
OBSTETRICS

Cervical swab culture results in preterm premature rupture of membranes (PPROM)

Supot Leingprom MD,
Dhiraphongs Charoenvidhya MD,
Boonchai Uerpaiojkit MD,
Vorapong Phupong MD,
Piyaratt Samritpradit MD.

Department of Obstetrics and Gynecology, Faculty of Medicine, Chulalongkorn University, Bangkok 10330, Thailand

ABSTRACT

Objective To study the results of cervical swab culture in preterm premature rupture of membranes (PPROM).

Design Prospective descriptive study.

Setting Department of Obstetrics and Gynecology, King Chulalongkorn Memorial Hospital.

Subjects Seventy eight PPRM women who underwent expectant management and delivered between June 1, 2000 and May 31, 2001.

Method Prospective collection of data from Obstetric and neonatal chart records.

Main outcome measurement Cervical swab culture results.

Results The incidence of PPRM was 10.53 per 1000 deliveries. Cervical swab cultures were positive in 23 cases (29.5%). Among 23 cases with positive culture group there were 12 cases of *Candida* species (52.2%), 4 cases of *E.coli* species (17.5%) and 3 cases of *Beta-Streptococcus* group B (13.1 %). The incidence of *Beta-Streptococcus* group B was 3.8% in the overall patients with PPRM. The most common maternal complication was chorioamnionitis: 4 cases (5.1%) in culture positive group and 1 case (1.3%) in culture negative group. The most common neonatal complication was hyperbilirubinemia: 14 cases (17.9%) in culture positive group and 11 cases (14.1%) in culture negative group.

Conclusion Common microorganisms revealed in cervical swab culture in PPRM were *Candida* species, *E.coli* species and *Beta-Streptococcus* group B. The most common organism in this study was *Candida* species. The evidence of *Beta - Streptococcus* group B was so far below the report in Western study. There were more maternal and neonatal complications in culture positive group than in culture negative group.

Key words: preterm premature rupture of membranes, cervical swab culture

Preterm premature rupture of membranes (PPROM) is a common obstetric complication which precedes one quarter to one third of preterm birth.⁽¹⁾ It is the most common causes of perinatal

morbidity and mortality.⁽²⁾ Several studies demonstrated association between lower genital tract colonization and subsequent PPRM.⁽³⁻⁵⁾ Prophylactic antibiotic in patients with PPRM has

been suggested by several studies.^(1,6-8) The protocol of antibiotic used should be selected on the basis of bacterial colonization in each population. There were limiting data on cervical colonization in patient with PPROM in our population. The only previous study which included all PPROM patients was done more than ten years ago.⁽⁹⁾ This study was conducted to explore the incidence of cervical colonization and the types of organism isolated in case of PPROM in King Chulalongkorn Memorial hospital .

Material and method

From June, 2000 to May, 2001, patients who admitted to the delivery room at King Chulalongkorn Memorial Hospital with a diagnosis of preterm premature rupture of membranes (PPROM) at gestational age from 28 to 36 weeks 6 days were recruited into the study. The diagnosis of premature rupture of the membranes was made on the history of clear watery discharge from vagina and positive Nile's blue test and Fern test. The patients were excluded if they had malpresentation, multiple pregnancies, underlying medical complication such as pregnancy induced hypertension, or uterine anomalies. Cervical swab cultures were done by placing a sterile cotton swab into the endocervical canal and then inserted into two Amies transfer media tubes. The first Amies transfer media tubes were prepared for Streptococcus species, Neisseria gonorrhoea and Enterococcus species. The second Amies transfer media tubes were prepared for Gardnerella vaginalis, Mycoplasma species and Ureaplasma urealyticum. Both Amies

transfer media tubes were carried within 4 hours to the laboratory room of The Department of Microbiology, Faculty of Medicine, Chulalongkorn University, where each cotton swab in the first transfer media tubes was inoculated onto the Streptococcus blood agar, Thayer-Martin agar, McConkey agar and each cotton swab in the second transfer media tubes was inoculated onto the specific agar for Gardnerella vaginalis, Mycoplasma species and Ureaplasma urealyticum. All agar plated were cultured at 37°C as standard microbiological techniques for each organism.

The main outcome measures were aimed at the rate of positive swab culture, type of organism colonized in the endocervical canal. The secondary outcome measures were maternal and neonatal outcomes. The maternal outcomes were aimed at latency period (defined as the duration from rupture of membranes to delivery), chorioamnionitis (diagnosed on the basis of the followings : fetal or maternal tachycardia, uterine tenderness, foul smell amniotic fluid), endometritis (diagnosed as maternal postpartum fever with foul smell lochia and uterine fundal tenderness). The data were analyzed by means of descriptive statistics.

Results

From June, 2000 to May, 2001, 120 pregnant women were diagnosed as PPROM among 11, 389 deliveries. Seventy-eight cases of PPROM met the inclusion criteria. The demographic data of the subjects were shown in table 1.

Table 1. Demographic data

Characteristics	Minimum	Maximum	Mean	S.D.
Age(years)	16	41	26.70	5.54
Gravida	1	5	2.00	1.41
Parity	0	3	0.59	0.78
Gestational age at PROM(weeks)	28	36	33.4	2.12
Gestational age at delivery(weeks)	28	37	33.8	2.23
Latency period(hours)	5	204	28.3	38.5
Hospital stay(days)	3	15	7.1	3.4

Cervical swab cultures were positive in 23 out of 78 cases (29.5%). Types of isolated

microorganisms were demonstrated in table 2.

Table 2. Cervical swab culture results in positive -culture group

Microorganism	Number (case)	percent
Candida species	12	52.2
E.coli species	4	17.5
Beta - Streptococcus Group B	3	13.1
Beta - Streptococcus Group D	1	4.3
Proteus species	1	4.3
Klebsella species	1	4.3
Pseudomonas species	1	4.3
Total	23	100

The most common microorganism colonized in endocervical canal was Candida species. The most common bacterial colonization was E.Coli. Beta Streptococcus group B were found 3 out of 23 cases (13.1%). No Gardnerella vaginalis, Mycoplasma species or Ureaplasma urealyticum was found.

The mean latency period was 28.3 + 38.5 hours. (range 5-204 hours). Fifty-four patients (69.2%)

delivered within 48 hours after the onset of PPROM. There were 5 cases of chorioamnionitis : 4 cases (5.1%) in positive-culture group and 1 case (1.3%) in negative-culture group. There was 1 case (1.3%) of endometritis among 78 patients with PPROM.

The neonatal outcomes were demonstrated in table 3 and table 4.

Table 3. Neonatal outcomes

	Minimum	Maximum	Mean	S.D.
Body weight (grams)	1,000	2,550	2,053	405
Apgar score at 1 minute	2	9	8.0	1.3
Apgar score at 5 minute	6	10	9.6	0.9
Hospital stay (days)	3	53	7.9	14.2

There were 25 neonates with various complications that might be associated with PPROM. One

neonate might have more than one complication. Each complication was demonstrated in table 4.

Table 4. Neonatal complications

Complications	Numbers of cases		Total	Percent
	culture positive	culture negative		
Hyperbilirubinemia	14	11	25	32.1
Hypoglycemia	7	3	10	12.8
RDS*	4	2	6	6.4
Sepsis	2	0	2	2.6
Birth Asphyxia	2	0	2	2.6
Pneumonia	0	1	1	1.3

* Respiratory Distress Syndrome

Respiratory distress syndrome (RDS) occurred in 6 newborns of gestational age 28, 29(2 cases), 32, 33 and 34 weeks. Two cases of birth asphyxia occurred in newborn delivered at 31 and 35 weeks of gestation.

Maternal complication were chorioamnionitis and post partum endometritis. The most common maternal complication was chorioamnionitis: 4 cases (5.1%) in culture positive group and 1 case (1.3%) in culture negative group.

There was no significant difference between mean latency period in the positive culture group (32.8±54.1 hours) and the negative-culture group (40.2±64.4 hours).

Discussion

In this study, 120 cases of PPROM were diagnosed among total 11,389 deliveries resulting in the incidence of 10.53 per 1000 deliveries. In the 78 cases of PPROM recruited into this study, the cervical swab cultures were positive in 23 cases (29.5%). This incidence was lower than the previous reported in King Chulalongkorn Memorial hospital in 1987 by Wajanavisit et al. (47.3%).⁽⁹⁾ The difference in the incidence might be the result of difference in methods of sample collection. Long interval between these two studies may be a factor of natural change in cervical colonization.

In the 23 cases of positive-culture group, the most common microorganism isolated from endocervical canal was *Candida* species (52.1%), which

were normal vaginal flora. Anyway, from this study, we cannot make a conclusion whether this organism associated with the infection of vagina and cervix. The most common bacterial colonization was *E. coli* (17.5%) and *Beta-Streptococcus* group B (13.1%). The incidence of *Beta-Streptococcus* group B, which is a microorganism associated with severe neonatal infection, was 3.8% in the overall patients with PPROM, which is consistent with the incidence reported in 1987 by Wajanavisit, et al. (4%).⁽⁹⁾ We found lower incidence of *Beta-Streptococcus* group B cervical colonization compared to those reported in previous Western studies, which were range from 7.3%-31.7%.^(4,10-12) In this study, there was no positive culture of *Gardnerella vaginalis*, *Mycoplasma* species or *Ureaplasma urealyticum*. These microorganisms cause bacterial vaginosis which is known to be associated with PPROM.⁽¹³⁾ The difference found in our may be the result of the variation caused by difference between populations or a pitfall caused by transfer media such as too long duration of media tube in appropriate temperature, or specific medium for these organism might be need.

Sixty-nine percent of the patients in our study delivered within 48 hours after the onset of rupture of membranes. This rate was higher than that found in the study by Magwali, et al (58.1%)¹⁴, which included subjects at gestational age comparable to our study (26-36 weeks). It is unable to compare the mean latency period reported in our study to those reported in Western studies because of

difference in gestational age at inclusion. Most studies recruited patients with PPROM at gestational age between 20 to 34-36 weeks.⁽¹⁵⁻¹⁷⁾

To date, there have been a large number of evidences supporting of the benefit of antibiotics administration in patients with PPROM.^(1,6-8) Several protocol of antibiotics administration were published, which were based on the types of microorganisms colonization in the population. Further randomized controlled study regarding benefit in antibiotic prophylaxis in PPROM in our population is warranted.

References

1. ACOG practice bulletin. Premature rupture of membranes. Clinical management guidelines for obstetrician-gynecologists. Number 1, June 1998. American College of Obstetricians and Gynecologists. *Int J Gynaecol Obstet* 1998; 63: 75-84.
2. Cunningham FG, Gant NF, Leveno JK, Gilstrap III LC, Hauth JC, Wenstrom KD. *Williams Obstetrics*. 21st ed. New York; McGraw-Hill, 2001 : 692.
3. Minkoff H, Grunebuam AN, Schwaarz RH, Feldman J, Cummings M, Crombleholme W, et al. Risk factors for maturity and premature rupture of membranes : a prospective study of the vaginal flora in pregnancy. *Am J Obstet Gynecol* 1984;150:965-72.
4. Alger LS, Lovchik JC, Hebel JR, Blackmon LR, Crenshaw MC. The association of clamydial trachomatis, *Neisseria gonorrhoeae*, and group B streptococci with preterm rupture of the membranes and pregnancy outcome. *Am J Obstet Gynecol* 1988;159:397-404.
5. McDonald HM, O'Loughlin JA, Jolly P, Vigneswaren R, McDonald PJ. Prenatal microbiological risk factors associated with preterm birth. *Br J Obstet Gynaecol* 1992;99:190-6.
6. Mercer BM, Miodovnik, Thurnua GR, Goldenberg RL, Das AF, Ramsey RD, et al. Antibiotic therapy for reduction of infant morbidity after premature rupture of the membranes. A randomized controlled trial. National Institute of Child Health and Human Development Maternal-Fetal Medicine Units network. *JAMA* 1997 ; 278 :989-95.
7. Locksmith GJ. Antibiotic therapy in preterm premature of membranes. *Clin Obstet Gynecol* 1998; 41: 864-9.
8. Kenyon SL, Taylor DJ, Tarnow-Mordi W. Broad spectrum antibiotics for preterm, prelabour rupture of fetal membranes : thr ORACLE I randomised trial. ORACLE coaborative Group. *Lancet* 2001; 357: 978-88.
9. Wajanavisit W, Nuntapisut P, Wejkigkul S, Yoon N, Veravatanatakul Y, Tangpisan S. Premature rupture of membranes ,and bacterial colonization of endocervix. *Chula Med J* 1987 ; 31 : 883-888.
10. Johnston MM, Sanchez-Romos L, Vaughn AJ, Todd MW, Benrubi GI. Antibiotic therapy in preterm premature rupture of membranes : a randomized, prospective, double-blind trial. *Am J Obstet Gynecol* 1990; 163: 743-7.
11. Tower CV, Lewis DF, Asrat T, Gardner K, Perlow JH. The effect of colonization with group B streptococci on the latency phase of patients with preterm permature rupture of membranes. *Am J Obstet Gynecol* 1993; 169: 1139-43.
12. Mercer BM, Crocker LG, Boe NM, Sibai BM. Induction versus expectant management in premature rupture of membranes with mature amniotic fluid at 32 to 36 weeks: a randomized trial. *Am J Obstet Gynecol* 1993; 169: 775-82.
13. McGregor JA, French JI, Parker R, Draper D, Patterson E, Jones W, et al. Prevention of premature birth by screening and treatment for common genital tract infections: results from a prospetive controlled evaluation. *Am J Obstet Gynecol* 1995; 173:157-67.
14. Magwali TL, Chipato T, Majoko F, Russakaniko S, Mujaji C. Prophylactic augmentin in prelabor preterm rupture of the membranes. *Int J Gynaecol Obstet* 1999; 65: 261-5.
15. Fortunato SJ, Welt SI, Eggleston M, Cole j, Bryant EC, Dodson MG. Prolongation of the latency period in preterm premature rupture of the membranes using prophylactic antibiotics and tocolysis. *J Perinatol* 1990;10: 252-6.
16. Lockwood CJ, Costigan K, Ghidini A, Wein R, Chien D, Brown BL, et al. Double-blind; placebo-controlled trial of peperacillin prophylaxis in preterm membrane rupture. *Am J Obstet Gynecol* 1993; 169: 970-6.
17. Lewis DF, Brody K, Edwards MS, Brouillette RM, Burlison S, London SN. Preterm premature ruptured membranes: a randomized trial of steroids after treatment with antibiotics. *Obstet Gynecol* 1996;88:801-5.