



CASE REPORT

Case Report on the Successful Management of *Listeria monocytogenes* Infection in the Third Trimester of Pregnancy

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Abstract

Listeria monocytogenes (LM) is a motile Gram-positive facultative anaerobe, which is primarily transmitted to humans through consumption of contaminated food. Examples include ready-to-eat meals, dairy products like milk and soft cheeses, cold meats and vegetables. In pregnant women, illness caused by LM infection, listeriosis, may occur asymptotically or it may present with vague flu-like and/or gastrointestinal symptoms. Infection with LM has a higher incidence in expecting women due to the physiological suppression of cell-mediated immunity during pregnancy. Fetal infection by LM may have severe, adverse outcomes as it may lead to abortion, premature birth, sepsis, meningitis or even stillbirth. Accurate, timely diagnosis and treatment are crucial, as they allow for a better prognosis of new-borns. LM is best diagnosed through placental cultures, but it may also be diagnosed through maternal or neonatal blood, or cerebrospinal fluid (CSF) cultures. The gold-standard treatment of listeriosis consists of two weeks of intravenous (i.v.) amoxicillin (at least 6 g/day). Patient education regarding handling, preparation and storage of foods that may contain *Listeria* is essential for decreasing the rates of infection. We present here a case of Listeriosis occurring in the beginning of the third trimester of pregnancy (27 weeks) which necessitated a caesarean section (C-section) for *abruptio placentae*.

Introduction

Listeria monocytogenes (LM) is a Gram-positive facultative anaerobic, motile, intracellular bacterium that has been recognised as a human pathogen for more than 60 years [1-3]. There are seven major serological subtypes of *Listeria*, although the majority of human infections belong to serotype 4B [4]. Furthermore, this serological species of LM has a higher propensity to

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infect pregnant women with significant adverse effects on the fetus [5]. *L. monocytogenes* is more prevalent during the summer months, and is primarily transmitted to humans orally through uncooked and ready-to-eat foods, raw (unpasteurised) dairy products including milk and soft cheeses, cold meats and vegetables [6,7]. Indeed, food-borne illness accounts for around 99% of all cases; however, there is most likely a reservoir of LM in the gastrointestinal tract of humans, giving rise to a potential for faecal dispersion of LM from persons with Listeriosis [8]. Immunocompromised individuals and pregnant females are at an increased susceptibility to LM, the latter having a 17-fold higher risk than among the general population [9-12]. It is thought that this occurs secondary to hormonal changes, particularly increased progesterone, that suppress the T-cell-mediated immune response to infection during pregnancy [13,14]. According to the European centre for diseases prevention and control (ECDC), the incidence rate of LM in Europe is 0.6 cases per 100,000 [15]. The stringent requirements in food production, better education of expecting women and avoidance of the aforementioned foods during pregnancy have contributed to its decline in highly industrialised nations [16].

Pregnant females suffering from LM infection may exhibit mild, vague, or flu-like symptoms including



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headache, fever, myalgia or other gastrointestinal-related symptomatology [17]. The facultative anaerobe has a propensity to infect the maternal-fetoplacental unit. This may have detrimental consequences on the fetus, as it traverses through the placenta causing spontaneous abortion, premature birth, sepsis, pneumonia, neonatal meningitis or death [1]. Although the incidence of listeriosis is reportedly low, it is still considered as a pertinent public health issue owing to its serious health consequences with hospitalisation and mortality rates hovering around 20-50% [18]. Therefore, imminent diagnosis, management and treatment is vital so as to prevent such adverse repercussions [19].

Case Report - Clinical Series

A 22-year-old Maltese woman, *gravid* 2, *para* 1, was admitted into the third trimester at 27+2/7 weeks gestation in view of suprapubic pain; frequent, regular and strong contractions; and minimal vaginal bleeding. She was also complaining of urinary urgency and frequency, but not dysuria. The patient was otherwise asymptomatic and denied any fever, chills, rigors, nausea, vomiting or diarrhoea. Up till then, the course of the pregnancy had been normal and the mother had an unremarkable past medical and surgical history. She was also on no regular medications and suffered from no allergies. The patient had had a lower uterine segment caesarean section (LSCS) two years previously in view of breech presentation.

At admission, the mother was alert, vital parameters were all within normal, and her general physical condition was satisfactory. Symphysio-fundal height (SFH) corresponded to 23-24 weeks gestation, lie was longitudinal and presentation was cephalic. Tightenings were palpable and there was no scar tenderness. On gynaecological examination, the uterus was tense, tender and irritable. On speculum examination, no bleeding or liquor was seen. However, minimal white discharge was noted, and a high vaginal swab was taken which, however, did not later cultivate any bacteria.

On admission, white blood cell (WBC) count was of $9.26 \times 10^9/L$ (4.5 to $11.0 \times 10^9/L$), Neutrophils $6.66 \times 10^9/L$ (2.0 - $8.0 \times 10^9/L$), Haemoglobin (Hb) of 10.4 g/dL (12.1 to 15.1 g/dL) and C-reactive protein (CRP) was significantly elevated at 61 mg/L (< 3 mg/L). Basic biochemistry results (e.g. renal and liver function tests) were within normal limits. Urinalysis revealed a strong presence of blood (+++) and ketones were detected (+), but nitrites and leucocytes were absent. A urine mid-stream specimen (MSU) was sent for culture, but again no bacteria were cultivated. Parameters remained stable throughout and renal punch was negative on both sides. Despite this, given the aforementioned clinical picture, she was promptly and empirically administered cefuroxime 750 mg three times daily (tds) intravenously (*i.v.*) and gentamicin 320 mg daily *i.v.* for a potential urinary tract infection.

Of note, a sub-amniotic haemorrhage measuring $4.1 \times 1.3 \times 6$ cm was reported on ultrasound (U/S) and this may have caused the presence of blood on urinalysis. The U/S on the previous day had revealed fetal growth compatible with 27 weeks gestation. Cardiotocography (CTG) gave a fetal heart rate of 160 bpm, which later rose to 190 - 210 bpm, variability was > 5 , but no decelerations were evident. In view of the sub-amniotic haemorrhage and fetal distress, it was decided to deliver the baby via an emergency caesarean section (C-Section). Two days prior, the patient was administered two dexamethasone injections to help with fetal lung maturation and improve neonatal survival, as well as four doses of nifedipine 10 mg every fifteen minutes to decrease the frequency and intensity of contractions. She was also administered 1 litre Hartmann's solution *i.v.* and a 4 g *i.v.* loading dose of magnesium sulphate for neuroprotection, and kept on a maintenance dose of 1 g hourly. After obtaining consent, the mother was operated for an emergency C-section and delivered a preterm male infant, weighing 0.94 kg with an Apgar score of $8/9$. The new-born was intubated immediately and surfactant was given. The liquor was meconium-stained. The placenta and retroplacental clot were sent for histology, and a swab from the placental bed was also sent for culture. The patient remained well and the cefuroxime and gentamicin antibiotics were stopped two days post-operatively. She was discharged home well, 48 hours after delivery on co-amoxiclav (Augmentin®) 1 g twice daily (bd) for 7 days.

Four days after delivery, *Listeria monocytogenes* was cultivated on the placental culture. In view of the diagnosis of listeriosis, she was admitted again to the obstetrics ward. The mother denied any intake of high-risk foods, and she also stated that she could not recall any sick close contacts. A complete blood count (CBC), CRP, renal profile (RP), blood cultures and cross-match were taken post-delivery. CBC and RP were normal, but CRP was still high at 59.1 mg/L. Blood cultures did not cultivate any bacteria. Physical examination was normal, uterus was contracted, lochia was very minimal and the LSCS wound was healing well. In view of the known possible neurological complications of listeria infection, a full neurological examination was carried out, but this was also normal. The patient also denied any fever, chills or rigors post-operatively. The patient was given amoxicillin 2 g *i.v.* four hourly for two weeks, and remained well throughout her stay in hospital; parameters kept stable, physical examinations were normal and CRP was down-trending.

The patient made a full recovery, there were no complications, and she was discharged back home after the full 14 days of *i.v.* amoxicillin. Meanwhile, the baby remained admitted at the neonatal intensive care unit (NPICU) as he was born before dates, but eventually did well too.

Discussion

LM is a motile gram-positive bacillus that thrives in resilient conditions as it tolerates low temperatures, alkaline pHs and high saline concentrations allowing it to proliferate in sewage, manure, water, animal foods as well as contaminated refrigerated foods. In this case report, following a thorough history, including a travel, food and beverage consumption history, no particular food could be associated with the infection, and thus, the source of LM in this patient remains unknown.

The treatment of choice for LM infection is antibiotic therapy with ampicillin (minimum of 6 g/day), for 2 weeks if the patient is immunocompetent and longer courses if the patient is severely immunocompromised. Erythromycin may be used in patients who are allergic to penicillin. It should be considered that the concentration of an antibiotic decreases once it passes through the placenta, and thus the dosages need to be increased compared to standard therapy [20]. Our patient was treated with high-dose intravenous ampicillin (12 g/day), as she was not penicillin-allergic. This antibiotic was administered for a total of 2 weeks, and the patient remained well and asymptomatic.

Neonatal listeriosis has a high mortality rate, and age is the main prognostic indicator in the survival of newborns suffering from this infection [1]. In our case, the neonate was admitted at NPICU as he was born at 27+2/7 weeks gestation, but otherwise he remained well and suffered from no complications.

Conclusions

In conclusion, due to the potentially severe adverse outcomes associated with LM infection in pregnancy, including miscarriage, preterm birth, stillbirth and congenital neonatal infections, it is crucial for medical professionals to be more alert for, and familiar with the condition [21]. In particular, it is crucial for the placenta to be carefully examined and sent to histology post-delivery in patients with a uterine infection of unknown cause. Furthermore, it should be kept in mind that listeriosis is not an uncommon disease, being commonly found in processed and prepared foods. Patient education is therefore important in decreasing the incidence of disease, e.g. by emphasising safe handling, preparation and storage of foods that may contain *Listeria*. At the same time, a greater suspicion, multi-disciplinary management and swift initiation of antibiotics in patients with suspected listeriosis will result in positive perinatal outcomes, as in our case report.

Conflict of Interest

The authors certify that there is no conflict of interest with any financial organization regarding the material discussed in the manuscript.

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Authors' Contributions

Caroline Vassallo and Yves Muscat Baron have given substantial contributions to the conception or the design of the manuscript, Caroline Vassallo and Yves Muscat Baron to acquisition, analysis and interpretation of the data. All authors have participated to drafting the manuscript, author A revised it critically. All authors read and approved the final version of the manuscript.

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