

Research Letter

Congenital listeriosis: A review of cases in Taiwan since 1990 until 2011

Mun-Kun Hong^a, Chun-Kuang Yang^{b,*}^a Department of Obstetrics and Gynecology, Buddhist Tzu Chi General Hospital, Tzu Chi University, Hualien, Taiwan^b Department of Obstetrics and Gynecology, Taipei Division of Buddhist Tzu Chi General Hospital, Hualien, Taiwan

Accepted 2 August 2011

Listeriosis is a food-borne illness caused by *Listeria monocytogenes*. The genus *Listeria* is a sub-branch of *Clostridium*, together with *Staphylococcus* and *Streptococcus*. There are six different species (*L. monocytogenes*, *Listeria ivanovii*, *Listeria innocua*, *Listeria welshimeri*, *Listeria seeligeri*, and *Listeria grayi*), but only the *L. monocytogenes* is consistently associated with human illness [1]. *L. monocytogenes* is an aerobic-to-microaerophilic Gram-positive bacterium with motile rods commonly present in soil, dust, water, processed food, and both animal and human feces [1]. *L. monocytogenes* resists freezing, drying, and heat remarkably well. It can spread from cell to cell without contact with the extracellular environment [1]; therefore, hosts with depressed, cell-mediated immunity such as pregnant women, unborn babies, aged adults, and immunocompromised people are especially susceptible to it. Incidence of prenatal listeriosis is 8.6–17.4/100,000 births [1–3]. This article describes a rare case of listeriosis during pregnancy, with an initial presentation of fever and flu-like symptoms. Published case reports of neonatal listeriosis in Taiwan since 1990 to 2011 were collected (Table 1).

A 25-year-old pregnant mother (G6P1SA3AA1) had regular and uneventful antepartum care up to 34 weeks. She presented at the emergency department with complaints of fever, abdominal pain, and decreased fetal movement for 1 day. Additionally, she reported a headache and vomiting for 2 days. Her recent history revealed a flu-like illness with a sore throat and intermittent fever for 7 days. On admission, the woman's vital signs were observed as follows: blood pressure 140/86 mmHg, heart rate 145 bpm, respiratory rate 21/min, and body temperature 38.4°C. Cardiotocography identified regular uterine contractions every 1.5 minutes with amplitudes of roughly 50–70 mmHg. Ritodrine 20 mg PO and 1 L normal saline infusion were prescribed immediately. The fetal

heartbeat had tachycardia with a baseline at 180 bpm; variability was moderate. Later, laboratory workup revealed leukocytosis with a left shift (white blood cell count of $20.1 \times 10^3/\mu\text{L}$, segmented neutrophils at 86%, and C-reactive protein at 2.20 mg/dL). Urine analysis was negative for a urinary tract infection. About 1 hour after the administration of the ritodrine prescription, the frequency of the uterine contractions decreased to 1 every 10–12 minutes with an amplitude of about 50 mmHg, but the fever persisted. The fetal biophysical profile score was 6 points with the following specific results: nonstress test was reactive, respiratory movement was positive, and amniotic fluid index was 18.53 cm, whereas gross body movements and fetal tone were negative. A distended bowel (bowel diameter 1.12 cm) with an inflamed bowel wall was noted. Cefazolin 1 g Q8H was administered immediately. During observation, variable decelerations of the fetal heart beat appeared occasionally. Finally, a deep deceleration occurred (dropping from 180 to 85 bpm) and persisted for 2.5 minutes. An emergency cesarean section was performed, and a 2155 g baby boy was delivered with Apgar scores of 8 at 1 minute and 9 at 5 minutes. Meconium stain 3+ was also noted. Due to aggravated respiratory distress and fever (38.5°C), the newborn was transferred to the neonatal intensive care unit. The newborn received continuous positive nasal-airway pressure during the first 5 days of hospitalization and was weaned to O₂ inhalation without problems. Gram-stain study of the amniotic fluid revealed Gram-positive bacilli 4+. Consequently, an empiric ampicillin/gentamicin treatment was started for both the mother and the newborn immediately following the surgery. Amniotic fluid cultures and newborn blood culture revealed *L. monocytogenes*. Blood culture of the mother was negative, as were the rectal and throat swabs of the newborn. A lumbar puncture of the neonatal was done, and the cerebrospinal fluid analysis was within normal ranges. Cerebrospinal fluid culture showed no bacterial growth. The mother's condition was stable, and she was discharged 7 days after admission. Neonatal brain sonography did not reveal any remarkable

* Corresponding author. Department of Obstetrics and Gynecology, Taipei Division of Buddhist Tzu Chi General Hospital, 707, Section 3, Chung-Yang Road, Hualien, Taiwan.

E-mail address: hongmunkun@yahoo.com.tw (C.-K. Yang).

Table 1
Cases of listeriosis during pregnancy in Taiwan.

Authors and publications	GA (wk)	Antepartum signs and symptoms	Apgar Score at 1 and 5 min	Neonatal condition	Treatment	Outcome
Bor-Ren Cheng, Changgeng Yi Xue Za Zhi, 1990;13:152–6	33	Lower abdominal dull pain, tenderness Fever PPROM, MS(+) Fetal distress	6→8	Irregular seizure start postpartum 2h Meningitis Hydrocephalus	Ampicillin + gentamicin	AAD on 26 th day and expired later
Ying-Yao Chen, Clin Neonatol, 1998; 5(1):32–34	31+3	PPROM MS (+)	5→6	Respiratory distress syndrome	Ampicillin + gentamicin	Discharged on 59 th day without abnormalities
Jia-Ming Chen, Acta Paediatr Taiwan, 2003;44:106–8	33	General malaise Poor appetite MS (+)	8→9	Fever, Sepsis Meningitis	Ampicillin for 21 d+ cefotaxime for 3d switched to gentamicin for 21 d.	Discharged on 59 th day, without abnormalities
Shih-Yu Chen, J Formos Med Assoc, 2007;106(2) (Two cases)	31	Fever and chill PPROM MS(+) Fetal distress	4→7	Maculopapular rash over trunk and four limbs Subtle seizure, bradycardia, ventriculitis with hydrocephalus	Ampicillin for 28 d+ cefotaxime for 5 d and switched to gentamicin for 10 d	Discharged on 58 th day. No abnormal neurologic development after one year of follow-up
	28	Fever and flu-like illness MS(+) Respiratory distress and bradycardia	4→4	Ventriculitis Multiple hypoechoic cysts over bilateral ventricles	Endotracheal intubation + ventilator support ampicillin + cefotaxime for 8 d.	Expired
Mun-Kun Hong et al., *current case, Taiwanese J Obstet Gynecol	34	Fever and flu-like illness:headache, sore throat and vomiting. MS(+) Fetal distress	8→9	Fever and respiratory distress	Ampicillin for 14 d + gentamicin for 7 d	Discharged on 14 th day without abnormalities

AAD = against advice discharge; GA = gestational age; MS = meconium stain; PPROM = preterm premature rupture of membrane.

* This reported case.

findings. Gentamicin treatment for the infant was discontinued after 7 days, and the ampicillin treatment was discontinued 2 weeks later. The infant was discharged without sequelae at 14 days after hospitalization.

On review of the literature, the predisposing factors for listeriosis included pregnancy, being a neonate or an elderly adult, glucocorticoid therapy, and immunosuppressive conditions or treatments (diabetes mellitus, AIDS, end-stage renal disease, hematologic malignancy, organ transplantation, collagen vascular disease, liver disease, and alcoholism) [4,5]. Annual infection rate is >17 times higher for pregnant women (12/100,000) than for healthy people [6]. Pregnant women are more susceptible to listeriosis, most likely due to their cell-mediated immunity depression during pregnancy [7]. Listeriosis most commonly occurs in the third trimester [8] and is usually preceded by influenza-like symptoms, including persistent fever and muscle aches. These symptoms differ markedly from the clinical manifestations of listeriosis in nonpregnant adults, which present as afebrile brain abscesses and seizures [9]. When a *Listeria* infection involves the nervous system, headache, stiff neck, confusion, loss of balance, or convulsion may occur.

Data on the incidence of listeriosis in Taiwan are incomplete. The largest series, which surveyed multiple medical centers in Taiwan, identified 14 cases of listeriosis between 1990 and 2007 [10]; however, only six of these cases were described in case reports (Table 1). All six cases occurred in the third trimester. The most common antepartum signs and symptoms were fever, a flu-like illness, and premature preterm rupture of the amniotic membrane with meconium staining. Apgar scores of the fetuses at delivery were generally low, with mean scores of 5.83 and 7.16 at 1 and 5 minutes, respectively. The common morbidities of the infants were respiratory distress, meningitis, hydrocephalus, and sepsis (Table 1). Ampicillin and gentamicin were most often chosen as the first-line treatments, and their effectiveness is reliable. Two cases with Apgar scores of 8 and 9 at 1 and 5 minutes, respectively, had very good outcomes. Of the six cases, two expired and the others were discharged without abnormalities. Therefore, including the outcome of the case mentioned here, the overall mortality rate of listeriosis in Taiwan was as high as 26% [10]. A literature review indicated that serious maternal diseases are rare, and only one case of maternal meningocephalitis was reported in Britain [11].

The purpose of this article is to attract the attention of obstetricians to this life-threatening disease. Listeriosis must be considered when treating cases of antepartum fever with lower abdominal pain and unspecific flu-like symptoms. Obstetricians must inquire in detail into the risk factors for listeriosis, including a history of raw food intake or ingestion of food implicated in a listeriosis outbreak, the mother undergoing glucocorticoid therapy (e.g., systemic lupus erythematosus), or the mother living with an immunosuppressive condition (e.g., type 2 diabetes mellitus). Although the mortality rate of listeriosis in infants is very high, early diagnosis and treatment can result in healthy babies.

Acknowledgment

The authors thank Ted Knoy for his editorial assistance.

References

- [1] Ward TJ, Gorski L, Borucki MK, Mandrell RE, Hutchins J, Papedis K, et al. Intraspecific phylogeny and lineage group identification based on the prfA virulence gene cluster of *Listeria monocytogenes*. J Bacteriol 2004;186:4994–5002.
- [2] Southwick F, Purich D. Intracellular pathogenesis of listeriosis. N Engl J Med 1996;334:770–6.
- [3] Tappero JW, Schuchat A, Deaver KA, Mascola L, Wenger JD, Swaminathan B, et al. Reduction in the incidence of human listeriosis in the United States. J Am Med Assoc 1995;273:1118–22.
- [4] Büla CJ, Bille J, Glauser MP. An epidemic of food-borne listeriosis in western Switzerland: description of 57 cases involving adults. Clin Infect Dis 1995;20(1):66–72.
- [5] Skogberg K, Syrjänen J, Jahkola M, Renkonen OV, Paavonen J, Ahonen J, et al. Clinical presentation and outcome of listeriosis in patients with and without immunosuppressive therapy. Clin Infect Dis 1992;14(4):815–21.
- [6] Broome CV. Listeriosis: can we prevent it? ASM News 1993;59:444–6.
- [7] Bortolussi R, McGregor DD, Kongshavn PA, Galsworthy S, Albritton W, Davies JW, et al. Host defense mechanisms to perinatal and neonatal *Listeria monocytogenes* infection. Surv Synth Pathol Res 1984;3:311–2.
- [8] Dawson KG, Emerson JC, Burns JL. Fifteen years of experience with bacterial meningitis. Pediatr Infect Dis J 1999;18:816–22.
- [9] Nieman R, Lorber B. Listeriosis in adults: a changing pattern, report of eight cases and review of the literature, 1968–1978. Rev Infect Dis 1980;2:207–27.
- [10] Hsieh WS, Tsai LY, Jeng SF, Hsu CH, Lin HC, Hsueh PR, et al. Neonatal listeriosis in Taiwan, 1990–2007. Int J Infect Dis 2009;13:193–5.
- [11] McLauchlin J. Human listeriosis in Britain, 1967–85: a summary of 722 cases. Epidemiol Infect 1990;104:181–9.