Prevention of perinatal group B streptococcal infection: Management strategies

Group B streptococcus (GBS) infects two to three per 1000 newborns in the United States with a mortality of 20% to 30% (1); although specific Canadian data are not known, they are likely similar. As many as 10% to 30% of pregnant women are colonized with GBS in the vagina or rectum (2,3), 1% to 2% of their newborns developing early onset disease (4). Chemoprophylaxis of the newborn infant has limited effectiveness (4,5). A recent meta-analysis of several studies have demonstrated the efficacy of intrapartum penicillin chemoprophylaxis for the prevention of early onset GBS infection (6), although another meta-analysis has questioned whether there is yet demonstrated proof that intrapartum chemoprophylaxis significantly decreases neonatal mortality from GBS (7). Despite the apparent effectiveness of intrapartum penicillin chemoprophylaxis, controversy persists regarding the identification of the population that would most benefit from it.

As many as 19 different strategies for screening and chemoprophylaxis to prevent early onset GBS infection have been identified (8), although most have not been tested for efficacy. Based on a study demonstrating the efficacy of early third-trimester screening for GBS and intrapartum chemoprophylaxis (9), the American Academy of Pediatrics (AAP) recommended universal screening for GBS colonization at 26 to 28 weeks’ gestation and intrapartum treatment for GBS-colonized women with specific risk factors (10). The American College of Obstetricians and Gynecologists (ACOG) preferred an approach that did not include screening cultures of women at any time during pregnancy. Based on a study from Atlanta, Georgia (11), they recommended chemoprophylaxis of women with specific risk factors (12). The Canadian Paediatric Society (CPS) and the Society of Obstetricians and Gynaecologists of Canada (SOGC) emphasized that the critical issue is the identification of at risk deliveries and suggested that either the approach of the AAP or the ACOG was acceptable (13).

Recently, the Centers for Disease Control and Prevention (CDC), Atlanta, Georgia, reviewed GBS prevention strategies and published new guidelines for the prevention of early onset GBS disease (14). The new guidelines are based on a concern that early third-trimester screening is insufficiently predictive of colonization at the time of delivery and on a discomfort with withholding chemoprophylaxis to GBS-positive mothers in the absence of risk factors. The CDC recommended two alternative strategies, both of which are believed to be effective but which have not been tested in prospective clinical trials. The proposed first strategy is a nonscreening approach similar to the strategy previously recommended by the ACOG. The second strategy proposed by the CDC involves prenatal GBS cultures at 35 to 37 weeks’ gestation. Intrapartum chemoprophylaxis is recommended for all preterm deliveries and for all women who are GBS carriers, regardless of the presence or absence of risk factors. As seen in Table 1 from the CDC guidelines (14), this latter strategy is estimated to prevent the most cases of neonatal GBS infection but requires treating the greatest proportion of mothers. The strategy of screening at 26 to 28 weeks’ gestation and treating colonized women with risk factors requires treatment of fewer mothers but is estimated to be the least effective (predicting only 67% of women who are GBS-positive at term [5]) and is not recommended by the CDC (14). An algorithm for pregnant women (modified from CDC guidelines) is presented in Figure 1.

Methods for obtaining and processing specimens for culture of GBS are outlined in previous guidelines (10,12-14). Difficulties with isolating GBS may be partially dependent on the broth used. Although CDC guidelines suggest Todd-Hewitt broth may be supplemented with either colistin and nalidixic acid or gentamicin and nalidixic acid, use of the latter requires blood supplementation (15); gentamicin may inhibit many GBS stains (16). It is also essential that swabs be placed directly in selective growth media because placement in standard growth media with subsequent transfer to selective media substantially reduces yield of GBS (17).

The management of a woman in premature labour whose labour stops is problematic. The CDC recommends that if the culture is negative and premature labour stops, antimicrobial
TABLE 1: Estimated impact of several strategies for the use of intrapartum antimicrobial prophylaxis (IAP) against early onset group B streptococcal (GBS) disease in a hypothetical population

<table>
<thead>
<tr>
<th>Prevention strategy</th>
<th>Proportion of early onset GBS disease prevented (%)</th>
<th>Proportion of deliveries receiving IAP (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prenatal culture at 35 to 37 weeks' gestation; IAP for preterm deliveries and all GBS carriers</td>
<td>86.0</td>
<td>26.7</td>
</tr>
<tr>
<td>No prenatal cultures; IAP for all women with intrapartum risk factors (eg, fever, prolonged rupture of membranes, more than 37 weeks' gestation)</td>
<td>68.8</td>
<td>18.3</td>
</tr>
<tr>
<td>Prenatal cultures at 26 to 28 weeks' gestation; IAP for GBS carriers who develop risk factors</td>
<td>50.7</td>
<td>3.4</td>
</tr>
</tbody>
</table>

*Percentage was estimated for a hypothetical population; proportion of deliveries among women who had intrapartum risk factors was 24.7% (18); 
†Percentage was estimated for a hypothetical population; proportion of deliveries among GBS positive women who had intrapartum risk factors was 4.6% (18)

Risk factors: Previous infant who had invasive GBS disease
GBS bacteriuria during this pregnancy
Delivery at more than 37 weeks gestation

Collect rectal and vaginal swab for GBS culture at 35 to 37 weeks gestation

Not done, incomplete or results unknown

Intrapartum temperature 38.0°C or higher
Membrane rupture 18 h or more

Intrapartum penicillin

No intrapartum prophylaxis needed

Figure 1) Algorithm for prevention of early onset group B streptococcal (GBS) disease in neonates, using prenatal screening at 35 to 37 weeks’ gestation

therapy can be discontinued and no further therapy is necessary (14). If the culture is positive for GBS, intrapartum chemoprophylaxis should be provided whenever labour resumes.

Management of the newborn whose mother had received intrapartum chemoprophylaxis is empirical; an approach was suggested in the CPS/SOGC guidelines. A simpler algorithm, similarly untested, is included in the CDC guidelines and has been modified as presented in Figure 2. These recommendations consider the presence of signs of infection, the gestational age of the newborn and the adequacy of the maternal chemoprophylaxis. The observation period for the term babies who have received adequate intrapartum antibiotic prophylaxis has been reduced to 24 h in hospital in accordance with Canadian guidelines (17).

With the publication of the CDC guidelines, the practitioner is now faced with three different strategies, all of which are estimated to be cost effective (20-22). Each has advantages and disadvantages. The AAP recommendation treats the fewest pregnancies but is estimated to prevent the lowest propor-
tion of GBS disease. However, in practice, the proportion of pregnancies treated may be higher because of an unwillingness by women and their physicians to ignore a positive GBS culture, even in the absence of other risk factors. The ACOG strategy is simplest in that it requires no prenatal cultures and prevents more GBS disease, but it requires that substantially more women receive chemoprophylaxis. The CDC late pregnancy cultures and treatment of all colonized women is estimated to prevent the most cases but requires the treatment of even more women. In view of the increasing prevalence of antimicrobial resistance worldwide, the prospect of antimicrobial use in over 25% of all pregnancies raises concerns (23). In addition, the CDC statement refers to the potential for 10 maternal deaths per year from anaphylaxis (0.001%) with another 0.7% to 10% women having less severe reactions (14).

Based on the limitations encountered with the screening strategy of cultures at 26 to 28 weeks’ gestation, we believe that either strategy published by the CDC is acceptable in Canada; there are still insufficient data to recommend a single preferred strategy. If the practitioner uses the screening strategy, it is essential that specimens be obtained and processed in an appropriate manner. The algorithm in Figure 2, based on the CDC guidelines, is a reasonable alternative to the CPS and SOGC guidelines for neonatal management.

It must be emphasized that no strategy can prevent all cases of GBS disease and that disease may occur despite intrapartum chemoprophylaxis. Further data are required on the epidemiology of GBS colonization and disease in Canada, the effectiveness of these alternative intrapartum antibiotic chemoprophylaxis strategies and the impact of widespread use of antimicrobial agents in pregnancy on the bacterial microflora. However, it is our belief that a standardized approach whereby all at risk pregnancies are identified and managed by one of these recommended strategies will allow the appropriate assessment upon which further refinements of the guidelines can be based.

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REFERENCES
