INCIDENCE AND SEROTYPE DISTRIBUTION OF INVASIVE EARLY ONSET AND LATE ONSET GROUP B STREPTOCOCCAL DISEASE

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Introduction

Group B streptococcus (GBS) is an infection that can cause significant mortality and morbidity in neonates and young infants. The international guideline for prevention of invasive GBS infection in neonates has recommended universal screening for all pregnant women at 35 weeks of gestation except those scheduled for elective Caesarean section, and the administration of intrapartum antibiotic prophylaxis in pregnant women with risk factors. This was implemented in KKH since 2010. A trivalent conjugate vaccine (serotypes III, 1a and 1b) administered to pregnant women has been proposed to decrease the incidence of both EOD and LOD. In this study, we aim to examine the incidence of EOD and LOD, the predominant causative GBS serotypes in our institution and to compare the risk factors between EOD and LOD.

Methods

In this retrospective study of 54 cases of new-borns and infants <6 months old over a 6-year period from 2010 to 2015, the influence of antenatal and perinatal risk factors were evaluated. The incidences of EOD and LOD were obtained by using the inborn EOD and LOD patients as the numerator and the live births at KKH as the denominator. Invasive GBS isolates were serotyped by National Public Health Laboratory, Ministry of Health except for the isolates from 2014 and 2015 which were not available for serotyping. All statistical analyses were performed using SPSS v 17.0 software. Risk factors were compared between EOD and LOD using chi-square test or Fisher's exact test (when numbers were <5) for categorical variables. Binary logistic regression analysis using a forward stepwise regression was performed to identify the optimum variables for the model. P values <0.05 were considered statistically significant.

Table 1. Characteristics of infants with invasive GBS Infection

Characteristics of the infants	EOD (n = 10)	LOD (n = 44)	P value
Race			0.019
Chinese, n (%)	1 (10.0%)	25 (56.8%)	
Malay, n (%)	4 (40.0%)	10 (22.7%)	
Indian, n (%)	4 (40.0%)	4 (9.1%)	
Others, n (%)	1 (10.0%)	5 (11.4%)	
Type of disease			0.560
Bacteremia, n (%)	8 (80.0%)	28 (63.6%)	
Meningitis, n (%)	0 (0%)	2 (4.5%)	
Urinary tract infection, n (%)	1 (10.0%)	5 (11.4%)	
Arthritis, n (%)	1 (10.0%)	1 (2.3%)	
Bacteremia and meningitis, n (%)	0 (0%)	7 (15.9%)	
Bacteremia and UTI, n (%)	0 (0%)	1 (2.3%)	
Gender			0.854
Male, n (%)	6 (60.0%)	25 (56.8%)	
Female, n (%)	4 (40.0%)	19 (43.2%)	
Gestational age			0.088
Preterm, n (%)	4 (40.0%)	7 (15.9%)	
Term, n (%)	6 (60.0%)	37 (84.1%)	
Birth weight			0.053
Normal birth weight, n (%)	6 (60.0%)	38 (86.4%)	
Low birth weight, n (%)	4 (40.0%)	6 (13.6%)	
Mode of delivery			0.271
Normal vaginal delivery, n (%)	8 (80.0%)	22 (53.7%)	
Assisted delivery, n (%)	0 (0%)	4 (9.8%)	
Elective caesarean section, n (%)	0 (0%)	8 (19.5%)	
Emergency caesarean section, n (%)	2 (20.0%)	7 (17.1%)	
Maternal group b streptococcus status			0.000
Infection, n (%)	4 (40.0%)	0 (0%)	
Colonization, n (%)	0 (0%)	8 (18.2%)	
Unknown, n (%)	3 (30.0%)	20 (45.5%)	
Negative, n (%)	3 (30.0%)	15 (34.1%) *	
Adequate intrapartum antibiotics			0.184
Not required based on guideline, n (%)	6 (60.0%)	29 (65.9%)	
Yes, n (%)	0 (0%)	7 (15.9%)	
No, n (%)	4 (40.0%)	8 (18.2%)	
Prolonged rupture of membrane			0.322
Yes, n (%)	0 (0%)	4 (9.1%)	
No, n (%)	10 (0%)	40 (90.9%)	
Maternal pyrexia			0.076
Yes, n (%)	3 (30.0%)	4 (9.1%)	
No, n (%)	7 (70.0%)	40 (90.9%)	
GBS serotypes #			0.041
1a, n (%)	1 (14.3%)	3 (10.7%)	
1b, n (%)	1 (14.3%)	1 (3.6%)	
II, n (%)	2 (28.6%)	0 (0%)	
III, n (%)	2 (28.6%)	21 (75.0%)	
IV, n (%)	1 (14.3%)	2 (7.1%)	
VI, n (%)	0 (0%)	1 (3.6%)	

** Missing data: 1 patient*
 # No serotype data for cases in 2014 and 2015. N = 7 for EOD and n = 28 for LOD

Table 2. Incidence of EOD and LOD in infants born in KKH

Year	Total live birth, n	EOD (n=9)	LOD, (n= 26)	Incidence of EOD	Incidence of LOD	Total incidence of EOD and LOD
				per 1000 live birth		
2010	11271	2	4	0.18	0.35	0.53
2011	11776	1	2	0.09	0.17	0.25
2012	11794	2	7	0.17	0.59	0.76
2013	11055	2	4	0.18	0.36	0.54
2014	11782	2	6	0.17	0.51	0.68
2015	12061	0	3	0	0.25	0.25

Results

There were 10 (18.5%) EOD and 44 (81.5%) LOD, of which 6 were very late onset disease. The incidence of EOD and LOD ranged from 0 - 18 and 17-59 per 100000 live births per year respectively. Of the 35 (64.8%) isolates sent for serotyping, the most common were: III (65.7%), 1a (11.4%) and IV (8.6%).

Comparing the patients with EOD to LOD, Chinese infants (p = 0.019), normal birth weight (p = 0.053) and maternal GBS status as unknown or negative (p < 0.05) are associated with LOD. In the multivariate analysis, LOD was associated with Chinese race (p=0.035, OR 18.6, 95% CI 1.24-280) and negative or unknown GBS status (p=0.04, OR 13.0, 95% CI 1.13-142.9).

On the other hand, the common risk factors for EOD such as inadequate antepartum antibiotic prophylaxis, prolonged rupture of membrane and maternal pyrexia were not associated with LOD.

Conclusion

LOD incidence was higher than EOD in KKH. The current GBS prevention guideline in our institution has helped to reduce the EOD incidence which is comparable to international standards.

A negative or unknown maternal GBS status without perinatal risk factors for sepsis was associated with LOD in our study population. This may be due to the timing of screening and the transient nature of GBS colonization leading to false negative prenatal screening result. In addition, the acquisition of LOD is not entirely known at this point.

With the future implementation of the trivalent GBS vaccine in addition to the current practice, it may prevent up to 83% of invasive GBS disease in our institution especially the LOD.

References:
1. Stephanie J. Schrag, Jennifer R. Verani. Intrapartum antibiotic prophylaxis for the prevention of perinatal group B streptococcal disease: Experience in the United States and implications for a potential group B streptococcal vaccine. Vaccine 31S (2013) D20–D26