Comparison of Combined Vaginal-Anorectal, Vaginal and Anorectal Cultures in Detecting of Group B Streptococci in Pregnant Women in Labor

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Objective: *To compare whether the Group B streptococcal culture detection rate from vaginal-anorectal cultures, vaginal, or anorectal are equivalent.*
Material and Method: *Cross-sectional descriptive study was performed on 320 pregnant women with a gestational age between 28-42 weeks presenting with labor pain, between October, 1 and 30, 2004 in Rajavithi Hospital. Anorectal and vaginal swab cultures were collected and cultured in Todd Hewitt broth with 15 µg/ml nalidixic acid and 8 µg/ml gentamicin.*
Results: *Forty-three (13.44%) and 33 cases (10.31%) were not significantly different in GBS detection rate in vaginal and anorectal culture, respectively (p = 0.154, McNemar). Combined vaginal-anorectal culture significantly improved the colonization GBS detection rate to 18.12% compared with either individual vaginal or anorectal culture l (p < 0.001, McNemar).*
Conclusion: *GBS detection rate from combined vaginal-anorectal was significantly higher than either individual vaginal or anorectal cultures.*

Keywords: *Group B streptococcous, Vaginal culture, Anorectal culture, GBS, Rajavithi Hospital*

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Group B streptococci (GBS) can cause serious neonatal infections such as sepsis, pneumonia, meningitis, osteomyelitis, septic arthritis, and cellulitis[1]. Early-onset of these infections are often caused by vertical transmission of GBS during labor or delivery[2]. The Centers for Disease Control and Prevention (CDC) and the American Academy of Pediatrics (AAP), the American College of Obstetricians and Gynecologists (ACOG) recommended a universal antenatal culture-based screening at 35-37 weeks of gestation [2,3]. These recommendations also suggested taking rectovaginal specimens to obtain an appropriate yield of GBS[2,3].

However, a few studies regarding the site of specimen collection had inconclusive results. The first study by Badri et al[4] reported that rectal cultures were positive more often than vaginal cultures (17.9% versus 10.2%). Orafu et al [5] reported similar results about recovery of GBS positive culture taken from the rectum compared with those from the perianal area and perianal-vaginal. The most recent study by Jamie et al[6] reported a similar GBS detection rate from vaginal-perianal specimens compared with those results from vaginal-rectal specimens (34% versus 33.5%).

Nowadays Rajavithi Hospital has no universal culture-based screening at 35-37 weeks of gestation. The authors planned to compare whether the GBS culture detection rate in pregnant women with labor pain from vaginal-anorectal, vaginal, or anorectal culture are equivalent. The specimens were collected from the anorectum instead of the rectum as recommended by CDC. Anorectal samples were taken from the perianal surface going through the anal sphincter and entering the rectum.

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Material and Method

The present study was carried out in the labor room (LR) of the Rajavithi Hospital between October 1and 30, 2004. The inclusion criteria were gestational age between 28-42 weeks with true labor pain. Those who had been treated with antibiotics within 2 weeks prior to admission were excluded. The hospital's ethics committee approved the present study and the written informed consent was obtained from the patients. Cultures were collected from two sites: vagina and anorectum. Vaginal samples were obtained by rotating a sterile cotton-tipped swab 360 degrees after being inserted 1 inch into the lower vaginal canal. Anorectal samples were taken from the perianal surface, going through the anal sphincter and by rotating a sterile cotton tipped swab 360 degrees after being inserted 1 cm beyond the anal orifice. The sample was then inoculated within 24 hours into a selective broth culture medium (Todd Hewitt broth containing 15 µg/ml of nalidixic acid and 8 µg/ml of gentamicin). The broth was incubated for 18 to 24 hours at 35ºC and subcultured onto a blood agar plate that was incubated for 24 hours. A gram stain was taken to confirm gram positive cocci in the chain. Staphylococcus was excluded using the catalase test. Finally, beta-hemolytic streptococcal colonies were identified using a CAMP test (latex agglutination test).

The diagnostic performance of vaginal or anorectal culture alone were examined when combined vaginal-anorectal culture was used as a gold standard. The combined vaginal-anorectal culture defined true positive when any or both samples of culture were positive and true negative when either sample of cultures were negative. Agreements between any pair of cultured methods were assessed by Kappa statistic (K)[7].

The McNemar test was used for two related measures on the same sample or situation where each individual measurement in one sample could be paired with a particular measurement in the other sample. The McNemar test for paired proportions was used to test the relationship between the three methods of specimen collection and whether or not the specimen tested positive or negative[5]. A p-value of less than 0.05 was considered statistical significant.

Results

Three hundred and twenty cases were enrolled in the present study. The mean maternal age and gestational age were 25.93 years and 38.15 weeks, respectively. There was no significant difference between the vaginal and anorectal methods in the detection rate of GBS. Comparison of GBS culture positivity from vaginal vs. anorectal sites, combined vaginal-anorectal vs. vaginal culture alone, and combined vaginal-anorectal vs. anorectal culture alone are shown in Table 1-3,

Table 1. Comparison of GBS culture positive from vaginal versus anorectal cultures

	Vaginal culture		Total No.
	Positive	Negative	
Anorectal culture			
Positive	18	15	33
Negative	25	262	287
Total No.	43	277	320

McNemar test p = 0.154
Kappa (K) = 0.404

Table 2. Comparison of GBS culture positive from combined vaginal-anorectal versus vaginal culture alone

	Vaginal-anorectal culture		Total No.
	Positive	Negative	
Vaginal culture			
Positive	43	0	43
Negative	15	262	277
Total No.	58	262	320

McNemar test p < 0.001
Kappa (K) = 0.824

Table 3. Comparison of GBS culture positive from combined vaginal-anorectal versus anorectal culture alone

	Vaginal-anorectal culture		Total No.
	Positive	Negative	
Anorectal culture			
Positive	33	0	33
Negative	25	262	287
Total No.	58	262	320

McNemar test p < 0.001
Kappa (K) = 0.684

respectively. Fifty-eight pregnant women from 320 cases were colonized with GBS from at least one collection site. So the prevalence of intrapartum GBS colonization in Thai pregnant women in the study was (58/320)18.12% The overall detection rate was 13.44% (43 of 320) for the vaginal culture, 10.31% (33 of 320) for anorectal culture, and 18.12% (58 of320) for both culture sites combined (Table 2, 3). The detection rate of GBS received from the combination of the test results was more common than the single one (Table 2, 3). The vaginal and anorectal culture alone were compared with combined vaginal-anorectal culture, and both individual cultures were found to have a significantly lower detection rate than the combined culture. There was no significant difference ($p = 0.15$) in the detection rate between vaginal and anorectal culture. The Kappa values for GBS detection from: anorectal vs. vaginal, vaginal vs. vaginal-anorectal, and anorectal vs. vaginal-anorectal were 0.40, 0.82 and 0.68, respectively (Table 1-3). The detection rate of GBS comparing vaginal with vaginal-anorectal and anorectal with vaginal-anorectal culture were statistically different ($p < 0.001$) while those of anorectal and vaginal culture were not (Table 1-3). The sensitivity from vaginal culture was better than those from anorectal culture while the specificity, accuracy, and positive and negative predictive value were comparable (Table 4).

Discussion

In the previous case-control study of term pregnant women with and without premature rupture of the membranes (PROM) delivered at Rajavithi Hospital, it found a very low GBS detection rate of 0.9% and 0% in the study and control groups, respectively[8]. However, only endocervical swab culture inoculated in blood agar and MacConkey agar was used in that study[8].

In the present study, it found a non-significant higher GBS detection rate in the vaginal region compared with those in the anorectal region (13.44% vs. 10.31%) ($p = 0.154$, McNemar test). Jamie et al[6] also reported a non-significant higher detection rate in vaginal compared with those in perianal and rectal cultures (28% vs. 24% vs. 25%, respectively). However, Badri et al[4] reported a higher GBS detection rate in the rectum than those in the vagina (17.9% vs. 10.2%). This ratio (2:1) was maintained with either a different type of medium or trimester of pregnancy. They suggested that GBS colonization in the vagina might be a contaminated secondary from the gastrointestinal tract. However, GBS is considered a type of normal vaginal flora and can be detected in 5-35% of pregnant women[9-11]. Philipson et al[12] also reported a higher GBS detection rate in the rectum than the vagina (87.5 vs. 58.6%).

The agreement assessed by kappa statistic is considered to represent excellent, good and marginal if it shows $K > 0.75$, $0.4 < K < 0.75$ and $O < K < 0.4$, respectively. The Kappa value for GBS detection from vaginal vs. vaginal-anorectal (0.82) was an excellent agreement while those from anorectal vs. vaginal-anorectal (0.68) and vaginal vs. anorectal (0.40) were a good agreement. Consequently, when any pair of methods for detection of GBS was used, the observed agreement was better than a chance agreement.

The non-significant difference results of the McNemar test for GBS detection from vaginal vs. anorectal ($p = 0.15$) meant that both methods gave the same discrepancy results (vaginal ⊕, anorectal Θ) and (vaginal Θ, Anorectal ⊕). The significant difference in the results of the McNemar test for GBS detection from vaginal vs. vaginal-anorectal and anorectal vs. vaginal-anorectal ($p < 0.001$, both) meant that combined vaginal-anorectal methods could detect a more positive result than either vaginal or anorectal alone.

Both CDC and ACOG guidelines suggested taking cultures from both the lower vagina and rectum[2,3]. When using anorectum instead of rectum, it was found that a combined vaginal-anorectal culture detected more significant positive GBS cases than either vaginal or anorectal alone ($p < 0.001$, McNemar, both). This agreed with the CDC and ACOG guidelines for taking cultures from both the lower vagina and rectum although anorectum was used instead of the rectum.

Table 4. Summarized diagnostic performance of vaginal or anorectal culture alone when combined vaginal anorectal culture was used as a gold standard

Test	Sensitivity (%)	Specificity (%)	Positive predictive value (%)	Negative predictive value (%)	Accuracy (%)
Vaginal culture	74.14	100	100	94.58	95.31
Anorectal culture	56.89	100	100	91.2	92.19

The better GBS detection rate from a combined vaginal-anorectal specimen compared with a single specimen has been confirmed by Jamie et al[7] and Philipson et al[12]. However, Philipson et al[12] reported that a detection rate from the combined method was higher than the vaginal but not the rectal method alone. Jamie et al[7] showed that the GBS positive rate from combined vaginal-perianal culture is not significantly different from those from vaginal-rectal cultures. They ascribed that perianal culture could replace rectal culture as the GBS detection rate was similar while avoiding the discomfort experienced by women when obtaining a rectal culture. The vaginal or anorectal culture alone had low sensitivity (74.14% and 56.89%). It suggested that vaginal or anorectal culture alone had insufficient sensitivity for GBS detection. Combined vaginal-anorectal culture was the better way for GBS detection.

In conclusion, combined vaginal-anorectal culture detected more significant GBS colonization when compared with vaginal or anorectal culture alone in pregnant women with labor pain.

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การใช้วิธีเพาะเชื้อจากช่องคลอดและทวารหนักร่วมกับไส้ตรง เปรียบเทียบกับการเพาะเชื้อจากช่องคลอดหรือทวารหนักร่วมกับไส้ตรงอย่างเดียว ในการค้นหาเชื้อสเตร็ปโตค็อคคัสกรุ๊ปบีในหญิงตั้งครรภ์ขณะเจ็บครรภ์คลอด

เอกชัย โควาวิสารัช, วรินทร สะอาดยิ่ง, สุวัฒนา กาญจนหฤทัย

วัตถุประสงค์*: เพื่อเปรียบเทียบว่าการเพาะเชื้อเพื่อค้นหาเชื้อแบคทีเรียชนิดกรุ๊ปบีสเตร็ปโตค็อคคัสทางช่องคลอดและทางทวารหนักร่วมกับไส้ตรงเปรียบเทียบกับการเพาะเชื้อจากทางช่องคลอดหรือทวารหนักร่วมกับไส้ตรงอย่างเดียวได้ผลเหมือนกันหรือไม่*

วัสดุและวิธีการ*: ใช้วิธีการสำรวจแนวตัดขวาง ในหญิงตั้งครรภ์จำนวน 320 ราย ที่มีอายุครรภ์ตั้งแต่ 28-42 สัปดาห์ ที่มาโรงพยาบาลราชวิถี ด้วยอาการเจ็บครรภ์ ระหว่างวันที่ 1-30 ตุลาคม พ.ศ.2547 โดยการเก็บตัวอย่างน้ำคัดหลั่งทางช่องคลอดส่วนล่าง และทางทวารหนักร่วมกับไส้ตรง โดยใช้น้ำยาเลี้ยงเชื้อ Todd-Hewitt ที่มียาปฏิชีวนะ (nalidixic acid 15 μg/ml และ gentamicin 8 μg/ml)*

ผลการศึกษา*: การเพาะเชื้อแบคทีเรียกรุ๊ปบี สเตร็ปโตค็อคคัสทางช่องคลอดให้ผลบวก 43 ราย(ร้อยละ 13.44) และทางทวารหนักร่วมกับไส้ตรง 33 ราย (ร้อยละ 10.31) ไม่พบความแตกต่างอย่างมีนัยสำคัญทางสถิติ (p = 0.154, McNemar) การเพาะเชื้อทางช่องคลอดและทางทวารหนักร่วมกับไส้ตรง เพิ่มอัตราการพบเชื้อ GBS เปรียบเทียบกับการเพาะเชื้อทางช่องคลอดหรือทวารหนักร่วมกับไส้ตรงอย่างเดียวอย่างมีนัยสำคัญทางสถิติ (p < 0.001, McNemar)*

สรุป*: การเพาะเชื้อทางช่องคลอด และทวารหนักร่วมกับไส้ตรง ทำให้ค้นพบเชื้อ GBS มากกว่าการใช้วิธีเพาะเชื้อจากช่องคลอดหรือทวารหนักร่วมกับไส้ตรงอย่างเดียวอย่างมีนัยสำคัญทางสถิติ*