

# Fetomaternal Outcome in Preterm Premature Rupture of Membrane

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## ABSTRACT

This prospective observational study was carried out to study the fetomaternal outcome in women with preterm premature rupture of membrane (PPROM) between 24 and 36 weeks of gestation.

**Materials and methods:** A total of 150 pregnant women between 24 and 36 weeks gestation with PROM were subjected to detailed history and examination. Each patient was followed till her delivery and fetomaternal outcome was recorded gestation-wise between 24 and 28 weeks (n = 15), 28 and 32 weeks (n = 30), 32 and 34 weeks (n = 90), and 34 and 36 weeks (n = 15).

**Result:** The mean latency period from membrane rupture to delivery decreased from 15 days at 24 to 28 weeks, 11 days at 28 to 32 weeks to 4.4 days at 32 to 34 weeks to 2.1 days at 34 to 36 weeks. Majority of women delivered vaginally. The rate of spontaneous labor increased as the gestational age at admission increased, the difference between rate of spontaneous labor of 67% at 28 to 32 weeks and 86% at 34 to 36 weeks was statistically significant (p = 0.001). The indications for induction of labor were intrauterine fetal death, gross oligohydramnios, and clinical chorioamnionitis. The most common complication was clinical chorioamnionitis (6%) and postpartum sepsis (6%). The perinatal outcome was favorable in majority of cases and improved with the increase in gestational age at PROM. The overall perinatal mortality was 9.3%.

**Conclusion:** Management of PPRM involves complete evaluation of risks and benefits of conservative management. Wherever possible, the treatment should be directed toward conserving the pregnancy with prophylactic use of antibiotics and steroids thereby reducing fetal-maternal morbidity and mortality. However, termination of pregnancy should be considered at the earliest suspicion of chorioamnionitis.

**Keywords:** Preterm premature rupture of membranes, Chorioamnionitis, Maternal outcome, Neonatal outcome.

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## INTRODUCTION

Preterm premature rupture of membrane (PPROM) is one of the most common cause of prematurity contributing to 30 to 40% of preterm births.<sup>1</sup> There has been significant advancement in the management of PPRM, leading to an improvement in the maternal-fetal outcome. This has been made possible with use of prophylactic antibiotics and steroids. However, neonatal outcome varies from center to center depending upon the neonatal care facilities. This study was done with an aim to find out the fetomaternal outcome in PPRM managed conservatively.

## MATERIALS AND METHODS

This is a prospective study carried out in the Department of Obstetrics and Gynecology in collaboration with the Department of Pathology and Pediatrics at Lady Hardinge Medical College and Smt Sucheta Kriplani Hospital, New Delhi. The study was conducted on pregnant woman attending the antenatal clinics, labor room, and maternity ward with PPRM. Pregnant women with singleton gestation in longitudinal lie with vertex presentation between 24 and 36 weeks were included in this study. Women with pregnancy-induced hypertension (PIH), antepartum hemorrhage, multiple gestation, polyhydramnios, medical disorders, including anemia, heart disease, hypertension and diabetes mellitus, and with gross congenital fetal anomalies, were excluded. Initially, each woman was admitted in the labor room for a complete maternal and fetal work-up. The baseline parameters *viz* demographic profile, gestational age in weeks, antenatal history, duration of premature rupture of membrane (PROM) and associated complications were noted in a prefilled performa. A complete general, physical, systemic, and obstetric examination was done initially to confirm the diagnosis of PPRM and to assess the maternal-fetal condition. Signs of overt chorioamnionitis, such as foul smelling discharge, fever, and tachycardia were looked for. A per speculum examination was done to confirm PROM and to assess the cervical parameters. Amniotic fluid was collected in a speculum or a high vaginal swab (if no leaking observed) is taken for culture and sensitivity before initiation of antibiotics. No

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per vaginam examination was done unless the woman was in labor. A baseline obstetric ultrasound was done to assess the fetal growth parameters, placenta, and the amniotic fluid volume. The woman was observed in the labor room for at least 24 hours. Those not in labor and planned for conservative treatment were transferred to the high-risk maternal ward.

Initial management included two doses of steroids 12 mg of betamethasone 24 hours apart if pregnancy was less than 34 weeks gestation, prophylactic antibiotics injection ampicillin 1 gm, 6 hourly and injection metrogyl 500 mg 8 hourly if PROM was <18 hours and injection gentamycin 80 mg BD was added in PROM >18 hours. After 48 hours, oral amoxicillin 500 mg qid was given for 5 days. Close monitoring of maternal and fetal condition was done. Antibiotics were changed according to the report of high vaginal swab (HVS) collected on admission before starting of prophylactic antibiotics. Antenatal assessment included daily vitals monitoring, obstetric examination, daily vulval pad estimation for continuing leaking, fetal growth assessment, and estimation of liquor volume was done every week by ultrasound. TLC/DLC was twice weekly and HVS was sent every week. Clinical chorioamnionitis was diagnosed if two or more of following clinical features were present. Maternal pyrexia (102° F) in conjunction with uterine tenderness, purulent vaginal discharge, or fetal tachycardia. Pregnancy was terminated at 34 weeks of gestation, in women with clinical chorioamnionitis, nonreassuring fetal heart, and fetal death. If infection was identified, delivery was expedited and antibiotic stepped up. After delivery, the placenta was sent for histopathological examination and placental membranes for culture sensitivity. Baby and mother were followed for evidence of sepsis. Postpartum sepsis in the mother is recognized by the presence of fever, tachycardia, lower abdominal tenderness, leucocytosis and positive high vaginal swab culture. Newborns were closely observed for any evidence of neonatal sepsis and other compli-

cations like respiratory distress syndrome (RDS), necrotizing enterocolitis, intraventricular hemorrhage, and so on.

## RESULTS

Total number of deliveries conducted during the study period was 1,678, out of this 150 women between 24 and 36 weeks had PPRM. The incidence of PPRM was 8.9%. The mean age of the women was 26 years  $\pm$  7.2 (19-36). More than 50% were primigravidae. The mean gestational age at presentation was 30.2  $\pm$  3.2 weeks with majority of the women between 32 and 34 weeks (60%) (Table 1). The median duration of leaking before admission to the hospital was 22 hours with the range between 8 and 38 hours.

The mean latency period from rupture of membranes to delivery is inversely proportional to gestation at rupture of membranes (Table 2). Lesser the gestational age at presentation longer the latency period.

Majority of women delivered vaginally. The rate of spontaneous labor increased as the gestational age at admission increased, the difference between rate of spontaneous labor of 67% at 28 to 32 weeks and 86% at 34 to 36 weeks was statistically significant ( $p = 0.001$ ) (Table 3 and Fig. 1). The indications for induction of labor were intrauterine fetal death, gross oligohydramnios, and clinical chorioamnionitis. Normal vaginal delivery occurred in almost all (100%) at gestation <28 weeks and in 96% at later gestation (>28-36 weeks). Cesarean section was done in 4% for indications like for fetal distress, abruptio placenta, cord prolapse, and breech presentation. On analyzing the results of high vaginal swab culture taken prior to initiation, of antibiotics, it was observed that in 86% the culture was sterile. However, the culture was positive in 24 women (16%). The most common organism grown was *Escherichia Coli* (46.6%), followed by *Klebsiella* (33.3%), *pseudomonas* (13.3%) and coagulase negative *Staphylococcus aureus* (6.6%). The most common antibiotic to which these organisms were sensitive was ampicillin (96%), gentamicin (94%), amikacin (96%). Women who had growth in their vaginal swab (16%) nearly 50% had clinical chorioamnionitis, 16% had histological chorioamnionitis, and 37% had postpartum sepsis (Table 4). Women who had growth in their initial HVS sample showed higher incidence of postpartum sepsis (37%) and early neonatal sepsis (33%), respectively. In women who had no growth in

**Table 1:** Distribution of women according to gestational age at onset of preterm premature rupture of membrane

Gestational age (weeks)	n (%)
24-28	15 (10)
28-32	30 (20)
32-34	90 (60)
34-36	15 (10)

**Table 2:** The gestational age at delivery and latency period with respect to gestational age at rupture of membranes

Gestational age at admission (weeks)	Mean gest. age at admission	Gest. age at delivery (mean $\pm$ SD) (range)	Latency period (days) (mean $\pm$ SD) (range)
24-28	26.6 $\pm$ 1.8	28.8 $\pm$ 5.2 (26-33)	15.13 $\pm$ 10.9 (6-26)
28-32	30.3 $\pm$ 1.6	32.6 $\pm$ 1.7 (29.5-34.4)	11.58 $\pm$ 9.56 (3-23)
32-34	33.4 $\pm$ 1.2	34 $\pm$ 1.02 (33.1-35.2)	4.92 $\pm$ 2.88 (2-9)
34-36	35 $\pm$ 1.02	35.2 $\pm$ 0.88 (34.1-36.3)	2.1 $\pm$ 0.1 (1-3)

Gest: Gestational, SD: Standard deviation

**Table 3:** Mode of delivery with respect to gestational age at rupture of membranes

Gestational age (n = 150)	Spontaneous labor (n = 99) (66%)			Induced labor (n = 51) (34%)		
	Total n (%)	Vaginal	LSCS	Total n (%)	Vaginal	LSCS
24-28 (n = 15)	1 (6)	1 (100)	0	14 (94)	14 (100)	0
28-32 (n = 30)	20 (67)	20 (100)	0	10 (33)	8 (94)	2 (6)
32-34 (n = 90)	65 (72)	65 (100)	0	25 (28)	23 (98)	2 (2)
34-36 (n = 15)	13 (86)	13 (100)	0	2 (14)	0 (0)	2 (100)

LSCS: Lower segment cesarean section

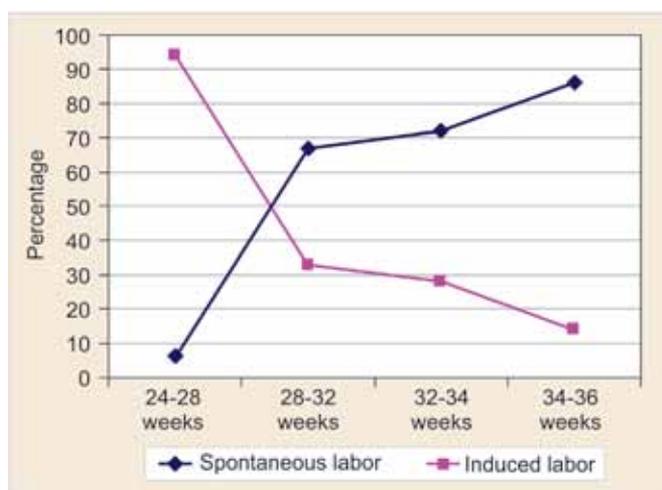
**Table 4:** Maternal complications

Maternal complications	Total (n = 150)
Positive high vaginal cultures	24 (16%)
Clinical chorioamnionitis	10 (6.6%)
Histological chorioamnionitis	4 (3%)
Postpartum sepsis	9 (6%)
Retained product of conceptions (POCs)	1 (0.6%)
Abruption placenta	2 (1.3%)

**Table 5:** Fetomaternal infectious complication in women who were high vaginal swab positive and high vaginal swab negative

Complications	HVS pos. (n = 24)	HVS neg. (n = 126)
Clinical chorioamnionitis (n = 10)	7 (29%)	3 (2.3%)
Histological chorioamnionitis (n = 5)	4 (17%)	1 (0.7%)
Postpartum sepsis (n = 9)	9 (37%)	0%
Neonatal sepsis (n = 8)	8 (33%)	0%

HVS: High vaginal swab, neg.: Negative, pos.: Positive



**Fig. 1:** Mode of delivery with respect to gestational age at presentation

their HVS, clinical chorioamnionitis was suspected in 2.3% of women (n = 3) and histological chorioamnionitis in only one woman (Table 5). There were no case of postpartum sepsis and neonatal sepsis. Placental abruption was seen in two women at gestation 32 to 34 weeks. There were no other serious complications seen.

The perinatal outcome was favorable in majority of cases and improved with the increase in gestational age at PROM. The overall perinatal mortality was 9.3% (14/150) and it was 73% at gestation 24 to 28 weeks, 10% at 28 to 32 weeks with 0% at 32 to 36 weeks (see Table 5). The

cause of death was neonatal sepsis, respiratory distress, and pulmonary hypoplasia. Babies at a gestation of >32 weeks had better survival rate compared with babies at less than 28 weeks (100% vs 27%, p = 0.00) (Table 6).

## DISCUSSION

PPROM complicates up to 2% of all pregnancies and contributes to 30 to 40% of all preterm birth.<sup>1</sup> In the current study, the prevalence of PPRM was 8.9% which is comparable to other studies reported in the literature.<sup>2,3</sup> PROM occurring at/near term is associated with insignificant adverse effect on the mother and fetus as in 80 to 90% spontaneous onset of labor ensues.<sup>3</sup> In women with rupture of membranes remote from term (<34 weeks) prematurity as well as sepsis puts both the mother and fetus at risk. However, with use of prophylactic antibiotics and steroids, a policy of conservative management has proven beneficial to both the mother and fetus.<sup>4,5</sup>

In the present study, women presenting with PPRM from 24 to 36 weeks were managed conservatively and were followed-up till delivery. It was observed that the mean latency period decreased from 15 days at 24 to 28 weeks to 2 days at 34 to 36 weeks (see Table 2). Similar observations have been reported in the literature with latent period varying between 1 and 5 weeks. The lower the gestation the longer is the latent period.<sup>6</sup>

There was no long-term maternal sequelae. The incidence of maternal complications, especially infectious morbidity observed in the current study, is low compared to that reported in the literature.<sup>7-9</sup> On analyzing the infectious complications in the mother and fetus, it was observed that women with positive growth in their initial vaginal samples had significantly higher rates of postpartum sepsis (37%) and neonatal sepsis (33%) compared with those who had no growth (p = 0.002). It implies relative safety of conservative management in women with PPRM with initial vaginal cultures negative. With use of antibiotics, the development of infectious complications can be further curtailed. However, women with positive culture need to be managed cautiously. Although we did not do C-reactive protein (CRP) in our patients, a recent study has shown CRP to be a highly sensitive parameter for predicting infectious morbidity in the form of chorioamnionitis.

Table 6: Perinatal outcome

Neonatal complications	24-28 (n = 15)	28-32 (n = 30)	32-34 (n = 90)	34-36 (n = 15)	Total (150)
Neonatal sepsis	0	1 (3%)	6 (6%)	1 (6%)	8 (5%)
RDS	5 (33%)	2 (6.6%)	1 (1%)	0	8 (5%)
Intraventricular hemorrhage	3 (20%)	–	0	0	3 (2%)
Pulmonary hypoplasia	3 (20%)	1 (3%)	0	0	4 (2.6%)
<b>Neonatal outcome</b>					
Stillbirths	4	0	0	0	0
Early neonatal deaths	2	1	0	0	0
Late neonatal deaths	5	2	0	0	0
PMR	11 (73%)	3 (10%)	0%	0%	14 (9.3%)
Mean birth weights (gm)	800 ± 100 (600-1000)	850 ± 210 (700-1100)	–	–	–
Live births	4 (27%)	24 (80%)	90 (100%)	15 (100%)	131 (90.7%)
Mean birth weights (gm)	1300 ± 112 (1200-1500)	1750 ± 575 (1200-2300)	2214 ± 346 (1900-2600)	2350 ± 380 (2000-2700)	–

PMR: Perinatal mortality rate; RDS: Respiratory distress syndrome

The neonatal outcome was favorable in majority. It was comparatively poorer in pregnancies less than 28 weeks with a perinatal mortality rate (PMR) of 73%. The fetal survival increased from 80% at 28 to 32 weeks to 100% at >32 weeks. It is most likely a result of the use of antenatal antibiotics, corticosteroids and improved neonatal care.<sup>4,5</sup>

The incidence of neonatal sepsis was 5%, a figure that is in line with numbers reported elsewhere (2-19%).<sup>11-14</sup> The incidence of respiratory distress syndrome and pulmonary hypoplasia in our study was also comparatively low, at 5% and 2.6%; however, it occurred more in gestation less than 28 weeks, a rate consistent with the previous reports.<sup>6,13,14</sup> The incidence of RDS and pulmonary hypoplasia is dependent on gestational age at the time of PROM.<sup>6</sup>

In short, management of PPRM involves complete evaluation of risks and benefits of conservative management. Wherever possible, the treatment should be directed toward conserving the pregnancy with prophylactic use of antibiotics and steroids thereby reducing fetal-maternal morbidity and mortality. However, termination of pregnancy should be considered at the earliest suspicion of chorioamnionitis.

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