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Original Research Article

Fetomaternal outcomes in conservative management of preterm premature rupture of membrane

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ABSTRACT

Background: The management of PPRM remains controversial. Aim of this study was to determine the fetomaternal outcome in conservative management of PPRM.

Methods: A prospective observational study was done on a total of 110 pregnant women between 24 and 36 weeks 6 days gestation with PPRM visiting Geetanjali medical college and hospital from February 2019 to July 2020. All the patients were subjected to detailed history and examination and followed till their delivery.

Results: The incidence of PPRM in our study was 4.94%. The mean latency period from membrane rupture to delivery decreased from 12.1±14 days at >28 weeks, 5.3±7.7 days at 28-31 weeks 6 days to 1.1±1.2 days at 32 to 36 weeks 6 days. The most common indication of LSCS was fetal distress (26.31%). *E. coli* was the most common organism (36.36%) isolated and it was significantly associated with gestational age at PPRM (p value <0.040405). The maternal morbidity was 24.53% and was closely associated with the gestational age at PPRM (p value <0.001). The perinatal morbidity was 44.20% and perinatal mortality was 13.04% which was mainly due to RDS (33.34%).

Conclusions: Management of PPRM involves complete evaluation of risks and benefits of conservative management. The treatment should be directed toward conserving the pregnancy with prophylactic use of antibiotics and corticosteroids thereby reducing fetomaternal morbidity and mortality. However, termination of pregnancy should be considered at the earliest suspicion of chorioamnionitis, septicemia.

Keywords: Chorioamnionitis, Conservative management, Fetomaternal outcome, Preterm PROM

INTRODUCTION

PPROM is defined as rupture of fetal membrane with leakage of the amniotic fluid before onset of regular uterine contractions before 37 weeks of gestation.^{1,2} It is one of the most common cause of prematurity contributing to 30 to 40% of preterm births.³

The conservative management of PPRM, with use of prophylactic antibiotics and steroids has led to improvement in the maternal-fetal outcome. However, neonatal outcome largely depends upon the neonatal care facilities. This study was done with the aim to find out the fetomaternal outcome in conservative management of PPRM.

METHODS

It was a prospective observational study. The study was conducted in department of Obstetrics and Gynaecology, Geetanjali Medical College and Hospital, Udaipur, Rajasthan for the period of 1.5 year from February 2019 to July 2020 after approval from Institutional Research Review Committee and Institutional Ethical Committee.

Source of data

All pregnant mothers who were admitted with PPRM in department of Obstetrics and Gynaecology, Geetanjali Medical College and Hospital, Udaipur, Rajasthan.

Sampling technique

Purposive Consecutive Sampling was used in this study.

Minimum sample size

Minimum sample size was 110 patients admitted with PPROM.

Inclusion criteria

All pregnant women between 24-36 weeks 6 days of gestational age with preterm premature rupture of membranes.

Exclusion criteria

Fetal anomalies, chronic liver disease, class II to IV cardiac diseases, chronic renal failure, patients who refuse to participate in the study.

A detailed history was taken including age of patients, booking, socio-economic status, parity, menstrual history, time of rupture of fetal membrane, amount of amniotic fluid lost, and its colour, association with pain or bleeding per vagina and perception of fetal movements, history of PPROM in previous pregnancies and history suggestive of cervical incompetence, history of P/V done before admission were noted in a prefilled proforma. In all cases, routine haematological investigations, urine examination, cardiotocography and obstetric ultrasonography was performed. General physical and obstetric examination was done. Sterile speculum examination was done to confirm the diagnosis of leaking per vagina. When in doubt litmus paper test was done to confirm leaking. The ultrasound finding of reduced amniotic fluid further confirmed the diagnosis. Digital examination was done only in cases with suspicion of pre-term labour. High vaginal swab was taken. All the patients were managed conservatively with antibiotics as per culture sensitivity report and corticosteroid. The patients were monitored clinically for signs of

chorioamnionitis. Serial ultrasound was done to monitor the amount of liquor. TLC/DLC was done twice weekly and high vaginal swab was sent weekly. Pregnancy was terminated irrespective of gestation, in women with clinical chorioamnionitis, non-reassuring fetal heart, and fetal death. If infection was identified, delivery was expedited and antibiotic stepped up.

The labour was allowed to progress either spontaneously or induced either by intra cervical instillation of PGE2 gel or continuous infusion of oxytocin depending on the bishops score and monitored carefully by partograph. Caesarean section was done for obstetric indication. The patients were monitored for third stage complications like PPH and retained placenta and followed up in puerperal period. Neonates were closely observed for any evidence of neonatal sepsis and other complications like respiratory distress syndrome (RDS), necrotizing enterocolitis, intraventricular haemorrhage in NICU. Neonatal morbidity and mortality were noted. The neonatal sepsis was confirmed by blood culture and sensitivity. Both mother and neonates were followed up till their stay in the hospital.

Statistical analysis

All the results were expressed in mean±SD or frequency (percentage). Statistical analysis was done by SPSS software 26 version. P value <0.05 was considered as significant.

RESULTS

The total number of deliveries conducted during the study period was 2224 out of these 110 patients presented with PPROM. The incidence of PPROM was 4.94%. The mean age of the women was 30.05±5.5 years (20-48). Majority of the women (49.09%) in our study came from V class of the society and 32.73% belonged to IV class of society according to modified Kuppuswamy scale. In our study, most of cases were booked (81.82%). The number of twin pregnancies were 28 (25.45%). More than 50.91% were multigravida.

Table 1: Distribution of women according to gestational age at PPROM and latency period with respect to gestational age at delivery.

Gestational age at admission (in weeks)	Number of patients (n)	Mean gestational age at admission (in weeks)	Mean gestational age at the time of delivery (in weeks)	Latency periods (days) (mean±SD)
<28 weeks	10 (9.09%)	26.7±0.73	27.7±1.79	12.1±14 days
28-31 weeks 6 days	24 (21.82%)	29.32±1.17	29.9±1.81	5.3±7.7 days
32-36 weeks 6 days	76 (69.09%)	33.81±1.21	33.96±1.17	1.1±1.2 days

In the present study, women with PPROM with gestational age >31 weeks 6-day, only 11.84% cases had latent phase of >72 hours, while 81.57% of women delivered within 24 hours of rupture membrane (p value was <0.00001). The mean latency period from membrane

rupture to delivery decreased from 12.1±14 days at >28 weeks, 5.3±7.7 days at 28-31 weeks 6 days to 1.1±1.2 days at 32 to 36 weeks 6 days. The gestational age at presentation in majority of the women was between 32 and 36 week 6 days (69.09%) (Table 1).

Table 2: Amniotic fluid culture in relation to gestational age.

Amniotic fluid culture growth	Gestational age (weeks)			P value =0.040405
	<28 weeks (n=10)	28-31 weeks 6 days (n=24)	32-36 weeks 6 days (n=76)	
<i>E. coli</i>	3 (30%)	8 (33.33%)	29 (38.15%)	
<i>Klebsiella</i>	2 (20%)	7 (29.16%)	11 (14.47%)	
<i>Pseudomonas</i>	2 (20%)	3 (12.5%)	1 (1.31%)	
Sterile	3 (30%)	6 (25%)	35 (46.05%)	

On analysing the results of high vaginal swab culture taken prior to initiation of antibiotics, it was observed that in 60% the culture was positive. The most common organism grown was *Escherichia coli* (36.36%), followed by *Klebsiella* (18.18%), *Pseudomonas aeruginosa* (5.45%). Among <28 weeks gestation age group 30% high vaginal swab was positive while in 32-36 weeks gestation age group (38.15%). *E. coli* was the most

common organism irrespective to gestation age (p value was 0.040405) (Table 2).

The most common risk factor for PPROM in our study was Twins (24.54%) followed by cervical incompetence (9.90%), malpresentation (5.45%), patients with previous history of PPROM (2.72%), urogenital tract infection (2.72%), elderly gravida (1.81%), abruptio placentae (1.81%) bicornuate uterus (0.90%).

Table 3: Maternal morbidity in relation to latency period.

Maternal morbidity (n=27)	Latency period		
	0-24 hours (n=13)	24-72 hours (n=7)	>72 hours (n=7)
Clinical chorioamnionitis	0 (0%)	2 (28.57%)	4 (57.14%)
Abruptio placenta	4 (30.76%)	2 (28.57%)	1 (14.28%)
Wound infection	1 (7.69%)	0 (0%)	1 (14.28%)
Retained placenta	3 (23.076%)	1 (14.28%)	0 (0%)
Puerperal pyrexia	5 (38.46%)	2 (28.57%)	1 (14.28%)

Table 4: Maternal morbidity in relation to gestation age.

Maternal morbidity	Gestation age in weeks			P value
	<28 weeks (n=10)	28-31 weeks 6 days (n=24)	32-36 weeks 6 days (n=76)	
Clinical chorioamnionitis	4 (40 %)	2 (8.33%)	0 (0%)	<0.001
Abruptio placentae	1 (10 %)	1 (4.16%)	5 (6.57%)	
Puerperal pyrexia	1 (10 %)	2 (8.33%)	5 (6.57%)	
Retained placenta	0 (0%)	2 (8.33%)	2 (2.63%)	
Wound infection	0 (0%)	0 (0%)	2 (2.63%)	

The majority of women (69.09%) delivered by LSCS. The indications for caesarean section were intrauterine fetal distress (26.31%) precious pregnancy (23.68%), severe oligohydramnios and previous caesarean section (15.78% each). Among the 34 patients who delivered vaginally, 67.64% had spontaneous delivery, and rest induced by PGE2 gel (8.82%) and oxytocin (23.52%).

In this study, chorioamnionitis was more common in patients who had >72 hours of latent period. Puerperal pyrexia (38.46%) and abruptio placentae (30.76%) were more common among those whose latent period was <24-hour latency (Table 3). We also compared the factors causing maternal morbidity with gestational age at PPROM (p value <0.001) which is suggestive of clinical chorioamnionitis to be the most common cause of

maternal morbidity in patient with gestational age <28 weeks (Table 4).

In our study population, 70.2% had NICU admissions. The mean NICU stay of neonates was 19.77±17.47 days who delivered before <28 weeks of gestation. While the mean NICU stay in 28-31 weeks 6 days, gestation age group was 6.1±3.5 days and 32-36 weeks 6 days gestation age group was 6.03±5.03 days). The mean NICU stay was significantly associated with gestational age at birth. (p value <0.001)

The perinatal morbidity was 44.21% with neonatal jaundice 20.89%, respiratory distress syndrome (15.21%), septicaemia (2.89%), IVH and pulmonary hypoplasia (2.17%), necrotizing colitis (1.44%).

The causes of neonatal morbidity were significantly associated with gestational age at birth (p value <0.001). There were 18 neonatal deaths out of which 7.97% were early preterm babies. In our study, the main cause of

perinatal mortality was RDS (33.33%) followed by sepsis (22.22%) then pulmonary hypoplasia (16.66%) and IVH (16.66%), necrotizing enterocolitis (11.11) (Table 5).

Table 5: Perinatal outcome in relation to gestation age.

Neonatal morbidity	<28 weeks (n=14)	28-31 week 6 days (n=14)	32-36 weeks 6 days (n=33)	P value <0.001
IVH	3 (21.42%)	0 (0%)	0 (0%)	
Necrotizing enterocolitis	1 (7.14%)	1 (7.14%)	0 (0%)	
Neonatal Jaundice	0 (0%)	3 (21.42%)	25 (75.75%)	
Pulmonary hypoplasia	2 (14.28%)	1 (7.14%)	0 (0%)	
RDS	6 (42.85%)	7 (50%)	8 (24.24%)	
Sepsis	2 (14.28%)	2 (14.28%)	0 (0%)	P value <0.001
Total NICU admission	13 (13.40%)	28 (28.8%)	56 (57.7%)	
Mean NICU stay	19.77±17.47 days	6.1±3.5 days	6.03±5.03 days	-
Neonatal mortality	11 (61.11%)	6 (33.33%)	1 (5.55%)	-

DISCUSSION

Preterm premature rupture of membranes complicates 3-8% of pregnancies and leads to one third of preterm deliveries.⁴ An incidence of PPRM to be 4.94%. This was comparable to the incidence rate of studies conducted by Tahir et al (5.4%).⁵ The mean age of patients in our study was 30.05±5.5 years.

There was no significant correlation between the antenatal care and incidence of PPRM which was in contrast to a study done by Akter et al where there was a strong correlation between the unbooked cases (90%) and the incidence of PPRM.⁶ The unbooked cases received poor antenatal care that ultimately leads to increased risk of infection to the mother which is a major risk factor for PPRM.

In our study, 76 cases (69.09%) delivered by Lower segment caesarean section. cases. This study is comparable to Singh et al which showed most of cases delivered by LSCS (54.36%).⁷ Pasquier et al (58.7%), Singhal et al (49%).^{8,9} The caesarean rate was high in our study because our institute is tertiary care referral centre with increased number of IVF conception, bad obstetric history and elderly gravida patients.

In our study the high vaginal swab was positive in 60% of the cases. *E. coli* was the most common organism found in cultures, which was present in 36.36% of PPRM cases, followed by *Klebsiella* in 18.18% of cases. We compared the microorganism grown on culture with the gestational age at presentation which came out to be significant (p value 0.040405). This shows that *E. coli* is a more common microorganism with advancing gestational age. Similar result obtained with study done by Lovereen et al showed high vaginal swab positive in (22%) and by Surayapalem et al (51%) and the predominant isolated organism from the high vaginal

swab in both the studies was *Escherichia coli*.^{10,11} These culture positive patients were treated with antibiotics according to antibiotic sensitivity test results.

In this study, we compared factors causing maternal morbidity with latent period and the (p value) came out 0.21 showing that the relation of maternal morbidity with latent period was non-significant. We also compared the factors causing maternal morbidity with gestational age at PPRM (p value <0.001) which is suggestive of clinical chorioamnionitis to be the most common cause of maternal morbidity in patient with gestational age <28 weeks.

Among patients with gestational age 28-31 weeks 6 days there were only 8.33% cases of clinical chorioamnionitis. No case of chorioamnionitis was found in gestational age 32-36 weeks 6 days. The most common factor for maternal morbidity was abruptio placentae and puerperal pyrexia (6.57% in both) in gestation age group 32-36 weeks 6 days.

The mean latency period varied inversely with gestational age (Table 1). Out of 110, two of our patients who presented at 24 weeks of gestation with PPRM were managed conservatively and carried up to 33 weeks. In both the patients, high vaginal swab was positive but with the proper use of antibiotics and corticosteroids, both pregnancies could be prolonged. One patient developed signs of clinical chorioamnionitis and so the pregnancy was terminated by lower segment caesarean section. A Female child 1.4 kg with Apgar score 9/10 was delivered. The other patient developed severe oligohydramnios and abruptio placenta and so the pregnancy was terminated by lower segment caesarean at 33.2 weeks. A female child 1.6 kg with Apgar score 9/10 was delivered. None of the patients developed significant maternal morbidity but the conservative management greatly improved neonatal outcome.

The perinatal morbidity was 40.28% and neonatal mortality was 13.04%. The main cause of perinatal mortality was RDS (33.33%) which is comparable with study by Khade et al in which perinatal morbidity was 33% and perinatal mortality was 15% and mainly due to RDS 53%.¹²

CONCLUSION

Management of PPRM revolves around balancing the risk benefit ratio of the conservative treatment. Wherever possible, the treatment should be directed towards conserving the pregnancy with prophylactic use of antibiotics, antenatal corticosteroids and strict vigilance for signs of chorioamnionitis thereby reducing fetal morbidity and mortality without significantly affecting the maternal morbidity. However, termination of pregnancy should be considered at the earliest suspicion of chorioamnionitis. The risk of chorioamnionitis is significantly associated with gestational age at PPRM rather than the duration of latent period. Administration of corticosteroids in all cases reduced the incidence of RDS and IVH. The perinatal mortality can be significantly reduced if we are able to achieve a birth weight of >1.5 kg. Thus, regular antenatal check-up, planned delivery and dedicated NICU care can significantly reduce the perinatal morbidity and mortality.

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