
OBSTETRICS

Epidemiologic Study of Cervical Swab Culture in Preterm Premature Rupture of Membrane (PPROM) at Ramathibodi Hospital.

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ABSTRACT

Objective To investigate the incidence and results of cervical swab culture in pregnant women with preterm premature rupture of membrane (PPROM) at Ramathibodi Hospital and their management.

Study design Retrospective descriptive study.

Setting Department of Obstetrics and Gynecology, Faculty of Medicine Ramathibodi Hospital, Mahidol University.

Subjects 161 pregnant women who were diagnosed as PPRM and admitted into labor room at Ramathibodi Hospital during January 2003 and September 2006.

Main outcomes Rate of cervical swab culture among cases of PPRM, types of organisms found and management compared with management protocol of the Department of Obstetrics and Gynecology Ramathibodi Hospital.

Results Cervical swab culture was done in 64.7% of pregnant women with PPRM and 82% of cases received antibiotics. The most common organism was Gardnerella vaginalis (34.8%). Group B Streptococcus (GBS) colonization was found in 6.8% of cases. One case of newborn was dead from GBS infection.

Conclusion The rate of GBS colonization was low in comparison with other studies. The rate of performing swab culture and prescribing antibiotics were not consistent with management protocol of Department of Obstetrics and Gynecology Ramathibodi Hospital. Management protocol should be improved in system implementation and compliance of personnel.

Keywords: preterm premature rupture of membranes (PPROM), cervical swab culture, group B streptococcus

Introduction

Preterm premature rupture of membranes (PPROM) occurs in 3% of pregnancies and is

responsible for approximately one third of all preterm births. PPRM has been proved to result in neonatal death from prematurity and sepsis.⁽¹⁾

Premature rupture of membranes is multifactorial in nature. Infection and inflammation appear to play important roles in etiology.⁽¹⁻⁴⁾

The management protocol for PPROM was developed, has been used and modified at Ramathibodi Hospital. According to the protocol, pregnant women with PPROM should have cervical swab culture to identify pathologic organisms as well as verification of rupture of membranes. Antibiotics should be initiated to prevent and to treat Group B Streptococcus (GBS) infection and finally to prolong latency of gestational age to delivery. In pregnant women with gestational age less than thirty four weeks, dexamethasone was given to promote fetal lung maturation.

Although cervical swab culture was conventionally done according to management protocol at Ramathibodi Hospital, the practice was not consistent and closely monitored. This study aimed to investigate the incidence and results of cervical swab culture in pregnant women with PPROM and their management.

Materials and Methods

This study was retrospective descriptive study. The study received approval from Ramathibodi's Ethical Committee on human research. Data of all women with PPROM who were admitted into labor room during January 2003 and September 2006 were retrieved. The pregnant women who did not deliver at Ramathibodi Hospital were excluded. Results of cervical swab culture, patient's age, parity, duration of PPROM to delivery, mode of deliveries, antibiotics used, other interventions and neonatal outcomes were recorded. In cases that results of swab culture were not available in medical records, the results were retrieved from hospital's computer database.

Preterm premature rupture of the membranes is defined as spontaneous rupture of fetal membranes that occurs before the onset of labor and before 37 weeks of gestation. The diagnosis of rupture of membranes was done with history of vaginal leakage of fluid and by visualized gross

vaginal pooling of amniotic fluid during speculum examination. Cervical swab culture was done during the process of this examination by using cotton wool swab which was then put in Stuart's medium and transported to the microbiology laboratory immediately. Primary plating media consisted of blood agar and chocolate agar. Only culture for aerobic microorganism was performed.

Results

Two hundred and forty-nine cases of PPROM were identified during January 2003 and September 2006. Cervical swab culture was done in only 161 cases (64.7%). Table 1 showed the characteristics of pregnant women with PPROM and doing cervical swab culture. Mean \pm SD age of the cases was 29.8 \pm 7.2 years old. Twenty-one cases (13%) had a gestational age less than 28 weeks when PPROM occurred, while 81 cases (50.3%) had gestational age between 28 to 34 weeks. Fifty-six percent of cases were primigravida.

Table 2 showed obstetric characteristics of pregnant women with PPROM and doing cervical swab culture. Fifty-five cases (34.2%) had prolonged PPROM (>18 hours). Four cases of PPROM developed chorioamnionitis (2.5%). All of them received prophylactic antibiotics (Cephalosporin or Ampicillin plus gentamicin). Seventy-three percent of cases had vaginal deliveries. Only eighty nine cases (55.3%) had the results of cervical swab culture recorded in medical records. Among 161 cases which cervical swab culture was performed, 145 cases (90.1%) had positive results (Table 3). The most common organisms were Gardnerella vaginalis (34.8%) and Lactobacillus spp (25.5%). Group B Streptococcus colonization was found in 6.8% of cases. All of Group B Streptococcus colonizations were sensitive to ampicillin and erythromycin.

Only 82% of PPROM cases received antibiotics. The percentage of antibiotics used decreased by gestational ages (Table 4). Before 28 weeks of gestation almost all patient received antibiotics (>90%), compared with only 63.6% in cases of gestational age greater than 34 weeks.

Almost all received ampicillin (97%). The rest received cephalosporin. There were 167 cases of neonates of which six cases were twins (Table 5). Sixteen infants had birth weight lower than 1500

grams (9.6%). Regarding neonatal outcomes, there were two cases of neonatal sepsis (1.2%). One case died from GBS septicemia. Delay used of antibiotics (18 hours after PROM) may play a role in this case.

Table 1. General characteristics of pregnant women with PPRM and doing cervical swab culture.

General characteristics	N=161	%
Age, years (mean ± SD)	29.8 ± 7.2	
Gestational age:		
< 28 weeks	21	13.0
28 - 33 weeks	81	50.3
34 - 37 weeks	59	36.7
Parity:		
1	90	55.9
2	42	26.1
3	21	13.0
≥ 4	8	5.0

Table 2. Obstetric characteristics of pregnant women with PPRM and doing cervical swab culture.

Obstetric characteristics	N=161	%
Duration of PPRM:		
< 18 hours	106	65.8
19 - 72 hours	40	24.8
72 hours - 7 days	7	4.4
> 7 days	8	5.0
Modes of delivery:		
Normal vaginal deliveries	115	71.4
Operative vaginal deliveries	3	1.9
Cesarean section	43	26.7

Table 3. Results of cervical swab culture (n = 161)

Microorganism	Cases	%
No growth	16	9.9
Positive culture	145	90.1
Gardnerella vaginalis	56	34.8
Lactobacillus spp.	41	25.5
Corynebacterium spp.	28	17.4
Staphylococcus coagulase-negative	24	14.9
Escherichia coli	15	9.3
Candida albicans	13	8.0
Group B Streptococcus	11	6.8
Group D Streptococcus	9	5.6
Others	30	18.6

Table 4. Use of antibiotics. (n = 161)

Gestational ages	Antibiotics used	%
< 28 weeks (n = 21)	20	95.2
28 - 33 weeks (n = 82)	75	91.5
34 - 36 weeks (n = 58)	37	63.8
Total (n = 161)	132	82.0

Table 5. Neonatal outcomes.

Infant data (n = 167)		%
Birth weight		
< 1000 gram	6	3.6
1000 – 1500 gram	10	6.0
1500 – 2500 gram	97	58.1
> 2500 gram	54	32.3
Birth weight, gram (mean ± SD)	2,130 ± 608	
Singleton	155	96.3
Twins	6	3.7
Neonatal sepsis:		
GBS infection	2	1.2
Clinical sepsis	1	0.6
Clinical sepsis	1	0.6

Discussion

PPROM is a commonly encountered obstetric complication. Despite the frequent occurrence of this condition, the optimal management of pregnancies complicated by PPRM is an area of great controversy in obstetrics. Although there are variations in the management for women with PPRM, there is general consensus regarding some issues such as the use of corticosteroids and antibiotics.^(1,5) PPRM is more frequent with increasing gestational age.⁽⁶⁾ In the present study half of cases had gestational age between 28 and 34 weeks.

Despite having management protocol for PPRM, cervical swab culture was taken in only 64.7% of cases. Bacterial vaginosis is a condition in which normal lactobacillus-predominant vaginal flora is replaced with Gardnerella vaginalis, Mycoplasma hominis, Ureaplasma urealyticum, Mobiluncus species and various other anaerobe. This condition has been associated with spontaneous abortion,

chorioamnionitis, preterm labor, and PPRM. Regarding bacterial vaginosis, Gardnerella vaginalis was found in 34.8% of cases. McDonald HM and associates⁽⁷⁾ reported the high prevalence of Gardnerella vaginalis in women who gave birth preterm compared to women who gave birth at term (23% vs 15%).

Group B Streptococcus is an important cause of perinatal morbidity and mortality. It was found a low rate of GBS colonization in the present study group (6.8%). This low rate may come from many reasons. Recommendation of the American College of Obstetricians and Gynecologists (ACOG) is that swab cultures should be obtained from lower vagina and rectum and inoculated in selective broth media (Todd-Hewitt agar) for eighteen to twenty-four hours which gave a positive result in about ten to thirty percent of cases.⁽⁸⁾ In the present study, specimen were collected conventionally from cervix uteri and was used blood and chocolate agar as media for culture. Geographic variation may also was another

reason. Many studies in developing countries showed a lower rate of Group B Streptococcal colonization than in the United States.⁽⁹⁾ But specimen collection and microbiologic methods are important factors in identification of women colonized with GBS. In recent study, Kovavisarach E⁽¹⁰⁾ reported GBS colonization detection rate of 18.1% from combined vaginal-anorectal swab culture.

There are variations in initiation of antibiotics prophylaxis. More than 90% of cases with gestational age below thirty-four weeks received antibiotics. But for the gestational age over thirty-four weeks group, only 64% received antibiotics. In the present study, there were 11 cases of GBS colonization, eight cases received antibiotic prophylaxis. There was one case of neonatal death with GBS infection. In this case, antibiotics were given at 18 hours after PPRM, 17 hours after admission, and 1.5 hour before delivery. The practice was not in accordance with management cases. Management protocol of PPRM was not strictly followed, this due to several reasons. Many of them were private cases. Almost all cases that obligated for caesarean section such as previous cesarean section or footling breech were not obtained cervical swab culture and not received antibiotics for GBS prophylaxis. This may come from misconception about GBS prophylaxis. GBS prophylaxis not indicated only in case that planned cesarean delivery performed in the absence of labor or membrane rupture or in case that GBS screening culture were negative.⁽⁸⁾ In addition, optimal effect of antibiotic required at least 2 hours before delivery.⁽¹¹⁾

In this study, only 55% of the results of swab culture were recorded in medical records. This may be due to the fact that most of cases were discharged from hospital before the results were reported. In some cases, although the patients were admitted long enough, the results were still not shown in medical records. This may be due to the lack of attention and continuity of management among physicians. Improvement of management of PPRM should be considered. First, improvement of management protocol should be done especially the

use of antibiotics and other interventions.

Conclusion

This study provided the characteristics of aerobic microorganisms in cervix uteri. We found high rate of Bacterial vaginosis and low rate of GBS colonization in pregnant women with PPRM. There were some inconsistencies in management of PPRM especially in cervical swab culture and use of antibiotics. The management protocol should be improved and strictly followed in order to improve neonatal outcomes. Management of PPRM should be supervision and closely monitored according to the protocol. Knowledge and attitude of physicians should be emphasized to make them realized the significance of GBS infection.

References

1. Mercer BM. Preterm Premature Rupture of the Membranes. *Obstet Gynecol* 2003; 101: 178–93.
2. McGregor JA, French JI, Richter R, Franco-Buff A, Johnson A, Hillier S, et al. Antenatal microbiologic and maternal risk factors associated with prematurity. *Am J Obstet Gynecol* 1990; 163(5 Pt 1): 1465-73.
3. Evaldson G, Carlström G, Lagrelus A, Malmberg AS, Nord CE. Microbiological findings in pregnant women with premature rupture of the membranes. *Med Microbiol Immunol* 1980; 168: 283-97.
4. Mikamo H, Sato Y, Hayasaki Y, Kawazoe K, Hua YX, Tamaya T. Bacterial isolates from patients with preterm labor with and without preterm rupture of the fetal membranes. *Infect Dis Obstet Gynecol*. 1999; 7: 190-4.
5. Ramsey PS, Nuthalapaty FS, Lu G, Ramin S, Nuthalapaty ES, Ramin KD. Contemporary management of preterm premature rupture of membranes (PPROM): A survey of maternal-fetal medicine providers. *Am J Obstet Gynecol* 2004; 191: 1497–502.
6. Pasquier JC, Rabilloud M, Picaud JC, Ecochard R, Claris O, Gaucherand P, et al. A prospective population-based study of 598 cases of PPRM between 24 and 34 weeks' gestation: description, management, and mortality (DOMINOS cohort). *Eur J Obstet Gynecol Reprod Biol* 2005; 121: 164-70.
7. McDonald HM, O'Loughlin JA, Jolley P, Vigneswaran R, McDonald PJ. Prenatal microbiological risk factors associated with preterm birth. *Br J Obstet Gynaecol* 1992; 99: 190-6.
8. ACOG Committee Opinion: number 279, December 2002. Prevention of early-onset group B streptococcal disease in newborns. *Obstet Gynecol* 2002; 100: 1405–12.

9. Stoll BJ, Schuchat A. Maternal carriage of group B streptococci in developing countries. *Pediatr Infect Dis J* 1998; 17: 499-503.
10. Kovavisarath E, Sa-adying W, Kanjanahareutai S. Comparison of Combined Vaginal-Anorectal, Vaginal and Anorectal Cultures in Detecting of Group B Streptococci in Pregnant Women in Labor. *J Med Assoc Thai* 2007; 90: 1710-4.
11. Lin FY, Brenner RA, Johnson YR, Azimi PH, Philips JB, Regan JA, et al. The effectiveness of risk-based intrapartum chemoprophylaxis for the prevention of early-onset neonatal group B streptococcal disease. *Am J Obstet Gynecol* 2001; 184: 1204-10.

การศึกษาทางระบาดวิทยาของผลการเพาะเชื้อจากปากมดลูกในหญิงตั้งครรภ์ที่มีภาวะน้ำเดินก่อนกำหนดคลอดในโรงพยาบาลรามธิบดี

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วัตถุประสงค์ : เพื่อศึกษาอัตรา และผลลัพธ์ของการทำการเพาะเชื้อจากปากมดลูกในหญิงตั้งครรภ์ที่มีภาวะน้ำเดินก่อนกำหนดคลอด รวมทั้งการดูแลรักษา

กลุ่มตัวอย่าง : หญิงตั้งครรภ์จำนวน 161 คน ที่ได้รับการวินิจฉัยว่ามีภาวะน้ำเดินก่อนกำหนดคลอดที่รับไว้ในห้องคลอดโรงพยาบาลรามธิบดี ในช่วงเดือนมกราคม 2546 ถึง กันยายน 2549

ตัววัดที่สำคัญ : อัตราการเพาะเชื้อจากปากมดลูกในผู้ป่วยที่ได้รับการวินิจฉัยว่ามีภาวะน้ำเดินก่อนกำหนดคลอด, ชนิดของเชื้อที่ได้จากการเพาะเชื้อ และการดูแลรักษา เปรียบเทียบกับแนวทางปฏิบัติในโรงพยาบาลรามธิบดี

ผลการวิจัย : มีการทำการเพาะเชื้อจากปากมดลูกใน 64.7% ของหญิงตั้งครรภ์ที่มีภาวะน้ำเดินก่อนกำหนดคลอด ผู้ป่วย 82% รับประทานยาปฏิชีวนะ เชื้อที่พบบ่อยที่สุดคือ *Gardnerella vaginalis* (34.8%) อัตราการพบเชื้อ Group B Streptococcus (GBS) เท่ากับ 6.8% ทารกแรกเกิดหนึ่งคนเสียชีวิตจากการติดเชื้อ GBS

สรุป : การเพาะเชื้อจากปากมดลูกในหญิงตั้งครรภ์ที่มีภาวะน้ำเดินก่อนกำหนดคลอดนั้น พบเชื้อ GBS ได้น้อย ยังมีความไม่สม่ำเสมอในการปฏิบัติตามแนวทางปฏิบัติของโรงพยาบาลรามธิบดีในเรื่องของการเพาะเชื้อและการให้ยาปฏิชีวนะ ควรมีการปรับปรุงแนวทางปฏิบัติสำหรับหญิงตั้งครรภ์ที่มีภาวะน้ำเดินก่อนกำหนดคลอดทั้งในแง่ระบบและการปฏิบัติของบุคลากร
