Neonatal listeriosis in Taiwan, 1990—2007

Wu-Shiun Hsieh, Li-Yi Tsai, Suh-Fang Jeng, Chyong-Hsin Hsu, Hong-Chih Lin, Po-Ren Hsueh, Chien-Yi Chen, Hung-Chieh Chou, Po-Nien Tsao, Peng-Hong Yang*

* Corresponding author. Tel.: +886 3 3281200x8203; fax: +886 3 3288957.
E-mail address: ph6619@gmail.com (P.-H. Yang).

International Journal of Infectious Diseases (2009) 13, 193—195

KEYWORDS
Listeria monocytogenes; Neonates; Taiwan

Summary
Objectives: Listeria monocytogenes is an important pathogen in neonates in Western countries, with a fatality rate of 20—30%. There is limited information on neonatal listeriosis in Eastern countries. The purpose of this study was to delineate the occurrence and clinical picture of neonatal listeriosis in Taiwan.

Methods: A questionnaire-based survey of all of the 17 medical centers in Taiwan was performed, and a literature review of neonatal listeriosis as reported in Taiwan from 1990 to 2007 was made.

Results: A total of 14 cases (10 male, four female) of neonatal listeriosis were identified, including 11 found from the survey of four medical centers and another three collected from the literature review. Three were found to have occurred prior to 2000 and 11 were found to have occurred after 2000. The age of onset was less than 3 days in all cases. L. monocytogenes was identified from blood in 13, cerebrospinal fluid in four, and gastric aspirate in two. Half of the cases (7/14) had involvement of the central nervous system with pleocytosis and hypoglycorrhachia in cerebrospinal fluid, and three of them even developed hydrocephalus. The mortality rate was 29%.

Conclusions: Our findings suggest that listeriosis may emerge as an important health threat among newborn infants in Taiwan.

© 2008 International Society for Infectious Diseases. Published by Elsevier Ltd. All rights reserved.

doi:10.1016/j.ijid.2008.06.006
Introduction

Listeria monocytogenes is an important pathogen in neonates in Europe and the USA with a high case-fatality rate of around 20–30%. It has been rated as the third leading pathogenic cause of neonatal meningitis in Western populations. The occurrence of listeriosis appears to be less frequent in Eastern populations than in Western populations. The only occurrence of listeriosis appears to be less frequent in Eastern populations, which was undertaken in Japan, showed an estimated incidence of listeriosis of 0.65 cases per million population, with perinatal infection accounting for 20% of cases.

There has been a lack of data on the incidence of this disease in Taiwan owing to the fact that there is no mandatory notification system or comprehensive national surveillance of L. monocytogenes isolates. Data obtained from National Taiwan University Hospital, a 2000-bed university hospital located in northern Taiwan, showed that the annual incidence of listeriosis (number of cases with bacteremia and/or meningitis per 1000 admissions) was <0.03 between 1996 and 2004 (one to two patients per year), 0.187 in 2005 (12 patients), and 0.093 in 2006 (six patients) (unpublished data). In a review of the literature for Taiwan, there was only one large series study of human listeriosis reported in 1995, which had collected information on 13 cases of L. monocytogenes bacteremia in the same hospital over a 12-year period; only one was a perinatal case. Also, only three case reports of neonatal listeriosis were identified from the literature for the period prior to 2003. This study undertook a questionnaire-based survey of 17 medical centers located in Taiwan in order to determine the occurrence and outcomes of neonatal listeriosis.

Methods

The Institutional Review Board of the National Taiwan University Hospital, Taipei, Taiwan approved this study. A questionnaire was mailed to all the medical centers (N = 17) in Taiwan. These medical centers are evenly distributed across the country to provide intensive and intermediate care for sick neonates. The attending physicians in neonatology were asked to identify retrospectively the neonates in their hospitals with L. monocytogenes infection during the period from 1990 to 2007.

Neonatal listeriosis was defined as the growth of L. monocytogenes from any body site of a newborn with clinical manifestations. The non-responders were subsequently contacted via telephone to confirm that there had been no documented case of neonatal listeriosis since 1990. The information obtained for each patient included maternal history, date of birth, gestational age, sex, clinical presentation and age at onset, laboratory data, and outcomes.

Results

A total of 11 cases of neonatal listeriosis were identified from the questionnaire survey, including two cases reported in 2007. Another three cases were collected from a literature review of neonatal listeriosis as reported in Taiwan from 1990 to 2003. The 14 cases consisted of 10 males and four females, with three occurring prior to 2000 and 11 occurring after 2000.

Most of the cases (12/14) were preterm infants. The mean gestational age was 32.2 weeks (range 26–38 weeks). Most of their mothers had a history of fever or flu-like symptoms before delivery. Chorioamnionitis was noted in four mothers, and one mother had L. monocytogenes bacteremia. The age at onset of clinical presentation was less than 3 days in all cases. The majority (11/14) presented with respiratory distress as the initial symptom, including two preterm infants with respiratory distress syndrome and one with meconium aspiration syndrome. Half of the cases (7/14) had involvement of the central nervous system with pleocytosis and hypoglycorrhachia in cerebrospinal fluid, and four of them were complicated with hydrocephalus. L. monocytogenes was identified from blood in most of the cases (13/14), and also from cerebrospinal fluid (3/14) and gastric aspirate (2/14). The mortality rate was estimated as 29% (four cases died). Among the 10 survivors, two received ventriculoperitoneal shunt placement or ventriculostomy due to hydrocephalus, and another two developed chronic lung disease.

Discussion

Neonatal listeriosis is not uncommon in Western populations and can result in significant morbidity and mortality. After group B streptococcus and Escherichia coli, L. monocytogenes is the third most common pathogen of neonatal meningitis in Western populations. However, neonatal listeriosis has rarely been reported in Eastern countries.

Taiwan is a newly developed oriental country in Asia with a per capita gross domestic product (GDP) of 16 030 US dollars in 2006; the annual live birth rate was around 230 000–300 000 over the last decade. Only a few cases of neonatal listeriosis have ever been reported in Taiwan. No nationwide survey of neonatal listeriosis in Taiwan is available. The reason for the low incidence of neonatal listeriosis in Taiwan is not well established. Incorrect determination of culture results due to the coccobacillus shape and changeable Gram-positive stain may be one of the impacting factors. Physicians seldom take cultures from aborted tissue or fetuses, which might account for missed diagnosis of perinatal infection.

In our study, we found that three of 14 cases with neonatal listeriosis in Taiwan occurred prior to the year 2000 and 11 cases were after 2000. We have demonstrated that there has probably been an increase in the number of cases of neonatal listeriosis during recent years in this newly developed oriental country.

Seroepidemiologic studies show that both sporadic and common-source outbreaks of listeriosis in humans are foodborne. The L. monocytogenes strains from foods and environmental samples collected in China have been reported to be similar to those found in North America and Europe. Rapid changes in food consumption and food distribution patterns during the last decade in China may lead to the emergence of human listeriosis. By using polygenetic analyses, Zhou et al. showed that the L. monocytogenes identified from ready-to-eat food products are mainly genetic lineage II strains, which may be less virulent than lineage I strains. It has been suggested that this phenomenon may have contributed to the low incidence of human listeriosis in China. Due to the similar dietary habits of the people in Taiwan and China, foodborne human listeriosis should also be considered in Taiwan.
Similar to the neonates seen with group B streptococcal disease, there are two forms of neonatal listeriosis, i.e., early and late onset of manifestations. Early onset listeriosis is often associated with preterm delivery and occurs in the first 5 days of life. A septic-like syndrome may predomi-
nate in these patients, but other manifestations such as acute respiratory distress and pneumonia are common. Meningitis is relatively rare. Late onset disease develops more than 5 days after delivery. Infants with late onset listeriosis are generally full term, and meningitis is not an uncommon presentation. L. monocytogenes may directly invade the cerebral parenchyma and brain stem causing meningoence-
phalitis and rhomboencephalitis. The ability of L. mono-
cytogenes to cross the meninges and blood–brain barrier is likely to be the result of endothelial cell or macrophage phagocytosis of the bacterium.

In our study, all cases were early onset with the onset time before 3 days of life. Most of our cases were preterm infants. The major manifestation was presentation with respiratory distress. Up to 50% of our cases had involve-
ment of the central nervous system with L. monocytogenes infection. In addition, two patients among the 10 survivors had neurological sequelae and underwent a neurological drainage procedure. L. monocytogenes was found to be life-threatening in our patients. The overall mortality rate was 29%. Comprehensive evaluation of the central nervous system is crucial in infants with L. monocytogenes infection.

Our questionnaire-based survey of the medical centers was the first survey of neonatal listeriosis in Taiwan to date. However, several limitations in the study design merit consideration. First, our cases were identified via a ques-
tionnaire-based survey that mainly relied on attending physician recall. This may have led to an underestimate of the incidence as established using prospective case registries or microbiological laboratory diagnostic logs. Second, perinatal healthcare professionals who seldom take cultures from aborted tissue or fetuses may have missed the diagnosis of perinatal infection. Finally, the study population was limited to medical centers, hence the data may not be generalized to the whole population of Taiwan. The incidence of perinatal listeriosis in Taiwan remains to be determined.

In conclusion, listeriosis is an important public health issue in Western countries, and our findings highlight the fact that neonatal listeriosis may emerge as a health threat in a newly developed oriental country. Early diagnosis of perinatal infection relies on a high index of suspicion in perinatal healthcare professionals. Comprehensive evaluation and appropriate treatment are crucial, especially for those who have involvement of the central nervous system.

Conflict of interest: No conflict of interest to declare.

References