STUDY ON AETIOLOGY & RISK FACTORS IN SPONTANEOUS LATE PRETERM PREMATURE RUPTURE OF MEMBRANES

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ABSTRACT

BACKGROUND

Preterm premature rupture of membranes is the rupture of membranes during pregnancy before 37 weeks' gestation. It occurs in 3 percent of pregnancies and is the cause of approximately one third of preterm deliveries. It can lead to significant perinatal and maternal morbidity. Appropriate evaluation of aetiology & risk factors helps in preventing PPRM and its related complications. We wanted to study the aetiology and risk factors of PPRM from 34-37 wks. of gestation. This is a descriptive study carried out in the department of obstetrics and gynecology, Hi-Tech Medical College & Hospital, Bhubaneswar.

METHODS

The present study is a descriptive study of risk factors in 100 cases of preterm premature rupture of membranes between 34-37 weeks' gestation with singleton pregnancy, from 1st Aug. 2016 to 31st July 2018. Patients with medical complications like anemia, preexisting hypertension, diabetes, vascular or renal disease, multiple gestations, uterine or foetal anomalies etc. were excluded from the study. Detailed history was obtained, physical examination carried out, and appropriate management instituted as per individual patient's need.

RESULTS

In this study, the risk-factors of PPRM were low socioeconomic status (67%), age group 21-30 yrs. (84%), primigravida (61%), irregular antenatal care (67%), recent coitus (23%), genital tract infection (21%), E. coli (18%) cases.

CONCLUSIONS

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 family, economy and health care resources of the country. An understanding of risk-factors of PPRM and better antenatal care, can improve maternal and neonatal outcomes.

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BACKGROUND

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 labour. 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

- Previa PROM – Before 23 weeks.
- PPRM remote from term – 23-31 weeks.
- PPRM near term – 32-33 weeks.
- PPRM near term – 34-36 weeks.

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

In most pregnancies, labour begins in the presence of intact foetal membranes. Without intervention the membranes usually remain intact until approximately 8 cm of cervical dilation. The pressure necessary to cause membrane rupture experimentally not only is greater than the base line resting tone of the intrauterine cavity, but also generally exceeds that generated by normal labour. The clinical entity of PROM that can occur in the absence of labour with an cervix even at bed rest and also remote from term is an enigma that remains only imperfectly explained. Hence a number of hypothesis have been proposed in an attempt to explain its aetiology. At present, majority of instances of PROM probably are secondary to multiple factors.

ROM 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 but early in gestation. 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 aetiology, difficult to diagnose and is associated with significant maternal and neonatal morbidity and mortality and has diverse and controversial management strategies.

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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 deliveries². It increases the risk of prematurity and leads to other perinatal and neonatal complications with 1-2% risk of foetal death. PROM is associated with increased risk of chorioamnionitis, dysfunctional labor, increased cesarean rates, postpartum hemorrhage and endometritis in the mother. In the foetus, there is increased occurrence of hyaline membrane disease, intraventricular hemorrhage, sepsis, cord prolapse, foetal distress and increased foetal 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 risk factors and aetiology of late PPRM.

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

Descriptive study.

Study Period

Over a period of two year from 1st Aug 2016 to 31st July 2018.

Study Place

Hi-Tech Medical College & Hospital.

Sample Size

100

Inclusion Criteria

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

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 foetal 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 foetus, engagement of presenting part, condition of uterus whether contracted or relaxed.

Uterine tenderness was looked for as a sign of chorioamnionitis. Foetal 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.

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 PPRM was most common between age group 21-30 year. In this study 84% patients had maternal age group of 21-30 yrs.

Age Group (Yr.)	No. of Mother	Percentage
< 20	7	07%
21-25	49	49%
26-30	35	35%
31-35	06	06%
>35	03	03%
Total =	100	100%

Table 1. Age Distribution of Late PPRM

Socio Economic Status	No. of Mother	%
Low	67	67
Middle	28	28
High	05	05
Total =	100	100

Table 2. Socio-Economic Status in Cases of PPRM

This table shows 67% belong to low socioeconomic status. PPRM is predominant in low socioeconomic status.

Gravidity	No. of Cases
Primigravida	61
Gravida - 2	29
Gravida - 3	05
Gravida - 4	05
Total =	100

Table 3. Gravidity Wise Distribution

In above table PPRM was most common in Primigravida (61%) or second gravida (29%).

ANC	No. of cases	Percentage
Regular	33	33 %
Irregular	67	67 %
Total =	100	100 %

Table 4. Antenatal Care in PPRM Cases

It is evident from the table that, the incidence of PPRM was higher in the group who do not avail regular antenatal care.

GA in Weeks	No. of Cases	Percentage
34 wks.	35	35 %
35 wks.	27	27 %
36 wks.	38	38 %
Total =	100	100 %

Table 5. Gestational Age Wise Distribution

In this study no of PPRM cases are almost same in each gestational age.

Time of Rupture of Membrane	No. of Cases	Percentage
12 AM – 6 AM	42	42%
6 AM – 12 PM	28	28%
12 PM – 6 PM	15	15%
6 PM – 12 AM	15	15%

Table 6. Time of Rupture of Membrane (In shift)

From above table it is evident that the incidence of PPRM occurred in late hours of night and early morning hours.

Risk Factor	No. of Cases	Percentage
Unknown	35	35 %
History of Recent Coitus	23	23 %
Genital Tract Infection	21	21 %
Travel History	12	12 %
Previous history of PPRM	09	09 %

Table 7. Risk Factors

It is evident from above table that risk factors were unknown in 35% of cases, H/O recent coitus 23% cases, genital tract infection 21% cases, travel history 12% cases, previous history of ppprom in 9% cases.

Organism Growth	Vaginal Swab Culture	Urine Culture
No growth	59	74
Group B Streptococcus	09	01
E. coli	14	18
Klebsiella	08	03
N. gonorrhoea	04	01
Staphylococcus	03	01
Chlamydia	03	02

Table 8. Culture Report in Late PPRM

In this present study E. coli is the most common organism found in both high vaginal swab and urine culture.

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 foetal 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 2 year were studied.

Maternal Age

In this study PPRM was present in 84% of cases in the age group of 21-30 years. The high incidence in this age group can be related to sexual activity & genital infection (Akhter et al 1980)

Khade et al (2014) found 79% of cases of PPRM are in the age group of 20-29 yrs.

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 et al (2010) 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 genital infection (Aktar et al, 1980). In this study 61 % PPRM cases are primigravida.

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

Table 9. Comparison of Parity with Other Studies

Gestational Age Wise Distribution.

In our study the incidence of PPRM at 34-35 wks, 35-36 wks., 36-37 wks. were almost same. This result is comparable to work of Breese (1961), Gillebrand (1967), and Pathak (1974).

Time of Rupture of Membrane

In the present study the incidence of PPRM was around 42% between 12 AM to 6 AM, followed by 28% between 6 AM to 12 am. This implies that most of the PPRM occurring in late hrs of night & early morning. It has been observed that prom has circadian distribution where by the maximus cases occur between 2 AM to 4 am.

Risk Factors Analysis

This study shows different risk factors of PPRM like H/O recent coitus in 23% of cases, Genital tract infection in 21 % cases, travel history 12 %, previous history of PPRM in 9% cases. No risk factor found in 35% cases.

Gunn et al, 1970 quoted genital tract infection as the major risk factors (40%) along with coitus (16%).

Flood and Nayee, 1984 studied 25, 820 patients with PROM and analysed 14 risk factors using multivariate analysis among which recent coitus was one of the leading risk factors.

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).⁷ But in more detailed studies WBC

and CRP were poor predictors of the presence of a positive amniotic fluid or foetal blood culture.⁸

Urine Culture and High Vaginal Swab Culture Report

Swati Pandey, Anupama Deva, S. Bandi et al MGM medical college Indore, in their study found E.coli (28.57%), Klebsiella (21.4%) to be common aerobic & Bacteroides fragilis (14.2%) was the commonest anaerobic organism isolated. Surayapalem S. et al (2017) study showed that no bacterial growth was observed in 49% cases followed by E.coli (19%), S.aureus (11%), GBs and Citrobacter (each 2%) of cervical swab culture.

High vaginal swab culture and urine culture was done in all patients with PPRM. The urine culture shows no growth in 74% cases, whereas 59% vaginal swab culture shows no growth.

The positive culture report of high vaginal swab shows E.coli (14%), Gp.B Streptococcus (9%), Klebsiella (8%), N. gonorrhoea (4%), Staph Aureus (3%), Chlamydia trachomatis (3%) cases.

The positive urine culture report shows E.coli (18%), Gp.B Streptococcus (1%), Klebsiella (3%), N. gonorrhoea (1%), Staph Aureus (1%), Chlamydia (2%) cases.

CONCLUSIONS

PPROM is a significant obstetric problem. Despite exhaustive research, most aspects of PPRM remain enigmatic. It 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, careful antenatal monitoring, detection and prompt treatment of infection is necessary. Strict aseptic precautions, appropriate therapy, regular follow up are important in prevention and management of PPRM. Close antenatal monitoring, identification of risk factors like cervicovaginal infection and their management play an important role in prevention of PPRM. 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, foetal and neonatal complications regardless of the management approach. 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. Danger of infection to both mother and foetus increases with increased duration of PPRM. Our experience

to date from the available resources suggests that management of PPRM still requires critical study.

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