74 Group B streptococcus infection

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Group B streptococcus (GBS) (*Streptococcus agalactiae*), a Gram-positive coccus, is one of the major causes of maternal or neonatal severe infection and sepsis. Maternal infection associated with GBS includes acute chorioamnionitis, endometritis, and urinary tract infection. Neonatal GBS infection is characterized as early onset if occurring within 7 days of age or late onset otherwise and involves bacteremia, pneumonia, or meningitis (1,2).

EPIDEMIOLOGY

Of all pregnant women in the United States, 10% to 30% have recto-vaginal colonization with GBS (3–5). In patients with preterm labor or preterm premature rupture of membranes (PPROM), the incidence of genital colonization of GBS is 15% (6). Of urinary tract infections during pregnancy, 2% to 7% result from GBS colonization (7). The incidence of neonatal GBS infection (number of cases per 1000 live births) was gradually decreased between 1990 and 2008. It was 1.8, 0.5, and 0.28 in 1990, 2000, and 2008, respectively (8–13). This decline can be attributed to screening of pregnant woman for GBS colonization and use of intrapartum antibiotic prophylaxis (14–17). Neonatal colonization of GBS may occur as a result of in utero ascending infection from the maternal genital tract or direct contact during delivery. Vertical transmission from the mother to the neonate by either method accounts for up to 50% (13) of cases of neonatal GBS colonization, and 1% to 2% of these infants will develop early-onset GBS infection (14,18–22). The case fatality of early-onset GBS neonatal infection varies from 2% to 3% for term infants without meningitis to 20% for preterm infants (13,23). Maternal risk factors that predispose a neonate to early-onset GBS infection include preterm delivery, prolonged rupture of membranes (>18 h), PPRM, chorioamnionitis, sustained intrapartum fetal tachycardia, GBS bacteriuria during the current pregnancy (>10⁴ cfu/mL), intrapartum fever (temperature of at least 38°C or 100.4°F), or prior infant with GBS infection (15,16,24,25). The risk of having an infant with early-onset GBS is 6.5 times higher in a pregnant woman with maternal fever, prolonged rupture of membranes, or preterm birth when compared with women who displayed none of the above findings (18,26,27). Late-onset GBS neonatal infection may occur from maternal–neonatal transmission, or nosocomial or community contacts (28,29).

DIAGNOSIS

Group B streptococcal colonization can be detected by either culture or rapid diagnostic tests. Currently, culture remains the gold standard for diagnosing GBS colonization. The yield of positive GBS culture is increased by sampling the anorectum in addition to the vagina, since the gastrointestinal tract is a major reservoir of GBS (5,30). This can be done in a

single swab. Inhibition of competing organisms by using a selective medium such as Todd–Hewitt broth, which contains gentamicin, polymyxin B, and nalidixic acid or colistin (24), also increases the yield of the GBS culture. The main limitation of culture is time. Since culture results are not available for 24 to 48 hours, management may be problematic if delivery is imminent.

Rapid diagnostic tests of GBS directly detect the extracted specific polysaccharide antigen. The available tests use either latex particle agglutination or enzyme immunoassay. These tests are relatively easy to perform, are generally less expensive than a culture, and produce results within a short period of time (usually within 1 hour). Although rapid detection tests are highly sensitive in patients who are heavily colonized with GBS, their overall rates of sensitivity and high false-negative results compared with those of cultures prevent their widespread clinical application (31–35). These drawbacks for the rapid diagnostic tests also exist in the setting of preterm labor or PPRM, demonstrating that the rapid latex agglutination test fails to identify GBS neonatal infection in (i) heavily, (ii) moderately, and (iii) lightly GBS-colonized mothers. More importantly, the overall sensitivity of the latex agglutination test in identifying maternal–neonatal pairs at risk for GBS neonatal infection is only 25% (6).

TREATMENT

Intrapartum chemoprophylaxis is effective in reducing the attack rate of early-onset neonatal GBS (26). In 2002, the Centers for Disease Control and Prevention (CDC) established new guidelines for GBS prevention. It recommended screening all pregnant women with culture of anogenital specimen at 35 to 37 weeks of gestation and providing intrapartum chemoprophylaxis for those with positive GBS culture. Specimen should be collected with swabbing the lower vagina and the lower rectum to obtain the best yield of GBS culture (36–39). Women with GBS bacteria during their current pregnancy and those with a prior history of having a neonate with invasive GBS infection do not need to be screened and should be given intrapartum chemoprophylaxis routinely (40). In 2010, the CDC maintained the same recommendations (24). Women with unknown GBS status at the time of delivery should be managed based on the presence of intrapartum risk factors [delivery at <37 weeks, rupture of membranes >18 hours, fever of ≥100.4°F (38°C)] (24).

Currently, prenatal treatment of asymptotically colonized pregnant patients with oral antibiotics is not recommended, since this approach is unlikely to eradicate maternal genital GBS colonization at the time of labor and delivery. Of pregnant patients who received antenatal ampicillin or aqueous penicillin for genital colonization of GBS, 30% to 70% remained colonized at delivery (41,42).

Figure 1 Algorithm for screening of group B streptococcal colonization and use of intrapartum prophylaxis in women with preterm labor. Abbreviation: GBS, group B streptococcus. Ref. 24.

In 2010, the CDC made recommendations regarding the prevention of early-onset neonatal GBS infection in the setting of preterm (less than 37 weeks) labor or PPROM (24). Patients who develop preterm labor without prior GBS screening during the preceding 5 weeks of admission should be screened for GBS colonization and provided GBS chemoprophylaxis. The latter should be stopped when the GBS screen is negative or preterm labor is resolved. GBS screening should be repeated at 35 to 37 weeks of gestation or when preterm labor recurs more than 5 weeks since the last GBS screening. Figure 1 summarizes the above process for management of patients with preterm labor.

Patients who develop PPROM should be screened for GBS colonization and provided antibiotics for prolonging latency period with adequate GBS coverage (ampicillin 2 g initially, then 1 g every 6 hours for 48 hours given intravenously) or GBS chemoprophylaxis otherwise. The GBS chemoprophylaxis can be discontinued when the GBS vaginal–rectal screening obtained on admission turns out to be negative. The patient with PPROM may not need GBS chemoprophylaxis on admission if her GBS screening was negative within 5 weeks of PPROM. Group B streptococcus (GBS) screening should be repeated at 35 to 37 weeks of gestation if she remains pregnant at that time. Figure 2 summarizes the above process. The patient should receive intrapartum chemoprophylaxis if she ever had genital GBS colonization during her pregnancy, regardless of the results of intervening GBS cultures and/or treatments in both situations of preterm labor and PPROM.

INTRAPARTUM CHEMOPROPHYLAXIS

Aqueous penicillin G is the drug of choice with the initial dose of 5 million units and maintenance dose of 2.5–3.0 million

units every 4 hours. Ampicillin is the alternative with the initial dosage of 2 g and the maintenance dose of 1 g every 4 hours. Penicillin G is preferable to ampicillin because of its narrower spectrum of bacterial sensitivity, thus being less likely to cause the selective emergence of other pathogenic bacteria (15). Women who are penicillin allergic but do not have a high risk of anaphylaxis (defined as a history of anaphylaxis, angioedema, respiratory distress, or urticaria after administration of a penicillin or cephalosporin) should receive cefazolin 2 g IV initially then 1 g every 8 hours. Cefazolin crosses the placenta and attains effective amniotic concentrations. Women who are allergic to penicillin and at a high risk of anaphylaxis should receive clindamycin IV 900 mg every 8 hours if (i) the GBS is susceptible to both clindamycin and erythromycin or (ii) GBS is susceptible to clindamycin, resistant to erythromycin but without inducible resistance to clindamycin. Women who are allergic to penicillin and at a high risk of anaphylaxis but do not meet the above conditions for clindamycin should receive vancomycin 1 g IV every 12 hours otherwise. Erythromycin is no longer used in women who are allergic to penicillin and are at high risk for anaphylaxis. Intrapartum chemoprophylaxis should be given intravenously until delivery. Figure 3 summarizes the GBS chemoprophylaxis (24).

SUMMARY

Although controversy exists regarding screening and treatments of GBS colonization in pregnant women, there is a consensus that chemoprophylaxis in the intrapartum period dramatically reduces the rate of infection in both the mother and the neonate. At present, the most cost-effective strategy of reducing early-onset GBS infection is universal screening of

Figure 2 Algorithm for screening of group B streptococcal colonization and use of intrapartum prophylaxis in women with preterm premature rupture of membranes. Abbreviation: GBS, group B streptococcus. Ref. 24.

Figure 3 Recommended regimens for intrapartum antibiotic prophylaxis for prevention of early-onset group B streptococcal disease. Abbreviation: GBS, group B streptococcus. Ref. 24.

maternal GBS vaginal–rectal colonization at 35–37 weeks of gestation. Intrapartum GBS chemoprophylaxis should be given to patients without antenatal screening who have one of the following risk factors: preterm delivery, prolonged rupture of membranes (>18 h), intrapartum fever, or prior infant with GBS infection. Penicillin G is the drug of choice for

this purpose and ampicillin is the alternative. Cefazolin may be used in patients who are allergic to penicillin or cephalosporin without a high risk for anaphylaxis. Patients who have allergy to penicillin with a high risk of anaphylaxis should receive clindamycin if the bacterium is susceptible to both clindamycin and erythromycin or vancomycin otherwise. Maternal

vaccination, being developed, appears to be the most cost-effective measure in preventing early-onset GBS neonatal infection.

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