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Clinical study of premature rupture of membranes at term

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Abstract
Introduction: The study was undertaken to assess role of different variables such as, presentation in utero, the rupture delivery interval, fetal and maternal outcome in case of PROM at term and their correlation to the rupture delivery interval, also to find out if the results could be improved by change in the attitude towards the condition.
Methods: 100 cases of PROM at term admitted at D Y Patil Medical College, Pune, during the period from June 2017 to June 2018 are studied. All single-tone pregnancies with spontaneous rupture of membranes at term gestation>= 37 weeks, demonstration of obvious pooling of amniotic fluid on sterile speculum examination and cervical dilatation < 3 cm and effacement < 80% were included in the study.
Results: Maximum of PROM at term cases are with vertex presentation i.e. 88% and remaining 12% having malpresentaions. Total 65% cases delivered vaginally, 13% had vaginal instrumental deliveries and 22% patients had undergone LSCS. There were 8 cases of chorioamnionitis out of that 6 had only fever and remaining 2 had all signs. Total antepartum morbidity was 8%, postpartum morbidity was 8%, neonatal morbidity was 9% and neonatal mortality was 2% in our study. There was no maternal mortality in our study.
Conclusion: PROM at term is common phenomenon and can occur in about 8-10% of cases. Incidence of LSCS is more in PROM at term mainly due to associated malpresentaions. Infection being major cause of concern in PROM at term as the maternal as well as neonatal morbidity and mortality increases as the leaking delivery interval (hours) increases.

Keywords: PROM, labour, LSCS, vaginal delivery

Introduction
Premature rupture of membranes (PROM) denotes to the loss of integrity of membranes before onset of labor resulting in leakage of amniotic fluid and establishing communication between the amniotic cavity and the endocervical canal and vagina [1]. PROM occurs in approximately 5–10% of all pregnancies, of which approximately 80% occur at term (term PROM) [2].
The optimum management of PROM at or near term presented an obstetrician with a dilemma. Due to PROM both maternal and fetal life can be endangered. It is one of the commonest clinical events where traditional pregnancy can turn into high risk situation for the mother as well as fetus [3]. The imprints of amniorrhexis on the pregnancy outcome depend upon several variables like period of gestation, presentation in utero, intrauterine infection, rupture delivery interval and policy of management whether active or conservative [4].
Rupture of membrane is diagnosed by speculum vaginal examination of cervix and vaginal cavity. Pulling of fluid in the vagina or leakage of fluid from the cervix, ferning of dried fluid under microscopic examination, and alkalinity of the fluid as determined by Nitrazine paper confirmed the diagnosis [5]. Blood contamination of Nitrazine paper and ferning cervical mucus may produce false positive results. Pulling of fluid is by far the most accurate for diagnosis of rupture of membrane and used in our study also. If all fluid has leaked out as in early PROM, an ultra sonographic examination may then show absence of or very low amniotic fluid in the uterine cavity [6].
Around 90% patients enter spontaneous labor within 24 hours when they experienced PROM at term. Major question regarding management of these patients is whether to allow them to enter labor spontaneously or to induce labor.[7]In large part, the management of these patients depends on their desire; however the major maternal risk at this gestational age is intrauterine infection.

The risk of intrauterine infection rises with duration of ROM. Evidence supports the idea that induction of labor, as opposed to expectant management, decreases the risk of chorioamnionitis without increasing the caesarian delivery rate [8].

Infection remains the most serious complication associated with PROM at term for the mother and the neonate. The risk of chorioamanionitis with term PROM has been reported to be less than 10% and increased to 24% after 24 hours of PROM. The neonatal risks of expectant management of PROM include infection, placental abruption, fetal distress, fetal/neonatal death [9].

Aims and Objectives

The objectives of the present research were to study the incidence of premature of membranes at term, the impact of rupture delivery interval in case of PROM at term on maternal and fetal outcome, the active management of PROM at term so as to improve fetal and maternal well beings, the incidence and indications of LSCS in cases of PROM at term and the imprints of PROM at term of pregnancy outcome.

Materials and Methods

The present prospective study was conducted at D Y Patil Medical College, Pune, during the period from June 2017 to June 2018. All single-tone pregnancies with spontaneous rupture of membranes at term gestation>= 37 weeks, demonstration of obvious pooling of amniotic fluid on sterile speculum examination and cervical dilatation < 3 cm and effacement < 80% were included in the study.

Women with PROM at term were included in the study after proper history taking. A thorough, general, and systemic examination was done to exclude exclusion criteria. Total 100 cases of PROM at term were included in the study. Detailed obstetric examination was done to note presentation, uterine contraction status, and fetal heart rate pattern. Speculum examination was done to confirm leaking and, in doubtful cases, further tests such as heat test and pH estimation of discharge were done. Cervical swab was sent for culture and sensitivity. To note the dilatation and effacement and to confirm the presence of membrane, vaginal examination was done.

In our study, the patient who enter into spontaneous labor were observed for progress, and those who didn't go in labor spontaneously till 6 hour were induced as earlier by oxytocin or prostaglandin (PGE2) vaginal gel, so as to achieve the earlier delivery, for better outcome and it will in turn minimize the risk of infection in both mother and fetus.

Results

In hundred cases of premature rupture of membranes at term studied in D Y Patil Medical College, Pune, during the period from June 2017 to June 2018, following observations were made. The table 1 shows PROM at term was found in higher percentage in younger age group i.e. up to 25 years of age may be due to earlier marriages in our country. Maximum of PROM at term cases are with vertex presentation i.e. 88% and remaining 12% having malpresentaions. In this study, premature rupture of membranes was found with higher incidence in multigravida i.e. 58% out of that second gravida being 32% and third gravida being 26%. These were 42% cases of primigravida. Table 1 shows that in series majority of cases (83%) delivered within 24 hours of leak and only 17% ruptured delivery interval more than 24 hours as they had reported late. The incidence of premature rupture of membrane at term, at our institute was found to be 8.01%.

In study of 100 cases total 65% cases delivered vaginally, 13% had vaginal instrumental deliveries and 22% patients had undergone LSCS. Total 34 patients went in labor spontaneously and 56 patients required active management. (Table 2)

In this study of PROM at term, majority of LSCS was done for malpresentations i.e. total 8 cases. In vertex presentation the indications of LSCS being failure of induction (22.27%), fetal distress (18.18%), arrest of dilation (13.63%). There were two cases of chorioamnionits who were undergone LSCS immediately (9.01%). (Table 3)

Table 4 shows PROM at term with vertex presentation 15.9% undergone LSCS means majority of patients delivered vaginally, and there was higher rate of cesarean in case of PROM with malpresentation.

According to table 5, there were 8 cases of chorioamnionitis out of that 6 had only fever and remaining 2 had all signs. None of the case of group 0-12 hours had fever, 4.25% cases of 13-24 hours, 18.18% from 25-36 hours, 50% from 37-48 hours and 100% from >48 hours had signs of chorioamnionitis in our study. Postpartum morbidity also increased as the leaking delivery interval period was increased being only 2.77% in 12 hour group and increased up to 50% in case where leaking delivery interval was more than 48 hours.

As shown in table 6, it is clear that as the internal period of PV leak and delivery increases the rate of neonatal morbidity increases. In our study there were 2 neonatal death where leaking delivery interval was more than 36 hours. There was not a single case of neonatal morbidity where delivery occurred within 12 hours. In 13-24 hours morbidity was 8.51%, in 25-36 hours 18.18% and <36 hours 50% neonatal morbidity was observed. Total antepartum morbidity was 8%, postpartum morbidity was 8%, neonatal morbidity was 9% and neonatal mortality was 2% in our study. There was no maternal mortality in our study.

Table 1: Obstetric history of study participants

Variable	Cases N=100 (%)
Age (in years)	
<20	18 (18)
21-35	52 (52)
26-30	21 (21)
31-35	8 (8)
36-40	1 (1)
Gravida	
Primigravida	42 (42)
Second Gravida	32 (32)
Third gravida and above	26 (26)
Presentation	
Vertex	88 (88)
Breech	8 (8)
Brow	1 (1)
Face	2 (2)
Transverse	1 (1)
Leaking delivery interval (in hours)	
<12	36 (36)
13-24	47 (47)
25-36	11 (11)
37-48	4 (4)
>48	2 (2)

Table 2: Mode of delivery

Mode of delivery	Cases N=100 (%)	Vaginal Spontaneous N=65 (%)	Vaginal Instrumental N=13 (%)	LSCS N=22 (%)
Spontaneous onset	34 (34)	26 (76.4)	5 (14.7)	3 (8.8)
Active management	56 (56)	39 (69.6)	8 (14.2)	9 (16.1)
Primary LSCS	10 (10)	-	-	10 (10)

Table 3: Analysis of indication for cesarean section in cases of premature rupture of membrane

Indication for LSCS	Cases N=22 (%)
Failure of induction	5 (22.7)
Fetal Distress	4 (18.2)
Secondary arrest of dilation	3 (13.6)
Pre LSCS with breech	3 (13.6)
Primi with breech	3 (13.6)
Transverse Lie	1 (4.6)
Brow	1 (4.6)
Chorioamniotis	2 (9.1)

Table 4: Analysis of percentage of cesarean section in vertex and non-vertex presentation

Presentation	Total cases	LSCS
Vertex	88	14 (15.9)
Non-vertex	12	8 (66.7)

Table 5: Correlation between premature rupture of membrane at term and antepartum-postpartum complication

Antepartum complications			
Leaking delivery interval (hours)	**Cases N= 100**	**Only Fever**	**Chorioamnionitis Other signs**
0-12	36	0 (0)	0 (0)
13-24	47	2 (4.3)	0 (0)
25-36	11	2 (18.2)	0 (0)
37-48	4	1 (25)	1 (25)
>48	2	1 (50)	1 (50)
Postpartum complications			
Leaking delivery interval (hours)	**Cases N= 100**	**Only Fever**	**Puerperal sepsis**
0-12	36	1 (2.9)	0 (0)
13-24	47	2 (6.4)	0 (0)
25-36	11	3 (18.2)	0 (0)
37-48	4	1 (25)	0 (0)
>48	2	1 (50)	0 (0)

Table 6: Correlation between interval of leak, neonatal morbidity and neonatal death (NND)

Leaking delivery interval (hours)	Cases N= 100	Neonatal morbidity	Neonatal death
0-12	36	0 (0)	0 (0)
13-24	47	4 (8.5)	0 (0)
25-36	11	2 (18.2)	0 (0)
37-48	4	2 (50)	1 (25)
>48	2	1 (50)	1 (50)

Discussion

Premature rupture of membrane at term is one of the common and challenging problem in perinatal medicine today. The management is one of the most controversial problems in obstetrics and has gone through various cycles of masterly inactivity to immediate intervention. Various factors have been complicated in causation of premature rupture of membrane at term of which maternal genital infection plays a major role directly or indirectly [10].

The study was undertaken to assess role of different variables such as, presentation in utero, the rupture delivery interval, fetal and maternal outcome in case of PROM at term and their correlation to the rupture delivery interval, also to find out if the results could be improved by change in the attitude towards the condition. Hundred cases of PROM at term admitted at D Y Patil Medical College, Pune, during the period from June 2017 to June 2018 are studied.

It is difficult to obtain an accurate determination of incidence of premature rupture of membrane at term by reviewing the literature because of variation in definition and methods used for diagnosis. They are as follows.

Table 7: Obtain an accurate determination of incidence

Sr. No.	Study	Incidence
1.	Gunn GC *et al* (1970) [11]	8.10%
2.	Grant & Keirse (1981) [12]	6.19%
3.	Meike SF *et al* (1992) [13]	8%
4.	Duff P. *et al* (1996) [14]	5.10%
5.	St. Joseph's Hospital (1987) [15]	10%
6.	Snehemay Chodhari el at (2006) [16]	5.10%
7.	Present study	8.01%

Gillbrand (1967) [17] was also of opinion that there is lower risk of premature rupture of membranes in first pregnancy. But Meudt (1967) [18] quoted that incidence of premature rupture of membrane was somewhat high in primigravida than its occurrence in multigravida. In the present study, 42% primigravida 58% multigravida.

Cardinal principle of medicine is prevention but as yet definitive etiology of premature rupture is not exactly know, hence prevention is not possible as such, but with proper management further complications can be prevented and better outcome of both mother and fetus can be optimized.

Although rupture of the fetal membranes before the onset of labor at term is a common phenomenon, there is no consensus as to its optimal management. Reports from 1950s and 1960s note increase in perinatal mortality when the fetal membranes are ruptured longer than 24 hours before delivery, for this reason, immediate induction of labor is advocated. In 1979, Kappy *et al*. [19] challenged this view, suggesting that the risk of cesarean delivery could be reduced with conservative management of PROM at term. In 1984 Duff *et al*. [14], published a randomized study supporting this view, showing no increased risk of neonatal sepsis.

In 1989, Wagner *et al*. [20] suggest that delaying labor induction in these women did not affect the cesarean delivery rate yet was associated with increased neonatal infectious morbidity. Other advocated the use of prostaglandins to expedite labor in women with unfavorable cervices at term without increasing rate of operative deliveries.

A report of a large, multicenter trial, Hannah *et al*. [21], suggested that cesarean deliveries are increased if immediate induction with oxytocin is carried out and that conservative management associated with increased maternal infectious morbidity.

We observe the patients who enter into spontaneous labor and the patient who don't go in labor more than 6 hours since PROM

were induced by either in oxytocin induction or prostaglandin PGE2 in post fornix, mainly depending upon the effacement and dilation of cervix. Most patients having OS closed were induced by PGE2 and repeated if required and after dilation are augmented by IV oxytocin drip. Patients having good effacement and dilatation (2cm) were induced by oxytocin. Patients were monitored throughout the labor in form of continuous fetal heart rate monitoring, maternal pulse rate, temperature, uterine tenderness, any foul smelling discharge and PV examination repeated under all aseptic precautions.

Patients having direct indication for LSCS like PROM with breech presentation or any other malpresentaions (total 8 cases) were taken for LSCS after required investigation done. Patients having signs of chorioamnionits also taken for LSCS urgently under proper antibiotic coverage (2 cases). There were two cases in our 100 cases study of PROM.

Formerly it was believed that one can wait for 24 hours for onset of spontaneous labor, as cumulative incidence of maternal and neonatal morbidity do not increase significantly in this interval and 90% of cases will go in labor during this period and in remaining 10% active policy can be instituted. Burchell[22]said that watchful expectancy for 24 hours increases fetal and maternal risk unnecessarily.

Lanier (1965) [23] stated that the critical line is 12 hours after PROM, infection begins at 12 hours and maximum by 24 hours, so at 12th hour after PROM decision must be taken to deliver these mothers. Hauth (1977) [24] reported approximately half of women at term who are not in labor 3 hours after membrane rupture were still not in labor by 12 hours. Risks to mother and fetus are even higher in indigent women who apparently more vulnerable to infection. Hence recent trend is to observe the patient only for few hours, for onset of labor otherwise if cervix is favorable and there is no contradiction to vaginal delivery oxytocin stimulation is instituted. Usually oxytocin induction will accomplish delivery in 95% cases.

Reported incidence of LSCS in PROM at term ranges from 1-15%. In our study the incidence was 22% as in our study malpresentation are included. Our study shows that in case of vertex presentation (total 88 cases), the incidence of LSCS is 15.9% matching to other studies and in non-vertex presentation (total 12 cases), the incidence is 66.66%. Largest study of PROM at term by Hannah [21], studied 5041 cases at term with vertex presentation having LSCS rate 9.6% to 10.9%.

Russell[25]proved that the active management reduces incidence of amnionitis, maternal and perinatal mortality and morbidity. Hence, patient managed actively in this series who do not go in spontaneous labor for 6 hours. In our study 34 patients enter in spontaneous labor (34%) and 50% patients requires active management. So, in our study 65% were vaginal spontaneous delivery, 13% were vaginal instrumental and 22% were LSCS.

In comparison to it, in study done by Grant *et al*. (1992) [28] 51.6% were vaginal spontaneous delivery, 28.6% were vaginal instrumental and 17.4% were LSCS.

Hannah *et al*. [21] shows mode of delivery in induction group in primi and multi. In primi group, 60.8% were vaginal spontaneous delivery, 25% were vaginal instrumental and 14.1% were LSCS. In multi group, 86.6% were vaginal spontaneous delivery, 9.1% were vaginal instrumental and 4.3% were LSCS.

In present series, none of the patient of interval period 12 hours (total36) had signs of chorioamnionitis. Up to 24 hours interval 2 cases have fever i.e. 2.40% while patients having more leak interval period had increasing number of chorioamnionitis. In the present study incidence of chorioamnionitis was 8%. In studies done by Russell (1962) [25], Clark (1968) [26], Ekvall (1961) [27] and Wilson (1964) [28] incidence of chorioamnionitis was 5%, 10.7%, 11.8% and 16.5% respectively.

Sachs (1967) [29] showed that the incidence of postpartum morbidity also rises with increasing interval period. Fever after delivery (2 temperature elevations of >38 °C occurring at least 6hours apart and not including the first 24 hours after delivery) uterine tenderness, or white blood cell elevation more than 20,000. In present series, shows that as interval period increases, postpartum morbidity goes on increasing.

As discussed in observation tables it is clear that delivery interval increases both neonatal morbidity and mortality increases Burchell (1964) [22] showed that perinatal mortality of entire group double24 hours of latent period and doubled again during second 24 hours.

Maternal mortality associated with premature rupture of membranes reported in literature varies widely. Maternal mortality was found 0.2% by Sachs (1967) [29], and 0.86% by Lanier (1965) [23]. It was 0% in the present Series.

Webb (1967) [30] in analysis of maternal mortality statistics from state of California from 1957 to 1965 reported 54 cases of maternal death associated with premature rupture of membrane. Primary cause of death in all most of cases was sepsis-septic shock or septicemia. Either patient reported late or antibiotics were given too late or in too small doses to be effective. Committee felt that most of these were preventable and recommended early aggressive management as described by Russell. In present series, there was no single maternal death.

Conclusion

We concluded that PROM at term is common phenomenon and can occur in about 8-10% of cases. Majority of patients enter in spontaneous labor following PROM at term. Patients who not enter labor spontaneously in labor should be induced after some hours of observations. Incidence of LSCS is more in PROM at term mainly due to associated malpresentation, otherwise in PROM with vertex presentation the incidence of LSCS is near to other cases without PROM. Infection being major cause of concern in PROM at term as the maternal as well as neonatal morbidity and mortality increases as the leaking delivery interval (hours) increases, but which can be minimized by active management and proper use of antibiotics at right time.

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