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### Case Report





## Early-Onset Neonatal listeriosis –A Case Report

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#### ABSTRACT

A 25-year-old primigravida in her 30 weeks of gestation presented with fever and some flu-like symptoms. There was minimal vaginal discharge. Keeping in view the possibility of chorioamnionitis a prompt intravenous infusion of antibiotics was instituted with continuous external monitoring of fetal heart rate. An emergency cesarean section was performed 3 hours later for persistent fetal tachycardia suggestive of fetal distress. A preterm baby girl was born with evidence of respiratory distress requiring ventilatory support. Listeria monocytogenes was isolated from newborn's blood culture, tracheal secretions and the placental swab, confirming neonatal listeriosis. Cerebro-spinal fluid examination did not reveal evidence of meningitis. Prompt laboratory diagnosis and aggressive antibiotic treatment led to complete recovery of the infant from septicemia.

This represents the first reported case of early-onset neonatal listeriosis in Malaysia

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#### Introduction

Listeriosis, an infection caused by a bacterium *Listeria* monocytogenes, encompasses a wide variety of diseases with symptoms ranging from febrile gastroenteritis, to life-threatening bacteremia and meningoencephalitis. It primarily infects pregnant women and their fetuses, neonates, elderly and individuals with impaired cell-mediated immunity [1]. A particular disposition is imposed by pregnancy. Pregnant women have 12-fold increased risk than normal population to acquire listeriosis after consumption of contaminated food (2). In pregnant women, *L. monocytogenes* often causes an influenza-like bacteremic illness that may lead to chorioamnionitis and infection of the defenceless fetus, resulting in abortion, stillbirth or preterm birth with early-onset listeriosis [2]. Perinatal listeriosis is rarely life-threatening to the mother, but neonatal morbidity and mortality are common, with fatality rates ranging from 3 % to 50 % in neonates born alive [3].

#### **Case report**

A 25-year-old primigravida of Indian descent had a normal antepartum course until 30+2 weeks of gestation when she developed fever. A day later she was admitted with temperature of 38.2 °C and vague complaints of backache, headache and lower abdominal pain for one day. Physical examination revealed tenderness in the left loin area. A speculum examination revealed minimal whitish discharge. Urine analysis gave normal results. No source of infection could be localized clinically. A battery of

tests were performed. Her blood and high vaginal swabs were taken for bacterial culture. Complete blood counts revealed a significantly raised total white blood count of 25.5x10<sup>9</sup>/L with a raised differential monocyte count. Intravenous cefuroxime 750mg and metronidazole (flagyl) 500mg were commenced on 8-hourly regimen. A dose of dexamethasone 12.5mg intramuscularly was given in anticipation of preterm labour. Fetal heart rate was monitored on cardiotocogram that was normal in the beginning but 2 hours later it showed persistent fetal tacchycardia at 200 bpm, suggestive of fetal distress. It was thus decided to deliver the fetus by an emergency Caesarean section.

A newborn baby girl weighing 1615g was delivered. The Apgar scores were 3/10 and 9/10 at one and five minutes respectively. The placenta appeared necrotic. A placental swab was sent for culture. The newborn was intubated immediately in the operation theatre and transferred to the special care nursery and recieved mechanical ventilation and oxygen for respiratory distress syndrome. The lungs were clear and there was no hepatosplenomegaly. She was started on crystalline penicillin (200,000U kg-1 day-1) and gentamicin (3.5mg kg<sup>-1</sup> day<sup>-1</sup>) after blood samples and tracheal secretions were taken for culture. The results of other laboratory investigations were as follows: haemoglobin 140 g/L, haematocrit 38%, total white cell counts: 7.8 x109/L, neutrophil 57%, lymphocytes 34%, monocytes 9%, platelets 209x109 /L, c-reactive protein (CRP) 3.3mg/dL, blood urea 7.4 mmol/L, creatinine 75 µmol/L, sodium 144 mmol/L, potassium 4.9 mmol/L and chloride 113 mmol/L. Increased streakiness was noted on a plain chest radiograph taken soon after admission to the neonatal unit.

Smears from Bactec- altert blood culture of neonate revealed small diphtheroidal gram positive bacilli after 24 hours of incubation. Direct smear microscopy of tracheal secretions also revealed pus cells >20/ hpf and gram positive coccobacilli. Both specimen cultures from the neonate and placental swab grew a pure growth of subdued beta-hemolytic colonies in 24 hours on the sheep blood agar (SBA). Interestingly the pure and heavy growth obtained from tracheal secretions was initially identified as enterococcus and that from placental swab as coagulase negative staphylococci. It was only after the suspicion of listeria growing from the blood culture, did we realize the homogeneity of all three cultures. The beta-hemolysis was only evident underneath the colonies, a feature typical of L. monocytogenes. The isolate was catalase and aesculin positive and showed characteristic 'tumbling motility' under light microscopy from the tryptic soy culture broth when incubated at 4°C and 24 °C. It also exhibited synergistc hemolysis when inoculated perpendicular with Staphylococcus aureus on the 5% SBA. All three isolates were presumptively identified as L. monocytogenes. The isolate was found to be sensitive to ampicillin, vancomycin, gentamycin but resistant to cefuroxime and penicillin. Later the minimal inhibitory concentration (MIC) of the isolate to penicillin was determined to be 0.38 µg/ml. Further testing the isolate with API Corvne Analytical Profile Index (Ref. 209900) by BioMerieux confirmed the identification. Lumbar puncture done on the second day of life yielded clear xanthochromic cerebrospinal fluid (CSF) that was not under pressure. The CSF microscopy revealed 22 WBC (polymorph 44%, lymphocyte 56%). The CSF glucose level was 2.7 mmol/L (compared with random blood glucose of 4.2 mmol/L), protein 1.88 g/L. Gram stain examination of the CSF did not reveal presence of micro-oraganism. Bacterial culture also remained negative after routine incubation of 48 hrs. Furthermore, maternal blood samples were also shown to be sterile.

Crystalline penicilin was replaced by ampicillin (200mg kg<sup>-1</sup> day<sup>-1</sup> in 2 divided doses) and was given for 10 days combined with gentamicin. The newborn was ventilated for three days followed by another day of nasal continuous positive airway pressure (CPAP) after which she was gradually weaned to room air. She tolerated her feeds well after commencing on enteral feeding. She was discharged well after three weeks of hospitalization and having achieved a body weight of 2100g.

Postoperatively the mother continued to recieve IV cefuroxime and was discharged with oral cefuroxime (zinnat) on the third postoperative day. She subsequently made an uneventful recovery.

#### Discussion

Listeria monocytogenes is ubiquitous in nature and has been isolated from soil, water, vegetation and through out the food chain. They colonize a wide range of wild and domestic animals and human beings, and may cause infection- listeriosis [4].

Because of its widespred occurence and ability to grow in the food at refigeration temperatures ( $3 - 4^{\circ}C$ ) and in the presence of 1% sodium nitrite or 10% sodium chloride L. monocytogenes easily contaminates food and processing environment [4].

Anecdotal reports and several outbreaks have linked human illness with ingestion of foods contaminated with listeria [2].

L. monocytogenes is an underdiagnosed and under-reported cause of congenital sepsis [3]. The clinical characteristics of neonatal listeriosis are similar to the neonatal Group B streptococcus sepsis, with early and late form of disease, suggesting different modes of transmission [5]. In the early-onset sepsis syndrome the infection is acquired in utero and is usually associated with prematurity. Infection in pregnancy is commonly recognized in third trimester, probably related to major decline in cell mediated immunity seen at 26 to 30 weeks of gestation; It is heralded by an influenza-like prodrome with chills, coryzal symptoms, and myalgia and backache that occurs in approximately two third of cases , presumably represents a bacteremic period inducing placentitis [1, 5]. Connatal infection results in either stillbirth or early onset listeriosis with clinical manifestations apparent within hrs or days of birth at the mean age of 1.5 days of life [2, 5]. Early onset listeriosis is usually associated with prematurity, septicemia or pneumonia. A severe form of disease ' granulomatosis infantisepticum' is associated with granuloma formation involving multiorgans. The placental and posterior pharyngeal, as well as small granulomas on the skin can be early clues to the diagnosis [5]. Less dangerous is the late-onset listeriosis a meningitic illness usually affecting full-term infants of mothers having uncomplicated pregnancies and is probably acquired from the colonized maternal vagina at parturation, cesarean section, and nosocomial transmission [1, 2]. The symptoms of the infection are apparent at mean age of 14.3 days of life The most effective regimen to treat listeriosis consists of a combination of aminopenicillin plus an aminoglycoside.In vitro this combination is bactericidal whereas aminopenicillin alone exerts weak bactericidal activity against listeria [6].

Our case represents an early- onset neonatal sepsis syndrome that is associated with prematurity and septicemia, and most likely acquired from mother during her pyrexial state [2]. Isolation of L. monocytogenes from placental swab and evident necrotic placenta indicate a uteroplacental spread of infection. Failure to recognize the cause of unexplained fever in mother and initiation of of ineffective antibiotic therapy (2<sup>nd</sup> generation cephalosporin) probably led to fetal distress followed by a premature delivery of the neonate [6]. Isolation of high concentration of bacterium from tracheal secretions suggested aspiration of infected amniotic fluid that could have contributed to respiratory distress [5]. Though appropriate antibiotic therapy of neonatal septicemia followed by prompt laboratory identification of the bacterium reverted back the course of a fatal outcome, an early antepartum recognition, and initiating effective maternal antimicrobial treatment could have controlled fetal infection until the birth [7].

At birth, the diagnosis was made by detecting the organism in the blood, respiratory secretions and placental swab. Whereas CSF remained sterile. In early onset disease *L. monocytogenes* can also be isolated from conjunctivae, external ear, nose, throat, amniotic fluid, cutaneous swabs, gastric aspirate, skin lesions and meconium of the neonate. Gram stained smears, particularly of the gastric aspirate, and meconium may give a vital lead to early diagnosis [1,4]. Maternal blood remained sterile after routine incubation. Though the blood culture taken from mother having non-resolving pyrexia of 38°C within 48hrs is strongly recommended [4]. In our case it remained sterile after routine incubation supporting the evidence of poor corelation between positive maternal blood culture and positive fetal blood culture [3]. A case of early- onset neonatal listeriosis with negative maternal blood culture has been reported before [8].

Laboratory misidentification of *L. monocytogenes* isolates as diphtheroids, streptococci, or enterococci in clinical specimens and culture has been described [4]. The practice in our laboratory to identify any Gram positive rod from sterile specimens saved us from committing this error.

In contrast to other countries listeriosis is not frequently reported in Malaysia. A medline search did not reveal any clinical reports of neonatal sepsis, although the prescence of listeria in food products in Malaysia has already been documented. A local study showed that between 19 to 50% of retail beef and poultry meat products sold in Malaysian wet markets and supermarkets were contaminated with L. Monocytogenes The incidence of Listeriae contamination (1.1%) in the local vegetable produce is relatively lower as compared to that reported in other countries [9]. As for our case, the possible link to food ingested contaminated with listeria by the mother could not be determined, and because of variable incubation period (upto 70 days), it is difficult to determine the point of exposure to potentially contaminated product [1]. It is generally considered that examination of the vaginal swabs and faeces for listeria organism has no value in the diagnosis of listeriosis. However, improvements in food hygiene and compliance with dietry advice have probably led to a marked decline in normal carriage rates. McFayden et al found that only 1 in 1000 antenatal patients was a carrier [10]. Hence, if there is clinical suspicion of maternal listeriosis, carriage of L. monocytogenes in the vagina or stool provides useful collateral evidence for this and the worst clinical outcome can be avoided with appropriate and prompt intrapartum institution of antibiotics like amoxycillin [3, 4].

In the end we wish to emphasize the necessity of considering listeriosis as a part of differential diagnosis of neonatal septicemia or a clinical scenario when a pregnant woman presents with fever associated with non-specific and vague complaints, especially in third trimester. As in our case the neonatal recovery from septicemia was attributed to an early recognition of the organism, prompt liaison of microbiologist with pediatrician and adminstration of recommended antibiotics.

#### References

- 1. Bennett Lorber Listeriosis (1997) Clin Infect Dis 24: 1-10
- 2. H Hof (2003) History and epidemiology of listeriosis. FEMS Immunology and Mirobiology 35: 199-202
- 3. Boucher M, Yonekura ML (1986) Perinatal listeriosis(earlyonset): Correlation of antenatal manifestations and neonatal outcome. Obstet Gynecol 68: 593-597
- Listeria, R.G. Mitchell (1996) Mackie & MacCartney Practical Medical Microbiology 14<sup>th</sup> Edition. Churchill Livingstone 1996: 309-315
- 5. Bruce G Gellin, Claire V Broome (1989) Listeriosis. JAMA 261: 1313-1320
- 6. H Hof (2004) An update on the medical management of listeriosis. Expert Opin Pharmacother 5: 1727-1735
- 7. Kalstone C (1991) Successful antepartum treatment of listeriosis. AM J OBSTET GYNECOL 164: 57-58
- 8. Boukhari, Abdulrahman Al Mazrou, Fahad Al Zamil, Ramzi Al Kilani (1999) L.monocytogenes bactermia and meningitis in a Saudiborn. Annals of Saudi Medicine 19L: 539-540
- Tang M Y, Cheong Y M, Zainuldin T (1994) Incidence of listeria spp. in Vegetables in Kuala Lumpur. Med J Malaysia 49: 217-222
- 10. McFadyen (1992) Carriage of Listeria spp. by pregnant women. The Eleventh International Symposium on Problems of Listeriosis.

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