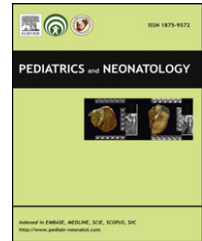




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ORIGINAL ARTICLE

Group B Streptococcal Infection in Taiwan: Maternal Colonization and Neonatal Infection

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Key Words

colonization;
group B streptococcus;
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Background: There is no national data on group B streptococcus (GBS) infection in Taiwan. We investigated incidence of maternal GBS colonization and neonatal GBS infection rate and clinical pictures of neonatal GBS infection to estimate the value of intrapartum chemoprophylactic strategy in Taiwan.

Methods: From January 2004 to June 2005, a prospective study to estimate maternal colonization rate by maternal rectovaginal culture at six hospitals was conducted. Neonatal GBS infection rate based on inborn infants was calculated retrospectively from January 2001 to June 2005; clinical pictures of infants diagnosed with invasive GBS disease were reviewed.

Results: Maternal colonization rate of GBS was around 20% at hospital base, incidence of neonatal GBS infection was 1 per 1000 live births of infants born at hospitals. There were 221 infants with GBS infection: in 142, the disease occurred within 7 days of birth (early-onset disease, EOD), and in 79, it developed later (late-onset disease). Infantile EOD was more often seen in mothers with premature rupture of membrane, often accompanied by respiratory failure necessitating ventilator support. Infants with late-onset disease often

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manifested fever, leukopenia, thrombocytopenia, and meningitis. Fifteen infants died, mostly of EOD type (12 of 15). Risk factors of mortality included rescue at delivery room, leukopenia, thrombocytopenia, sepsis, respiratory distress, persistent hypertension of newborn, respiratory failure needing intensive respiratory support (intermittent mandatory ventilator and high frequency oscillatory ventilator), surfactant use, shock, and congenital heart diseases.

Conclusions: We concluded that universal maternal rectovaginal culture of GBS with intrapartum antibiotic prophylaxis is an urgent call to reduce EOD and mortality because of GBS infection in neonates in Taiwan.

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1. Introduction

Group B streptococcus (GBS), or *Streptococcus agalactiae*, is the most common cause of early neonatal infection, with 5–20% mortality and serious complications.^{1,2} Since implementation of intrapartum antibiotic prophylaxis in 1996, incidence of early-onset disease (EOD) of GBS has dropped by 50–85% in the United States.³ Incidence of invasive GBS infection, which was defined as isolation of GBS from a normally sterile site [such as blood or cerebrospinal fluid (CSF) or, less commonly, joint, pleural, or pericardial fluid],⁴ is around 0.2–5.4 infants per 1000 live births before intrapartum antibiotic prophylaxis.^{5,6}

GBS is commonly found in the female genital tract and exists at a lower rate in male urethras.⁷ An estimated of 15–28.7% women at childbearing age are colonized with GBS.^{8,9} Approximately 50% of infants born from these women will become infected,¹⁰ with 1–2% of infants with GBS colonization developing disease.¹¹ There were several reports of neonatal GBS infection in Taiwan,^{12–16} but data were from regional single institutes that could not validly represent incidence of neonatal GBS infection in Taiwan. Although researchers believe that Taiwan needs its own policy to reduce neonatal GBS infection, no intrapartum antibiotics strategy exists in Taiwan at present because of lack of accurate data. We speculated that maternal colonization and incidence of neonatal GBS infection and mortality rate of EOD of GBS by hospital base will match those in previous reports; intrapartum chemoprophylactic strategy might be warranted for Taiwan to reduce GBS infection in neonates.

2. Materials and Methods

2.1. Maternal colonization

From July 2004 to June 2005, we performed a prospective study of maternal rectovaginal colonization rate from six hospitals (China Medical University Hospital, Taichung Veterans General Hospital, Shinyaton Hospital, Cheng Ching Hospital, Mackay Memorial Hospital, and Chang Gung Memorial Hospital). This study encouraged pregnant women to do rectovaginal culture, paid by themselves. Collection of cultures was conducted by swabbing both lower vagina and rectum (through the anal sphincter) between 35 and 37 weeks' gestation.¹⁷

2.2. Incidence of neonatal GBS infection

From January 2002 to June 2005, a retrospective study enrolled all infants born in the hospital in six medical centers (China Medical University Hospital, Taichung Veterans General Hospital, Changhua Christian Hospital, National Taiwan University Hospital, Chang Gung Memorial Hospital, and Mackay Memorial Hospital) and recorded inborn infants with GBS infection to calculate the neonatal GBS infection rate.

2.3. Clinical pictures of neonatal GBS infection

From January 2002 to June 2005, all infants with invasive GBS infection and with gestational age more than 24 weeks and less than 3 months of age, including inborn and transferred infants, were enrolled. Invasive GBS infection included GBS pneumonia, bacteremia, or meningitis diagnosed at six medical centers and five hospitals (Cheng Ching, Tai-An, Taipei City, Shin Kong Wu Ho-Su Memorial, and Taiwan Adventist) were reviewed retrospectively. Infants were identified from computerized medical records and reports of positive body fluid culture.

GBS was identified based on gram-stained smear and growth characteristics, production of beta-hemolysin on sheep blood agar, resistance to bacitracin disc, negative hydrolysis of bile-esculin agar, and positive CAMP test showing typical arrowhead enlargement by GBS of the zone of hemolysis caused by *Staphylococcus aureus*; this was confirmed by Streptex agglutination test (Wellcome Diagnostics, Dartford, UK). Typing of GBS isolates was not routinely performed. The following items were reviewed: gender, gestation age, body weight, age at onset, delivery method, chorioamnionitis, preterm delivery, premature rupture of membrane (PROM), Apgar score at 1 and 5 minutes, rescue at delivery room, neonatal fever, white blood cell count, platelet count, sepsis, meningitis, shock, respiratory distress, persistent pulmonary hypertension, and mode of ventilatory support.

For data collection, the following terminologies were defined: PROM, rupture of membranes was more than 18 hours; chorioamnionitis: maternal fever, uterine tenderness, foul smelling vaginal discharge/amniotic fluid, maternal leukocytosis, maternal and/or fetal tachycardia; very low birth weight, birth weight less than 1500 g. EOD means symptoms present at less than 7 days of age. Late-onset disease (LOD) means symptoms present at 7 days of

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