unbooked cases

In this study the booked cases were 33% and unbooked cases 67%. In unbooked cases there is lack of antenatal care leading to lack of identification of recurrent risk factors like PPRM, preterm delivery, induced abortions and their managements. Also, urogenital infections are not detected and treated due to lack of antenatal care leading to PPRM.

Parity

Primigravida is a risk factor for PPRM due to increased sexual activity & increased sexual infection.

Table 8: Comparison of parity with other studies

Other studies	Swathi ³	Shehla ⁴	Okeye ⁵	Trinity ⁶	Our sstudy
Primi	48 %	44.7 %	29.1 %	55.9 %	61%
Multi	52 %	55.3 %	69.9 %	44.1 %	39 %

Mode of delivery

In our study normal delivery were 42%. LSCS were more (58%) because as this is a tertiary hospital with good NICU set up most of the cases referred from outside hospital for fetal condition.

With slight compromise of fetus as shown in USG (oligohydraminous) or nonreactive CTG early termination done. With increase in maternal leucocyte count, CRP levels or increase in maternal temperature termination of pregnancy done by LSCS.

Table 9: Admission Delivery Interval

Admission delivery interval	<12hrs	12-24hrs	>24hrs
No of cases	60	26	14

In our study maximum cases (86%) delivered within 24hours of admission to the Hospital. According to Russels, 1962 80% established labour within 24hours.

Table 10: Comparison of mode of deliveries with other studies

Mode of delivery	NVD	LSCS	INSRTUMENTAL
Shehla ⁴	65.88 %	14.11 %	20%
Trinity ⁶	71.4 %	26.7 %	1.9%
Kadikar ⁷	77 %	10 %	4%
Chales PJ	34.3%	58.7%	7%
Our study	42%	58%	0%

Table 11: Comparison of maternal morbidity with other studies

Other Studies	Maternal Morbidity
Swathi ³	9%
Okeye ⁵	20%
Kadikar ⁷	8%
Anjana ¹²	21%
Our study	35%

Indication for LSCS

Indications for LSCS In this study LSCS was done in 58% of the cases, the main indications

being fetal distress 44.9% followed by non progress of labour in 36.2%, malposition in 10.3%, CPD in 8.6%.

Investigations for evidence of infection

The investigations like total count, C-reactive protein and high vaginal swab for culture and sensitivity were done to evaluate for the evidence of infection. Leukocytosis can be affected by pregnancy and labor. CRP estimates seem to be reliable monitoring tool (Carroll).⁸ But in more detailed studies WBC and CRP were poor predictors of the presence of a positive amniotic fluid or fetal blood culture.¹⁰

In this study 59 cases of normal vaginal flora, 14 cases of *E. coli*, 9 cases of Group B Streptococcus, 8 cases of Klebsiella, 4 cases of *Neisseria gonorrhoea*, 3 cases of staphylococcus Aureus, 3 cases of Chlamydia trachomatis were isolated.

AFI < 5 and LSCS

The findings of this study correlate with the studies by Tavassoli et al that PPRM with oligohydramnios is associated with shorter latency, higher rate of C/S, higher rate of neonatal morbidity and lower neonatal Apgar.¹¹ Therefore, it is recommended to consider the AFI as a prognosis index in patients with PPRM. These patients with reduced AFI on NST had variable deceleration. These studies suggest that NST could be used to monitor for low AFI and cord compression in patients with PPRM. As the duration of PPRM increases the maternal morbidity also increases. The maternal morbidity in this study was 35%. In this study 65% of patients were healthy. Febrile morbidity was seen in 07 % of cases, 6% of cases had Post partum hemorrhage.

The study conducted by Arul Kumar showed that after 32 weeks of gestation the common causes of perinatal morbidity were RDS, perinatal asphyxia and infection, but with good supportive neonatal care most of the infants can survive.¹³ In this study perinatal morbidity was 69% of which 22%

were hyperbilirubinemia 15% sepsis and 12% birth asphyxia. In this study, perinatal mortality was 1%. The high incidence of maternal and neonatal infection may be consequence of decreased antibacterial activity in the amniotic fluid which is low in early pregnancy and increases with gestational age. Another factor is the limited ability of a preterm infant to fight infection.

Perinatal morbidity and mortality in relation to duration of PPRM

In this study, as the duration of PPRM increases, perinatal morbidity increases. When PPRM to delivery interval more than 36 hours Perinatal morbidity was 60.71%. The studies by Russel showed that the danger of infection to both mother and fetus increases with duration of PPRM. But prolongation of latent period decreases the incidence of RDS.¹⁴

Perinatal morbidity and mortality according to birth weight

Perinatal morbidity & mortality decreases as the birth weight increases. When the weight was <1800grams perinatal morbidity was 95.8%. It reduced to 40% morbidity when birth weight increases to > 2500grams.

Conclusion

PPROM is one of the important causes of preterm birth that can result in high perinatal morbidity and mortality along with maternal morbidity. Looking after a premature infant puts immense burden on the economy and health care resources of the country. Therefore, management of PPRM requires accurate diagnosis and evaluation of the risks and benefits of continued pregnancy or expeditious delivery. An understanding of gestational age dependent neonatal morbidity and mortality is important in determining the potential benefits of conservative management of preterm PROM at any gestation. It is important that the patient should be well informed regarding the potential for subsequent

maternal, fetal and neonatal complications regardless of the management approach. Risk scoring strategies involving the demographic variable along with previous history of preterm deliveries should be developed to identify high risk cases and treating them prior to rupture of membrane. Tocolysis in women with PPRM is needed till completion of corticosteroid. Antenatal corticosteroids should be administered in women with PPRM. Routine antibiotic administration reduces maternal and neonatal morbidity. Antibiotic therapy also delays delivery, thereby allowing sufficient time for prophylactic prenatal corticosteroids to take effect. PPRM with oligohydramnios is associated with shorter latency, non reactive CTG, higher rate of cesarean sections,

Recommendations

- Regular antenatal care, good hygiene, nutritious diet, early diagnosis of vaginal infection, literacy, and health education can decrease the incidence of PROM.
- Timely referral of PROM cases to tertiary care hospitals and timely intervention can further improve perinatal outcome.
- Strict aseptic precautions, appropriate therapy, regular antenatal follow-up are important factors in the prevention and management of PPRM.
- The management protocol should be improved and strictly followed in order to improve neonatal outcomes.
- Thus, PPRM patient should be considered high risk and monitored closely with strict supervision and managed according to protocol.

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