Active surveillance of early onset disease due to group B streptococci in newborns

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Received August 7, 2003

Background & objectives: Early onset disease (EOD) due to group B streptococci (GBS) poses a serious threat in many countries. In the Czech Republic neither summarized data on the EOD incidence are available nor a nationwide prevention program has been initiated. The present surveillance was initiated to establish the incidence of EOD due to GBS in newborns in the Czech Republic, distribution of GBS serotypes and GBS susceptibility to antimicrobials.

Methods: Both invasive and carrier GBS isolates from newborns and the data on the newborns' clinical status and maternal colonization and intrapartum prophylaxis were collected from 30 microbiological and clinical centres all over the Czech Republic within prospective active surveillance. HCl extracts of the GBS strains were precipitated with rabbit polysaccharide (I-VIII) and protein (c,R) antisera.

Results: Between January 2001 and September 2002, GBS isolates from 239 full-term and 46 preterm newborns were collected. Of the 285 GBS positive newborns, 105 had invasive EOD, 42 showed suspected EOD, and in 56 clinical diagnosis was not specified. Eighty two GBS isolates were obtained from healthy colonized infants. The isolates obtained from newborns with confirmed invasive EOD were mostly of serotype III (42%), followed by serotypes V a Ia (13% each). Types Ia (26%), III (22%) and II (20%) were most frequent among the isolates from colonized individuals. Protein antigens (c protein, R protein) either coupled with polysaccharide or alone were found in 70 per cent (30 and 40 %, respectively) of the study isolates.

Interpretation & conclusion: The incidence of EOD due to GBS found in the Czech Republic 0.7-1.0 per 1000 live births was comparable with the rates reported in the countries where the prevention programme has been implemented nationwide. Serotypes III, V and Ia prevailing among the isolates from Czech newborns with EOD belonged to those most frequently identified in the USA and Western European countries.

Key words: Active surveillance - Czech - group B streptococci - incidence - infection - neonate - serotype - Streptococcus agalactiae

Early onset disease (EOD) due to group B streptococci (GBS) poses a serious problem in many countries. Most frequent clinical manifestations in EOD are meningitis, sepsis or pneumonia difficult to differentiate from the respiratory distress syndrome. EOD incidence rates in other countries range between 0.4 and 5.4 per1000 live births\(^1\). In the Czech Republic, very limited data are available in some neonatology centres, and in most cases, microbiological details on the causative agent are not specified. Thus the active GBS EOD surveillance was started in January 2001, including EOD incidence monitoring, serotyping of the strains isolated and their testing for antimicrobial susceptibility.
Material & Methods

GBS isolates obtained from newborns with EOD and colonized newborns together with the filled in forms with necessary data on their diagnosis or clinical condition and possible maternal GBS carrier status and intrapartum prophylaxis were referred to the National Reference Laboratory for Streptococci and Enterococci (NRL), National Institute of Public Health, Prague from 30 hospital microbiological centres all over the Czech Republic. If available, maternal GBS isolates were sent together with those from newborns. The isolates confirmed as GBS were typed by precipitation reaction in gel with the use of HCl extracts prepared according to Lancefield's modification and rabbit antisera raised against polysaccharide (I-VIII) and protein (c,R) antigens. The absence of both polysaccharide and protein antigens was tested by the precipitation reaction in capillary tubes.

Results

Between January 2001 and September 2002, GBS isolates from 239 full-term and 46 preterm newborns from all over the Czech Republic were referred to the NRL. Of the 285 GBS positive newborns, 105 had invasive EOD (52 cases of sepsis, 7 of meningitis, 17 of respiratory disorders, in 29 cases infection was not specified), in 42 infection was suspected, and in 56 with hypoxia resulting from a preterm or complicated birth, clinical diagnosis was not specified. None of 82 GBS colonized infants was reported to develop EOD. As many as 170 isolates from the newborns were sent together with the maternal isolates from the vagina or lochia; the same serotype was always identified in the matched isolates. Mothers of 15 GBS positive newborns showed negativity in prenatal screening. Data on possible maternal colonization were not available for the remaining 100 cases. Among the strains isolated from 105 newborns with proved GBS EOD, serotype III prevailed widely followed by serotypes V and Ia (Fig.1). The same serotypes were also the most frequent serotypes to be identified among 42 isolates obtained from newborns with suspected infection. Serotypes Ia, III and II prevailed among isolates from 82 colonized individuals (Fig. 2). Serotypes of isolates from 56 newborns after a preterm or complicated birth whose diagnosis was not specified, were not included in the study. Of the total of 285 GBS isolates, 64 per cent had both polysaccharide and protein (c or R) antigens and 6 per cent had the protein alone. None of the known antigens was found in 2 per cent of the GBS isolates. Two deaths were reported during the study. Ib/c and c protein alone were demonstrated in the post mortem isolates from these two newborns. The isolates

Fig. 1. GBS serotypes from 105 neonates with proved invasive infection, Czech Republic, 2001(Jan) - 2002(Sep).

Fig. 2. GBS serotypes from 82 colonized neonates, Czech Republic, 2001(Jan) - 2002(Sep).
from cerebrospinal fluid of 7 newborns with meningitis were of serotypes III and V.

Discussion

To obtain more accurate and extensive data, the GBS EOD surveillance has been continued and the data reported are being verified. Although any nationwide EOD prevention programme has not been implemented in the Czech Republic, the preliminary estimate of the EOD incidence rate based on the present data, i.e., 0.96 per 1000 live births, was comparable with the rates reported in the countries where such programmes have been implemented. In the Czech Republic, not all of the participating centres carried out prenatal screening and not all of them followed the CDC recommendations. The culture procedure optimizing the GBS detection was not used for screening negative mothers of the GBS positive newborns either.

The serotypes prevailing in Czech newborns with invasive EOD were among those most frequently identified from such isolates in India and North America and Western European countries. Type VIII isolates frequently found in Japan were not identified among the present GBS study isolates. Prevailing serotypes as found among the GBS study isolates from the Czech newborns were consistent with those identified from epidemiologically unlinked isolates from colonized pregnant Czech women. In the light of frequent antimicrobial resistance of serotype V, the relatively high proportion serotype V among our isolates, including those isolated from CSF, is alarming.

Acknowledgment

The financial support by the Internal Grant Agency of the Ministry of Health of the Czech Republic is acknowledged. Authors thank all staff of microbiological and clinical centers involved in the active EOD surveillance for help in collecting strains.

References


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