Scholars Journal of Applied Medical Sciences (SJAMS)
Abbreviated Key Title: Sch. J. App. Med. Sci.
ISSN 2320-6691 (Online)
ISSN 2347-954X (Print)

A Unit of Scholars Academic and Scientific Society, India
www.saspublishers.com

Obstetrics

A Prospective Study of Fetomaternal Outcome in Women with Early and Late Preterm Premature Rupture of Membranes at a Tertiary Hospital

Srivastava S[1*], Banerjee KP[2], Rajoria L[3], Pant R[4]
[1]PG student at SMS medical college and hospital, Jaipur India
[2]Professor at SMS medical college and hospital, Jaipur India
[3]Professor at SMS medical college and hospital, Jaipur India
[4]Professor at SMS medical college and hospital, Jaipur India

Original Research Article

***Corresponding author**
Srivastava S

Article History
Received: 13.03.2018
Accepted: 28.03.2018
Published: 17.04.2018

DOI:
10.36347/sjams.2018.v06i04.004

Abstract: Fetomaternal outcome was studied in 200 women (100 in the gestational age 28-33+6 weeks and 100 in gestational age 34-36+6 weeks) who were admitted with complains of leaking per vagina. Leaking was confirmed with sterile speculum examination and fern test. A high vaginal swab was taken at admission along with administration of antibiotics and betamethasone. Women in early PPROM group were managed conservatively in obstetrical ward and monitored for signs and symptoms of chorioamnionitis and fetal distress and women in late PPROM were induced after group B streptococcal prophylaxis. Fetomaternal outcome was studied and results were analysed with required statistical tests
Keywords: PPROM, early PPROM, late PPROM, Latency period, Fetomaternal outcome.

INTRODUCTION

Preterm premature rupture of membranes (PPROM) is a significant contributor to neonatal morbidity and mortality. Onset of PPROM harbingers a high risk period for both mother and the fetus .Its incidence varies across studies and nations. Preterm premature rupture of membrane (PPROM) is defined as rupture of fetal membrane before onset of labor at less than 37 completed weeks of gestation. Despite exhaustive research most of the aspects of PPROM remain enigmatic.

Challenges in study of PPROM include variable case definition, outcome misclassification due to inaccurate identification of the initiating event, heterogeneity of pathways leading to PPROM and inconsistent evidence in assessing risk factor.

PPROM complicates approximately 3 percent of pregnancies and leads to one third of preterm births [1].

PPROM arises from complex, multifaceted pathways. Several epidemiological and clinical factors are considered precursors to PPROM. These include maternal reproductive tract infections (e.g., bacterial vaginosis [BV], trichomoniasis, gonorrhea, Chlamydia, and occult chorioamnionitis), behavioral factors (e.g., cigarette smoking, substance abuse, poor nutritional status, and coitus during pregnancy), and obstetric complications (e.g., multiple gestation, polyhydramnios, incompetent cervix, gestational bleeding, prior cervical surgery, and antenatal trauma). Environmental factors (e.g., stress and toxin exposure) and genetic predisposition also have been proposed [2]. PPROM 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 management strategies that are often diverse and controversial.

METHODOLOGY

A hospital based comparative analysis was carried out on 200 pregnant women admitted in the department of Obstetrics and gynecology at SMS Medical College Jaipur, with preterm premature rupture of membranes after taking written and informed consent. These women were divided into 2 groups according to gestational age: Group 1(100 women) early gestation age(28-33+6 weeks) and Group 2 (100 women) late gestation age (34-36+6 weeks). After written and informed consent, history and physical examination was done. Gestational age was determined by asking the women about her last menstrual period, if reliable or from the earliest ultrasonography available. Diagnosis of preterm premature rupture of membrane was based on history and per speculum examination. A history of sudden passage of amniotic fluid from the

vagina or feeling wet with pooling of amniotic fluid in the posterior fornix on sterile speculum examination or by fern test was used to confirm the diagnosis. Ultrasonography was done to assess the amniotic fluid index level, gestational age, fetal weight, presentation, placenta localization and congenital anomaly. Conservative management was done in all early PPROM (28weeks to 33weeeks+6days) patients till the onset of spontaneous labour or till the maternal or fetal indication for delivery ensues such as chorioamnionitis, meconium stained amniotic fluid, abruption, cord prolapse or fetal distress. Women were managed conservatively in the obstetrical ward and monitored for signs and symptoms of chorioamnionitis and fetal compromise. All women received antibiotics: intravenous ampicillin 2g 6 hourly for 2 days followed by oral amoxicillin 250mg 8 hourly for 5 days. Corticosteroid (24 mg betamethasone in 2 doses 24 hour apart) was given to women with gestational age <33 weeks 6 days. Women were monitored 4 hourly for BP, pulse, temperature and per abdomen examination including fetal heart sound. Fetal monitoring was done by electronic fetal monitor one hour daily and by daily fetal movement count. Following investigations were sent: CBC, CRP, urine complete and microscopy, high vaginal swab apart from the routine antenatal investigations like ABORh, HIV, HBsAg, VDRL, RBS.

All women were required to wear a sterile pad which was inspected 4 hourly for colour and smell of liquour. The diagnosis of clinical chorioamnionitis was based on the presence of maternal pyrexia (temperature>37.8 degree C or 100.4F) and 2 or more of the following: Maternal tachycardia (>100bpm), Fetal tachycardia (160bpm), Uterine tenderness, Purulent vaginal discharge, Leucocytosis(>15000),C reactive protein>2.7 mg/dl.

Women with gestational age >34 weeks were induced for delivery after group B streptococcal prophylaxis if they were not in labour. Labour was monitored using a partograph. Women with malpresentations, twin gestation, medical disorders such as diabetes, hypertension and heart disease, fever, intrauterine fetal death, congenital anomaly, diagnosed cases of placenta previa and accidental hemorrhage were excluded from the study.

RESULTS

The early and late PPROM groups are similar with each other with respect to maternal age. Majority of women in each of the group fell into 21-25 year category (69% in group I and 59% in group II). Mean age in group I was 23.91±3.44 and in group II was 23.96±2.76 .The p value was >0.05 which was not found to be significant. Majority of women in both the groups had received antenatal care in their pregnancy. However it was found that a woman who has not received antenatal care is more likely to present with PPROM at an early gestational age. Among all those cases which presented with PPROM and were booked, they were more likely to do so towards the end of preterm period. More than half of women in both the groups were Hindu and resided in urban areas. However the p value across the 2 groups was found to be significant indicating that a women residing in rural area is more likely to present with early PPROM. A plausible explanation for this finding may stem from the fact that women belonging to rural area are more likely to skip antenatal care as compared to their urban counterparts. In early PPROM group majority of women were illiterate (34%) and majority of women in group II (36%) had at least attended school till 5th class. The p value was not significant (>0.05). The socioeconomic profile was similar in both the groups across the 4 classes. The p value was not significant (>0.05).Majority of women in our study in both the groups belonged to lower middle class group (63% in group I and 57% in group II). The most common gestational age of presentation in group I is 30-30+6 weeks and in group II is 36-36+6 weeks. Overall the most common gestational age of presentation in our study is 36-36+6 weeks. Majority of the cases in both the groups are primigravida (42% in group I & 44% in group II). The p value was not found to be significant (>0.05). Hence it can be concluded that gravidity does not have a significant relationship with the period of gestation in a women with PPROM. The most common past maternal history across the 2 groups was a history of preterm vaginal delivery and 1st trimester abortion. The difference in these values between the 2 groups was not significant (p value>0.05). A greater percentage of women delivered within 12 hours of rupture of membranes in both the groups. The p value was also significant implying that women presenting with late PPROM are more likely to deliver within 12 hours of rupture of membranes. At a latency of >48 hours, p value was found to be significant implying that at 48 hours of PPROM more women remain undelivered in early PPROM (16%) group as compared to late PPROM group (3%). 75% women delivered vaginally and only 25% had an LSCS in group I, but the percentage of women delivering by either method was equally distributed in group II (50%). The p value was found to be significant (<0.05). This suggests that in our study women in early PPROM group are more likely to deliver vaginally while women presenting with late PPROM have equal chances of having an LSCS and a vaginal delivery. The reason for this finding was that more women in late PPROM group presented with a history of previous LSCS. Also all the women in late PPROM group were induced resulting in a higher rate of LSCS. Most common indication for LSCS in both the groups was failed induction followed by non reassuring fetal heart rate in early PPROM group and previous LSCS with PPROM in late PPROM group. The p value for indications for LSCS was not found to be significant. At 1 minute of birth majority of neonates in both the groups had an Apgar score of 5-6 at 1 minute of birth. The p value for the above distribution

was not significant (>0.05). This implies that in our study, the Apgar score at 1 minute of birth for neonates born to mothers with either early or late PPROM does not depend upon the gestational period at PPROM. At 5 minutes of birth majority of neonates had an Apgar score of >7 in both the groups. The p value for Apgar score of <4 at 5 minutes of birth had a significant difference (>0.05). This implies that neonates born to women presenting with early PPROM are more likely to have an Apgar score <4 at 5 minutes of birth than women presenting with late PPROM. The p value for Apgar score at 5 minutes of birth for the other 2 categories that is 5-6 and >7 did not have a significant difference (p value>0.05). The mean birth weight in group I was 1.3+0.334 kg and in group II was 2.09+0.430kg. The p value was significant (p value<0.05). This implies that women with early PPROM are more likely to deliver neonates in extremely low birth weight category and women presenting with late PPROM are more likely to deliver a neonate in the low birth weight category. Since birth weight is a significant factor in determining the morbidity, the perinatal outcome of women with late PPROM is better than women with early PPROM. The p value for the perinatal survival and mortality for early and late PPROM was significant. This implies that perinatal outcome of women presenting with late PPROM is better than that of women presenting with early PPROM. Birth weight and gestational age is a significant predictor of perinatal outcome. Hence a higher birth weight and gestational age in the late PPROM group is responsible for the better perinatal outcome in the late PPROM group. The most common perinatal complication in both groups was septicemia followed by congenital pneumonia and neonatal jaundice. The p value was significant (<0.05) for septicemia and congenital pneumonia. Sepsis is an important preventable cause of morbidity and mortality. 89% newborns in group I were admitted in NICU for more than 24 hours compared with 51% newborns in group II. This difference is significant (p value<0.0001). The p value was also significant for the percentage of newborns who received ventilation, surfactants and antibiotics. Antibiotics were the most common perinatal intervention used in our study. This is because of the high rate of sepsis reported in our study. Largely, the rate of maternal morbidity was low in our study. The most common complication in our study was fever followed by chorioamnionitis in the both the groups. There was no case of maternal mortality. The p value was not found to be significant (>0.05). Vaginal swab culture was sterile in 47% patients in group 1 and 55% in group 2. The most common organism isolated in both the groups was E.Coli and the p value across 2 groups was not significant. When latency period was studied with respect to perinatal outcome, it was found out that perinatal outcome does not depend on latency period in early as well as late PPROM. Presence of neonatal sepsis increased with increasing latency period, however the difference was not significant between early and late PPROM. NICU admissions also increased with increasing latency period and the difference between 2 groups was significant when the duration of latency was <24 hours implying that when duration of leaking is <24 hour, neonates born to women with early PPROM are more likely to be admitted in NICU as compared to neonates born to women with late PPROM. Maternal morbidity in relation to latency period also depicted an increasing trend; however the p value between 2 groups was not significant.

DISCUSSION

In a retrospective cohort study by Fenette P *et al.* in Nova Scotia in 2013 for PPROM occurring at gestational ages of 24+0 to 33+6 weeks, the odds of neonatal prematurity-related morbidity were significantly decreased at the latency periods of 48 hours or more compared with < 24 hours latency. For PPROM at 34+0 to 36+6 weeks of gestation, the odds of prematurity-related morbidity at 48 hours to < 7 days latency was decreased compared with latencies < 24 hours (OR 0.4;95% CI 0.2 to 0.8). Therefore postponing delivery following PPROM may contribute to less prematurity-related morbidity, even close to term, without putting mother or neonate at substantial risk for serious infectious morbidity [3]. In a retrospective cohort study by D'souza AS it was found out that babies born to mothers with early PPROM had statistically significant increase in the frequency of hyaline membrane disease, septicemia, periventricular leukomalacia, intrauterine pneumonia, need for ventilatory support and inotropes. Babies born to mothers with late PPROM had significant increase in the frequency of Apgar score <7 at 1 min, APGAR <7 at 5 min and LSCS rate [2]. In a descriptive study by Diraviyam JMV et al between 28 to 36weeks+6days with PPROM , it was found out that 60% of early PPROM had latency period >24 hrs. 18% had chorioamnionitis and immediate termination of pregnancy. 73% of newborns in this group needed admission due to complications of prematurity like RDS (54.54%). 80% of late PPROM had latency period <24 hrs and only 4% had chorioamnionitis.18.5% babies in this group had hyperbilirubinemia. There was statistically significant association between latency period and perinatal complications (p=0.001). RDS was 33% in latency period <24hrs, 18% in >24hrs and sepsis was 36% in >24hrs and 10% in <24hrs [4]. In an observational retrospective study, at Jiangsu Province Hospital in 2017 in patients with PPROM, rates of patients with previous cesarean section were significantly higher in earlier gestational age(28-33 weeks) (28.6% vs. 12.1%, p < 0.05). There were also no significant differences between the two groups in terms of mode of delivery and postpartum hemorrhage (p > 0.05), but the latency period was significantly longer at earlier gestational age (91.52 ± 56.94 hours vs. 34.56 ± 43.94 hours, p < 0.05). Neonatal infants at gestational age of 32-36 weeks had a significantly higher APGAR

score at 1 minute (9.58 ± 1.02 vs. 8.67 ± 1.82, $p < 0.05$), but NICU admission rates were significantly higher at gestational age of 28-31 weeks (100% vs. 60.3%, $p < 0.05$). There were no differences in birth weight, meconium staining and Apgar score at 5 minutes between these groups ($p > 0.05$) [5].

CONCLUSION

Perinatal outcome in late PPROM is invariably better than early PPROM due to differences in birth weight and gestational age. Sepsis, which was the most common cause of perinatal morbidity in our study in both early and late PPROM, is an important and preventable cause of perinatal morbidity and mortality. A higher rate of LSCS is seen in late PPROM group. Induction which is associated with a higher rate of fetal distress may be the incriminating factor. The incidence of chorioamnionitis and other maternal morbidity is largely low in both the groups emphasizing the importance of antibiotics and shorter latency periods. Duration of latency period was not associated with perinatal mortality and sepsis in neonates and morbidity in mother as well in both the groups. However the p value was significant for NICU admission in <24 hour period. This implies that when duration of leaking is <24 hour, neonates born to women with early PPROM are more likely to be admitted in NICU as compared to neonates born to women with late PPROM.

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