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A study of maternal and perinatal outcome in premature rupture of membranes at term

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Abstract
Background and Objectives: Premature rupture of membranes (PROM) is a vital event which is unpredictable. It can lead to maternal and perinatal complications and neonatal morbidity and mortality. The current research is conducted to evaluate the labour outcome, maternal morbidity and perinatal morbidity and mortality in PROM at term gestation and compared the outcome in controls.
Methods: A total of 200 cases were studied, of which 100 cases of PROM at more than or equal to 37 weeks of gestation, confirmed by speculum examination were evaluated.
Another set of 100 cases with spontaneous rupture of membranes/Artificial rupture of membranes after onset of labour was studied.
A detailed history was taken and gestational age confirmed, general, systemic and obstetrical examinations were done. Parameters of maternal and foetal well being were recorded.
All study groups received prophylactic antibiotics. Pelvic examination done was done on admission and maternal vitals and foetal heart rate was recorded hourly.
Results: PROM was common in younger women. 64% of cases were unbooked while 24% of controls were unbooked. 67% of cases had PROM-delivery interval between 11-20 hours. In the present study, the rate of Caesarean section was 38%. The commonest indication of LSCS being Foetal distress which is 21%. Maternal morbidity was seen in 42% of cases, fever being the commonest responsible for 21% of cases. Perinatal morbidity was seen in 50% of cases, Respiratory distress being the commonest. The perinatal mortality rate was seen in 3%. No maternal mortality was observed in the study.

Keywords: Premature Rupture of Membranes, Maternal morbidity, Perinatal morbidity, Prematurity, amniotic fluid, chorioamnionitis

Introduction

The developing foetus is surrounded by amniotic fluid in amniotic sac, is usually intact until onset of labour or even for a while after labour has begun. Once the membranes rupture labour usually starts within 12 to 24 hours. If labour does not begin during this period, it is called Premature Rupture of Membranes (PROM) [1]. The incidence of PROM is 2.7 – 17% and is high in women with incompetent cervix, polyhydramnios, foetal malpresentations, multiple gestation or cervical/vaginal infection [2]. Other factors that may be linked to PROM include Low socioeconomic status, sexually transmitted infections, previous preterm birth, vaginal bleeding in pregnancy, cigarette smoking and other unknown causes [3].

The primary complication for the mother is risk of infection. Complications in foetus and newborn consist of prematurity, foetal distress, cord compression, deformation and altered pulmonary development leading to pulmonary hypoplasia and hypertension [4].

Diagnostic tests used in the management of PROM include

- Commonly available procedures such as electronic foetal monitoring and collection and analysis of amniotic fluid from the vagina
- Imaging techniques such as Ultrasonography and Biophysical Profile
- Procedures such as amniocentesis that are performed by specialist training in Obstetrics[5].

The administration of antibiotics and corticosteroids and serial evaluations for chorioamnionitis, abruption placentae, foetal growth and well-being are the clinical measures used during surveillance period[6]. The longer the time interval between rupture of membranes and onset of labour the greater the risk of ascending infection and chorioamnionitis.

Latent period is the time interval between the rupture of membranes and onset of uterine contractions. Prolonged PROM is the term used when >24 hours have elapsed before labour

embarks upon. High rupture of membranes is the rupture of amniochorion at a site distant from the internal os. PROM is one of the common complications of pregnancy occurring in about 10% of all births. It is an Obstetric crux which is not precisely described, with an obscure etiology, ambiguous diagnosis and is associated with significant maternal and neonatal morbidity and mortality and has a variable and a controversial management. So the current study is to analyze the maternal and perinatal outcome in premature rupture of membranes at term.

Aims and Objectives

1. To study the maternal outcome in patients with PROM at term in view of outcome of labour and maternal morbidity and compared to non-PROM controls, in which spontaneous or artificial rupture of membranes after the onset of labour was observed.
2. To study the perinatal outcome in patients with PROM at term in view of perinatal morbidity and mortality and compared to non-PROM controls, in which spontaneous or artificial rupture of membranes after the onset of labour was observed.

Methodology

The study consists of an analysis of labour outcome in cases with premature rupture of membranes after 37 completed weeks and compared to controls at term. 200 cases were studied

Group A (cases) – 100 subjects with PROM

Group B (controls) – 100 subjects in labour (spontaneous rupture of membranes/artificial rupture of membranes after onset of labour) The study was done at the Department of Obstetrics and Gynecology, Dr B R Ambedkar Medical College and Hospital, Bangalore between the period November 2015 and May 2017. It is a Randomised controlled prospective study. The data will be collected using a present proforma meeting the objectives of the study by means of personal interview with the patients after taking informed consent.

Inclusion Criteria

1. Gestational age of > 37 weeks confirmed by dates, clinical examination or ultrasound
2. Cervical dilatation of < 3 cms
3. Lack of uterine activity
4. Single live pregnancy in vertex presentation
5. Presence or absence of PROM confirmed by

- Direct visualisation
- Litmus/Fern test

Exclusion Criteria

1. Gestational age < 37 weeks
2. Cervical dilatation of > 3 cms
3. Women in labour
4. Previous Caesarean Section
5. Malpresentations and multiple gestations
6. Medical disorders in pregnancy
7. Newborns with ABO, Rh incompatibility

A detailed history was taken including age, booking, socioeconomic status, time of onset of draining, amount of fluid lost, its colour, odour, association with pain or bleeding per vagina and perception of foetal movements.

Detailed Obstetric history and menstrual history was taken

Relevant past Obstetric history was noted

Detailed General and Systemic examination was done

In Obstetric examination

- Height of uterus, lie, presentation, engagement and uterine contractions looked for
- Uterine tenderness for signs of chorioamnionitis
- Foetal Heart sounds rate and variability

A sterile speculum examination was done, liquor draining from os observed for

- Colour and smell
- Specimen collected and subjected to litmus paper and fern test

A single per vaginal examination done to note the Bishop's score, adequacy of pelvis, and assessment of CPD and rule out cord prolapsed Investigations Complete Blood Count, Urine Routine and Microscopy done Prophylactic antibiotic Injection Ampicillin stat 2 g followed by 500 mg IV every 6 hours were given.

Depending on Bishop Score, labour was induced with Prostaglandins or augmented with oxytocin. Labour monitored with partogram. Induction to delivery time and PROM to delivery interval were noted. If any complications then mode of delivery switched to instrumental delivery or Caesarean section.

After delivery, APGAR at 1 and 5 minutes noted, birth weight, sex, anomalies, birth injuries, signs of asphyxia, meconium aspiration, sepsis and other complications recorded. The babies followed up in the postnatal period. Neonatal morbidity and mortality noted.

Mothers watched for third stage complications like PPH and retained placenta and followed up in puerperal period. Maternal morbidity like puerperal sepsis, sub involution of uterus, urinary and respiratory tract infection and wound infection were looked for.

Results

Table 1: Age Distribution

Age Group	Cases		Controls		Total	
	No	%	No	%	No	%
18 - 20	25	25.0	26	26.0	51	25.5
21-25	52	52.0	50	50.0	102	51.0
26-30	22	22.0	18	18.0	40	20.0
31-40	1	1.0	6	6.0	7	3.5
Total	100	100	100	100	100	100

52% of PROM cases were of 21-25 years of age and 50% of the controls were of the same age group.

Table 2: Group and Obstetric score

Obstetric Score	Cases		Controls		Total	
	No	%	No	%	No	%
Primigravida	63	63.0	48	48.0	111	55.5
Multigravida	37	37.0	52	52.0	52.0	44.5
Total	100	100	100	100	100	100

Chi square test of significance is used to test the association between Obstetric score and group. There is an association between them (p<0.005). Primigravida cases are more in case group (63%) than in control group (48%) which is significant.

Table 3: Group and leak

Leak	Cases		Controls		Total	
	No	**%**	**No**	**%**	**No**	**%**
Clear	66	66.0	87	87.0	153	76.5
Msl-1	19	19.0	10	10.0	29	14.5
Msl-2	15	15.0	3	3.0	18	9.0
Msl-3	100	100	100	100	100	100

Chi square test of significance is used to test the association between leak and group. There is an association between them

(p<0.001). Leak is clear in control group (87%) than in case group (66%) which is significant.

Table 4: Induction delivery interval

Group		N	Meak+/-SD
Induction Delivery Interval	Cases		
	• Primigravida	63	8.98+/-2.45
	• Multigravida	37	7.54+/-2.19
	• Primi+Multi	100	8.45+/-2.44
	Controls		
	• Primigravida	48	12.65+/-1.50
	• Multigravida	52	9.33+/-2.33
	• Primi+Multi	100	10.92+/-2.50

Student's t- test is used to test the mean induction delivery interval between primigravida of cases and controls and multigravida of cases and controls. There is significant difference between them (p<0.05). Mean of total cases 8.45+/-2.44 and total control group was 10.92+/-2.50 with p<0.001.

Table 5: Induction to Delivery Interval (hours)

Interval (hours)	PROM	Control
0-10	88	37
>10-20	12	63

Table 6: Latent period in PROM group

Latent Period (hours)	No	Percentage
0 -12	75	75
>12-24	24	24
>24	1	1

75% of cases delivered in 0-12 hours after induction and 24% delivered in >12-24 hours, 1% had latent period of >24 hours which is significant (p<0.001) whereas controls 37% delivered in 0-10 hours and 63% delivered in 11-20 hours.

Table 7: Group and mode of delivery

Lscs	Cases		Controls	
	NO	%	NO	%
Normal vaginal	58	58	87	87
Lscs	38	38	12	12
Forceps	4	4	1	1

58% of cases had Normal vaginal delivery, the incidence of Caesarean section in cases was 38% and that of instrumental delivery was 4%. The incidence of vaginal delivery in controls was 87%, that of LSCS was 12% and instrumental delivery was 1%. There is significant difference (p<0.0001).

The commonest indication of LSCS in PROM cases is Foetal distress (55.26%) followed by failed induction (26.3%), deep transverse arrest and combination of non-progress of labour and foetal distress.

Table 8: Maternal Morbidity in cases and controls

Maternal morbidity	Cases		Controls	
	No	%	No	%
Present	42	42	5	5
Absent	58	58	95	95

The maternal morbidity is seen more in cases (42%) where as in controls it is only 5% which is statistically significant.

No maternal mortality was seen in the study.

Table 9: Maternal morbidity in PROM cases

Perinatal morbidity	Cases	
	No	%
None	58	58
Febrile illness	21	21
Sepsis	4	4
Post-partum haemorrhage	1	1
Urinary tract infections	5	5
Wound infection	4	4
Abdominal distension	3	3
Subinvolution of uterus	4	4
Chorioamnionitis	0	0
Manual Removal of Placenta	0	0

42% of the PROM cases have maternal morbidity with highest incidence being fever (21%).

Table 10: Group and APGAR 1 minute

APGAR at 1 minute	Cases		Controls		Total	
	No	%	No	%	No	%
Not normal <8	79	79	8	8	87	43.5
Normal >/=8	21	21	92	92	113	56.5
Total	100	100	100	100	200	100

Chi-square test of significance is used to test the association of APGAR between groups. APGAR at 1 minute is normal in controls in 92% and in cases in 21% which is statistically significant (p<0.001).

Table 11: Group and APGAR at 5 minutes

APGAR at 5 minutes	Cases		Controls		Total	
	No	%	No	%	No	%
Not normal <8	33	33.0	-	-	33	16.5
Normal >/=8	67	67.0	100	100	167	83.5
Total	100	100	100	100	200	100

In APGAR of 5 minutes, 100% normal in control group and 67% normal in cases group which is significant.

Table 12: Perinatal morbidity in cases and controls

Perinatal morbidity	Cases		Controls	
	No	%	No	%
Present	50	50	9	9
Absent	50	50	91	91

Perinatal morbidity was seen in 50% of cases and 9% of the controls.

Table 13: Perinatal morbidity in PROM cases

Perinatal Outcome	Cases	
	No	%
None	50	50
Respiratory distress	16	16
Sepsis	14	14
Necrotising enterocolitis	4	4
Meconium aspiration syndrome	6	6
Seizures	3	3
Umbilical sepsis	4	4
Birth asphyxia	3	3
Jaundice	0	0
Conjunctivitis	0	0
Intraventricular Hemorrhage	0	0

50% of PROM cases had perinatal morbidity; highest is Respiratory distress in 16%.

Discussion

The present study was done in Dr B R Ambedkar Medical College and Hospital, Bangalore with 200 cases and was compared to similar studies done elsewhere.

Table 14: Maternal Age 21-25 years and PROM

AGE (Years)	Ray *et al.* 1997 [7]	Patil *et al.* [8] 2014	Girija *et al.* [9] 2015	Nagaria *et al.* [10] 2016	Present Study
21-25	62.00%	49%	70%	57.10%	52%

The results in the present study are comparable to other studies where PROM is common in the age group of 21-25 years.

Table 15: Obstetric Score in PROM cases

Gravida	Thakor *et al.* [11] 1994	Pandey *et al.* [12] 2000	Patil *et al.* [8] 2014	Girija *et al.* [9] 2015	Present study
Primigravidas	53.30%	62.00%	53%	25%	63%
Multigravidas	46.80%	38.00%	47%	75%	37%

PROM is more common in Primigravidas in this study which correlated with other studies.

Table 16: Latent period in cases

	Devi *et al.* [13] 1986	Thakor *et al.* [11] 1994	Present study
Mean Latent period In hours	16	12.06	10.47

In the present study, the mean duration of latent period was 10.47 hours.

Table 17: Mode of delivery in PROM cases

Mode of delivery	Jayaram *et al.* 2001 [14]	Patil *et al.* 2014 [8]	Nagaria *et al.* 2016 [10]	Present study
LSCS	15.0%	27.0%	32.0%	38.0%
VD	74.0%	55.0%	68.0%	58.0%
Instrumental delivery	11.0%	10.0%	0%	4.0%

The rate of LSCS is 38% in the present study which is comparable to Nagaria *et al* study in 2016.

Table 18: Indication of LSCS in PROM cases

Commonest Indication of LSCS	Patil *et al* 2016 [8]	Present study
Foetal distress	51.89%	55.26%

The commonest indication for LSCS is Foetal distress as in with Patil *et al* study.

Table 19: Maternal morbidity in PROM cases

Maternal morbidity	Patil *et al.* 2014 [8]	Girija *et al.* 2015 [9]	Nagaria *et al.* 2016 [10]	Jaiswal *et al.* 2017 [15]	Present study
None	81%	81%	71.7%	74.3%	58%
Febrile illness	11%	7%	25%	10.5%	21%
Sepsis	0%	0%	0.5%	1.4%	4%
Post partum hemorrhage	0%	10%	0%	1%	1%
UTI	2%	0%	0%	0.5%	5%
Wound infection	3%	2%	2.8%	1.4%	4%
Abdominal distension	0%	0%	0%	0%	3%
Subinvolution of uterus	0%	0%	0%	0%	4%
Chorioamnionitis	3%	0%	0%	11.9%	0%
Manual removal of placenta	0%	0%	0%	0.5%	0%
Total morbidity	19%	19%	28.3%	25.7%	42%

In the present study, maternal morbidity was seen in 42% of PROM cases.

Table 20: Perinatal morbidity in PROM cases

Perinatal morbidity	Patil *et al.* 2014 [8]	Present study
None	50%	50%
Respiratory distress	26%	16%
Sepsis	14%	14%
Necrotising enterocolitis	0%	4%
Meconium aspiration syndrome	0%	6%
Seizures	0%	3%

Umbalical sepsis	0%	4%
Birth asphyxia	0%	3%
Jaundice	3%	0%
Conjunctivitis	3%	0%
Intraventricular hemorrhage	4%	0%
Total perinatal morbidity	50%	50%

Patil *et al* study reported perinatal morbidity of 50% with highest being respiratory distress in 26%.

The present study showed perinatal morbidity of 50% with respiratory distress being 16%.

Conclusion

- PROM occurs in approximately 10% of all pregnancies.
- PROM is more common in primigravidas.
- The outcome of labour is found to be more in the form of LSCS and instrumental deliveries and the most common indication being foetal distress and failed induction.
- Maternal and perinatal morbidities are found to be significantly more in PROM cases in comparison to controls.
- There is increased incidence of maternal morbidities in PROM cases like puerperal fever, sepsis, UTI, PPH, wound infection etc. No maternal mortality was observed in this study.
- The incidence of perinatal morbidity is greater in PROM cases and commonest being respiratory distress, sepsis, necrotising enterocolitis, birth asphyxia.
- Antenatal diagnosis of PROM by identifying risk factors is an important tool in the management of PROM.
- AN women should be educated about possibility of PROM and the need to report at the earliest.
- Timely use of proper antibiotics, steroids and induction or augmentation of labour reduce hospital stay and ultimately reduce perinatal and maternal complications.
- The Obstetrician and Neonatologist should work as a team to ensure optimal care for mother and foetus.

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