

Obstetric outcome in women in premature rupture of membranes and women without premature rupture of membranes at term: A comparative study

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Abstract

Introduction: Premature Rupture of Membranes is an enigmatic condition despite exhaustive research, and is associated with high maternal and perinatal morbidity and mortality.

Aim: To study the frequency of PROM at term, to study the maternal, neonatal outcome in women with PROM at term and to compare the maternal and neonatal outcome in women with PROM at term and without PROM at term.

Method: This Prospective Observational hospital based study (cohort) of analysis of pregnancy outcome in 190 antenatal women with PROM and 190 antenatal women without PROM at term admitted to labour ward of a tertiary care hospital pregnant women after 37 completed weeks of gestation admitted to labour ward of a tertiary care hospital and research centre from November 2012 to October 2014.

Result: Shows that duration of PROM till delivery, is directly proportional to maternal and neonatal morbidity. There were 100% LSCS rate in patients with

PROM of ≥ 48 hrs duration and 63.6% in PROM of 25-47hrs. Raised TLC and positive CRP are markers of infection but solely cannot be relied upon. CRP was raised in 100% women with PROM of duration between 25-47 hrs, but it was raised in only 50% women with PROM of ≥ 48 hrs. Percentage of maternal morbidity in the form of infection showed a rising trend as the duration of PROM increased while neonatal morbidity was maximum (90.9%) with PROM of 25-47 hrs.

Conclusion: Above study concludes that the frequency of PROM at a tertiary care hospital is 6.08%. Maternal morbidity is directly related to PROM delivery interval.

Keywords: PROM, Maternal, Neonatal Outcome

Introduction

Premature Rupture of Membranes is an enigmatic condition despite exhaustive research, and is associated with high maternal and perinatal morbidity and mortality. This remains a subject of great clinical relevance and intense interest and is a day to day problem for each and every obstetrician.

Premature Rupture of Membranes (PROM) is one of the most common complications of pregnancy occurring in about 10% of all births. It is an obstetric condition 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.

The normal development, structural integrity and function of the foetal membranes are essential for normal progress and outcome of pregnancy. Membranes should remain intact until the onset of labour at term in order to maintain protective intrauterine fluid environment; the amniotic fluid, upon which foetus depends for its survival in utero. Normally membranes rupture during second stage of labour.

Premature rupture of the membranes is the spontaneous rupture of the membranes before the onset of uterine contractions. It is characterised by rupture of membranes before the onset of true labour. This occurs in 5-20% of all labours.

PROM is associated with increased risk of chorioamnionitis, unfavourable cervix, dysfunctional labour, increased caesarean rates, postpartum haemorrhage and endometritis in the mother. In the foetus, there is increased occurrence of hyaline membrane disease, intraventricular haemorrhage, 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. Reduction of maternal morbidity being one of the Millennium Development Goals, is the high priority in international community. Over the last decade there has been increased awareness of appreciable morbidity of PROM at term and various

management protocols have been used. But due to lack of larger randomized trials in this field, management guidelines are varied.

Aims and objectives

- To study the frequency of PROM at term at a tertiary care hospital.
- To study the maternal outcome in women with PROM at term in view of mode of delivery and maternal infection
- To study the neonatal outcome in women with PROM at term in view of septicemia, birth asphyxia and NICU admission.
- To compare the maternal and neonatal outcome in women with PROM at term and without PROM at term.

Material and Methods

This Prospective Observational hospital based study (cohort) of analysis of pregnancy outcome in 190 antenatal women with PROM and 190 antenatal women without PROM at term admitted to labour ward of a tertiary care hospital was carried out in the department of Obstetrics and gynaecology over 2 years from 1 November 2012 to 31 October 2014 after obtaining permission from institutional ethics committee.

Selection of subjects

Cohort was defined as pregnant women after 37 completed weeks of gestation admitted to labour ward of a tertiary care hospital and research centre from November 2012 to October 2014. They were divided into two groups. Group 1 comprised of antenatal women with PROM diagnosed on history, examination and/or litmus test and group 2 comprised of antenatal women without PROM of the same age, parity and associated risk factors and reporting on the same day to the labour ward.

Method of collection of data

Sample size was calculated by doing a pilot study with 80% power of study with 95% confidence interval taking into consideration maternal infection as a risk factor. We found that the percent of maternal infection in women without PROM was 3.8 and relative risk was 3.2 and accordingly the sample size was calculated, which came to 188 in cases and control group each, which was rounded to 190 antenatal women with PROM and 190 antenatal women without PROM.

This study consisted of clinical analysis of antenatal women with term PROM (190 cases) and antenatal women without PROM (190 control) admitted to labour ward. Controls were matched in terms of maternal age, gravidity, parity, associated high risk factors. Cases were assessed and enrolled in study as per formulated inclusion and exclusion criteria, after counselling and taking written informed consent

Inclusion Criteria

- Antenatal women after 37 weeks of gestation with PROM
- Gestational age of >37 weeks confirmed by dates, clinical examination and ultrasound.
- Lack of uterine contractions for at least 1 hour after PROM.
- PROM confirmed by history, direct visualisation or litmus test.

Exclusion Criteria

- Intra uterine death
- Heart disease complicating pregnancy
- **Evaluation:** Antenatal women with gestational age of >37 weeks admitted to labour ward with or without PROM were recruited on the basis of selection criteria and consent was obtained. Particulars were collected using a preset proforma

meeting the objectives of the study by means of personal interview with the patients after taking informed consent.

Particulars of the woman were noted regarding age, parity, socio economic status and past obstetric history regarding duration of marriage, infertility, gravidity, parity status, abortions, PROM, preterm labour, low birth weight, neonatal death. Past medical history for vaginal discharge, diabetes was asked. Significant surgical, family, diet, nutrition history was asked. The date of last menstrual period according to calendar or lunar months was noted.

Cases were labeled as PROM depending upon history and examination. Questions regarding exact time of leaking with colour of liquor, history of pain in abdomen, perceiving fetal movements and history of bleeding per vaginam were asked to all patients.

Clinical examination was done particularly regarding pulse, temperature, blood pressure. In obstetrical examination gestation age, presentation, position, uterine contractions, amount of liquor was noted and fetal heart sounds were auscultated with fetoscope. Per speculum examination was done to see the presence of pool of liquor in posterior fornix or coming from the cervix to confirm the diagnosis. Also colour of liquor was noted. Litmus test was done to confirm the diagnosis in which red litmus turned blue when it came in contact with amniotic fluid due to alkaline pH.

Per vaginal examination was done under all aseptic precautions to note cervical dilation, effacement, station, position of cervix, consistency of cervix, presenting part, presence of membrane, pelvic adequacy and to rule out cord prolapse. Bishops score was calculated.

Minimum per vaginal examination examinations were done to prevent infection.

All preliminary and baseline investigations like Haemoglobin, urine routine microscopy, post glucose blood sugar, VDRL, sickling, HIV, HBsAg, S.TSH and specific investigations like Total and differential leucocyte count, C-Reactive protein were sent before starting antibiotic therapy to mother. Ultrasonography was done for confirmation of presentation, position, gestation age, placental localization. Amniotic fluid index, Doppler was done for assessing fetal wellbeing.

All cases were started on prophylactic antibiotics

Cases with high risk factors like PROM with previous caesarean scar, severe oligohydramnios, placenta previa, severe Intrauterine growth restriction, Antepartum haemorrhage, twins were chosen for Lower segment caesarean section (LSCS).

Obstetric management of women with PROM was decided according to Departmental protocol.

Control group was selected as women >37weeks of gestation without PROM who were admitted on the same day of case with true labour pains or those who were for induction .They were matched with study group and detail history regarding age, parity, socio economic status, obstetric and medical history was noted. Clinical examination was done.

Careful partographic monitoring was done during labour, mode of delivery was assessed in both groups and rupture of membranes to delivery interval was noted in women with PROM. . Soon after delivery, baby was assessed for APGAR score at 1 and 5 minutes, birth weight, sex, congenital anomalies, signs of asphyxia, meconium aspiration, sepsis and other associated complications were recorded in both the groups.

In presence of complications, the opinion of neonatologist was sought for. The babies were followed up in the postnatal period. Neonatal morbidity and mortality were noted.

Mothers were watched for third stage complications like postpartum haemorrhage and retained placenta.

They were followed up in puerperal period.

Observations

During the study period of 2 years 212 PROM cases were diagnosed but 22 were not incorporated in the study as sample size was calculated to be 190 and some were not fulfilling the inclusion and exclusion criteria. Hence, pregnancy outcome of first 190 women with PROM and 190 women without PROM fulfilling the criteria was noted and compared. Frequency of PROM at a tertiary care centre was found to be 6.08%.

Maximum number of women belonged to the age group of 20-24yrs. Mean age of women with PROM was 24.26 ± 3.32 yrs, while in women without PROM it was 24.23 ± 3.39 yrs. majority of the women with PROM and without PROM were primigravidae (53.2% in women with PROM and 55.8% in women without PROM).

The mean gestational age in women with PROM was 38.6 ± 1.10 wks and in women without PROM was 38.93 ± 1.15 wks. The difference between the two study groups was not found to be statistically significant ($p > 0.05$), (91.1%) Women had PROM of < 24hrs duration. Only 3.15% had PROM OF > 48hrs. Median duration of PROM was 9hrs. Vaginitis (trichomonal and bacterial vaginosis), UTI and other factors like fever, trauma, history of contact were the probable etiological factors for PROM in 21.05% of women with PROM and it was 10% in women without PROM. The difference between two study groups was found to be statistically significant ($p = 0.018$). 83.7% of women

with PROM were with Bishops score of <6 on admission and 72.6% of women without PROM were with Bishops score of <6 on admission. The difference between two study groups was found to be statistically significant (p = 0.009). Total leucocyte count was raised in 12.6% of women with PROM and 4.2% of women without PROM. Positive C Reactive protein was found in 56.8% of women with PROM and 26.8% in without PROM. The difference between two study

groups was found to be statistically significant (p < 0.05). 52.6% of women with PROM had lower segment caesarean section whereas 34.7% of women without PROM delivered vaginally. The difference between two study groups was found to be statistically significant (p < 0.05) Fetal distress and previous caesarean scar in women with PROM and fetal distress and CPD in women without PROM was the commonest indication for caesarean section.

	Maternal infection present		Maternal infection absent	
	no	%	no	%
Women with PROM	28	14.7	162	85.3
Women without PROM	8	4.2	182	95.8
	Chi square = 12.27 P=0.0004		RR=3.5	

Table 1: showing the maternal morbidity (infection) in women with PROM and without PROM maternal infection was observed in 14.7% of women with PROM and 4.2% of women without PROM. The difference between two study groups was found to be statistically significant (p=0.0004). The risk of having maternal infection was found to be 3.5 times higher in women with PROM than in women without PROM.

NICU admission was observed in 22.1% of women with PROM and 10.5% of women without PROM. The difference between two study groups was found to be statistically significant (p = 0.002) and the risk of having NICU admission in women with PROM was found 2 times more than in women without PROM.

Table 2: Showing the neonatal morbidity in women with PROM and without PROM

Neonatal morbidity	APGAR(<8)		NICU admission		sepsis	
	no	%	no	%	no	%
Women with PROM	14	7.4	42	22.1	8	4.2
Women without PROM	8	4.2	20	10.5	1	0.5
	RR=1.75 P=0.187		P=0.002 RR=2.1		P=0.018 RR=8.0	

The indications for NICU admission were hyperbilirubinemia, LBW, asphyxia, sepsis and

meconium aspiration. The most common being asphyxia indicated by low APGAR and sepsis.

Table 3: Showing correlation between PROM delivery interval, investigations, maternal and fetal outcome

PROM-Delivery interval (Hrs)	Mode of Delivery (%) Vaginal/Lscs / inst	Investigations TLC/CRP	Maternal morbidity (%)	Neonatal morbidity(%)
less than 24 hrs	47.3/50.2/2.3	10.4/54.3	12.1	15.6
24-47 hrs	36.3/63.6/0	36.3/100	36.3	90.9
more than 48 hrs	0/100/0	33.3/50	50	83.3

Table 3 shows that duration of PROM till delivery is directly proportional to maternal and neonatal morbidity. There were 100% LSCS rate in patients with PROM of ≥ 48 hrs duration and 63.6% in PROM of 25-47 hrs. Raised TLC and positive CRP are markers of infection but solely cannot be relied upon. CRP was raised in 100% women with PROM of duration between 25-47 hrs, but it was raised in only 50% women with PROM of ≥ 48 hrs. Percentage of maternal morbidity in the form of infection showed a rising trend as the duration of PROM increased while neonatal morbidity was maximum (90.9%) with PROM of 25-47 hrs.

Discussion

In our study the probable etiological factors like vaginitis (6.8%) (trichomonal, bacterial vaginosis), UTI(13.2%), fever(1.1%), were found in women with PROM total being 40 out of 190 cases(21.05%). While in women without PROM it was 19 out of 190 cases (10%). In study by Ning li et al.² (2013), they found 30.2% positive vaginal bacterial cultures in women

with PROM and 10.76% positive vaginal bacterial cultures in women without PROM which was statistically significant as in our study.

C-reactive protein was positive in 56.8% of women with PROM and 26.8% of women without PROM. The rise was statistically significant.

In a study by Shah et al.³. (2011) C-reactive protein was found positive in 28.3%.

Table 4: Showing distribution of women according to maternal morbidity in different studies

Study	Maternal morbidity women with PROM	Maternal morbidity Women without PROM
S.Chaudhari et al 2006 ⁴	1.89%	-
M Gandhi et al 2009 ⁵	postpartum fever,abd distension 3.12%	-
V Bangal et al 2010 ⁶	14%sepsis,wound infection	-

M.Shah et al 2013 ³	Nil	-
Ning Li et al 2013 ²	2.64 puerperal infección	0.46% (P=<0.05)
Present study	14.7% postpartum fever, wound infection	4.2%

Table 5: Showing distribution of women according to neonatal morbidity in different studies

Study	Neonatal morbidity women with PROM	Neonatal morbidity Women without PROM
S.Chaudhari et al 2006 ⁴	19%	-
M Gandhi et al 2009 ⁵	3.38%	-
V Bangal et al 2010 ⁶	14% sepsis - 8%, asphyxia - 2% , Hyperbilirubinemia - 2%	-
Fauna Khanet al 2010 ⁷	sepsis-2%	-
M.Shah et al 2013 ³	28.3%	-
Ning Li et al 2013 ²	Mec aspiration - 23.8% Pneumonia-16.4%	Mec aspiration-12.7%, Pneumonia-8.9%
Present study	NICU-22.1%, sepsis-4.2%, low apgar-7.4%	NICU-10.5%, sepsis-0.5%, low apgar-4.2%

Duration of PROM till delivery is directly proportional to maternal and neonatal morbidity. Raised TLC and positive CRP are markers of infection but solely cannot be relied upon. As the duration of PROM increases, caesarean section rate increases, common indications for caesarean sections being fetal distress and non-progress of labour. This correlation has not been mentioned in any of the studies.

Conclusion

Above study concludes that the frequency of PROM at a tertiary care hospital is 6.08%. Maternal morbidity is directly related to PROM delivery interval. Thus this should be considered during risk based counseling and labour management. In the present study the maternal morbidity in the form of maternal infection (RR=3.5) was high. Caesarean section rate was high in women with Bishops score <6 in whom labour was induced by

PGE2 gel. So, benefit of prostaglandins in women with PROM and unfavourable cervix needs to be further studied.

The art of good obstetric care involves balance between vaginal delivery and caesarean sections with its associated complications. Randomised control trials have concluded that planned early births leads to decreased maternal and neonatal infection, which is in accordance with our study. Hence, Induction of labour and aggressive management is the cornerstone for management of PROM.

In the present study neonatal morbidity comprising of asphyxia and sepsis was more in women with PROM between 25-47hrs. Current trends are towards immediate induction as a means to decrease the perceived risk of infection. Use of prophylactic

antibiotics and minimal internal examinations during labour may help in minimizing the complications.

Maternal and neonatal outcome is affected in women with PROM as compared to women without PROM. Thus, imparting knowledge of healthy pregnancy during antenatal care, screening and treatment of lower genital tract infections timely, may help in prevention of PROM which is responsible for maternal and foetal complications. To provide new insight into management of PROM and evaluation of associated complications we need to construct, validate and implement a protocol.

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