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Case Report

Neonatal brucellosis: A case report

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Abstract
Although brucellosis is not uncommon in Saudi Arabia, neonatal brucellosis has been infrequently reported. In this case of neonatal brucellosis, *Brucella abortus* was isolated by blood culture from both the mother and the neonate. Serology was positive only in the mother.

Key words: prenatal transmission; neonatal brucellosis; Saudi Arabia

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Introduction

Brucellosis a zoonotic disease contracted by contact with animals, consumption of animal products, or inhalation of contaminated dust particles [1]. Although human-to-human transmission is rare, vertical transmission from mother to baby during pregnancy has been reported [2]. Other modes of human-to-human transmission of brucellosis include blood transfusion [1,3], transplantation [4], and breastfeeding [5].

The disease is mainly encountered in the Mediterranean area and the adjoining countries [6]. Although brucellosis is common in the Kingdom of Saudi Arabia, neonatal brucellosis has not been reported [7-9]. This case report describes neonatal brucellosis in a preterm infant.

Case report

A 21-year-old asymptomatic primigravida woman underwent preterm premature rupture of the membranes (PPROM) at 22 weeks and 6 days of pregnancy and was admitted to the hospital. Investigations at the time of admission revealed white blood cell (WBC) count of 11.4 × 109/L with a raised C-reactive protein (CRP) level (21.1 mg/L). The patient was empirically treated with ampicillin (2 gm/IV/stat, followed by 1 gm/IV/Q 6 hours) and erythromycin (250 mg IV Q 6 hours) for 48 hours initially, followed by amoxicillin (500 mg/orally/Q 8 hours) and erythromycin (500 mg/orally/Q 8 hours), both for 5 days. In addition, 2 doses of dexamethasone (12 mg/IM/12 hours apart) were also administered at the time of admission. Antenatal ultrasonography at 25 weeks of gestation revealed anhydramnios with normal fetus and placenta. One week prior to delivery, the maternal WBC count increased to 17.3 × 109/L with elevated serum CRP level of 35.2 mg/L. The mother delivered a female neonate at 25 weeks and 6 days of gestation by spontaneous vaginal delivery. At birth, the baby was intubated, with APGAR score of 8 at 1 minute and 9 at 5 minutes; 4 mL/kg surfactant was administered via endotracheal tube prior to transfer to the neonatal intensive care unit (NICU), and mechanical ventilation was initiated.

Growth parameters at birth were weight 980 g, head circumference 24 cm, and length 35 cm. During the first hour of life, the newborn's temperature was 36.2°C with a heart rate of 165 beats per minute. Chest radiograph revealed severe hyaline membrane disease

(Figure 1). The baby had low oxygen saturation and was shifted to high-frequency ventilation. She was hypotensive, and her blood pressure was maintained by inotropes. Two doses of surfactant (4 mL/kg via endotracheal tube) were administered on first day at six hourly intervals. Fraction of inspired oxygen (FiO_2) requirement decreased after surfactant therapy, and X-ray showed clear lung fields (Figure 2). After obtaining specimens for blood culture, empirical treatment with ampicillin and amikacin was commenced in keeping with the sepsis protocol of the unit. Peripheral blood examination of the neonate at this juncture revealed a remarkably high WBC count of 40.5 × 10^9/L, comprising 56% neutrophils.

Initial blood culture reported Gram-negative coccobacilli on day 5, and meropenem was added to the antimicrobial therapy. On day 6, *Brucella abortus* was identified, and specific antimicrobial therapy comprising rifampicin and trimethoprim/sulfamethoxazole was commenced for 8 weeks. Following the detection of *Brucella abortus* in the baby, mother's blood culture also yielded *Brucella abortus* along with positive serology for both *B. abortus* and *B. melitensis*, with titers of 1:320 each. In retrospect, the mother admitted experiencing mild fever in the evenings, sweating, and malaise around 20–23 weeks of gestation. She also revealed frequent visits to the family farm that raised cattle, horses, and camels. There was no history of consumption of unpasteurized milk. The mother was treated with rifampicin and trimethoprim/sulfamethoxazole, and eventually her symptoms subsided.

The general condition of the baby improved gradually, and she was extubated to nasal intermittent mandatory ventilation (IMV) on day 10. The follow-up blood, cerebrospinal fluid, and tracheal aspirate cultures were negative for *Brucella* species. Head ultrasound was normal and indomethacin was introduced as a prophylactic measure for intraventricular hemorrhage.

On day 19 of life, the baby's blood gases revealed CO_2 retention, and she was re-intubated. On day 31 of life, she was put on high-frequency ventilation because of low oxygenation. Chest X-ray revealed diffuse opacities all over lung fields with chronic lung changes (Figure 3). Culture of tracheal aspirate yielded *Klebsiella pneumoniae*, and she was treated for ventilator-associated pneumonia. On day 60, the baby was finally extubated. On day 93 of life, the baby had

Figure 1. X-Ray anterior posterior (AP) view showing hyaline membrane disease at admission (ground glass appearance with air bronchogram).

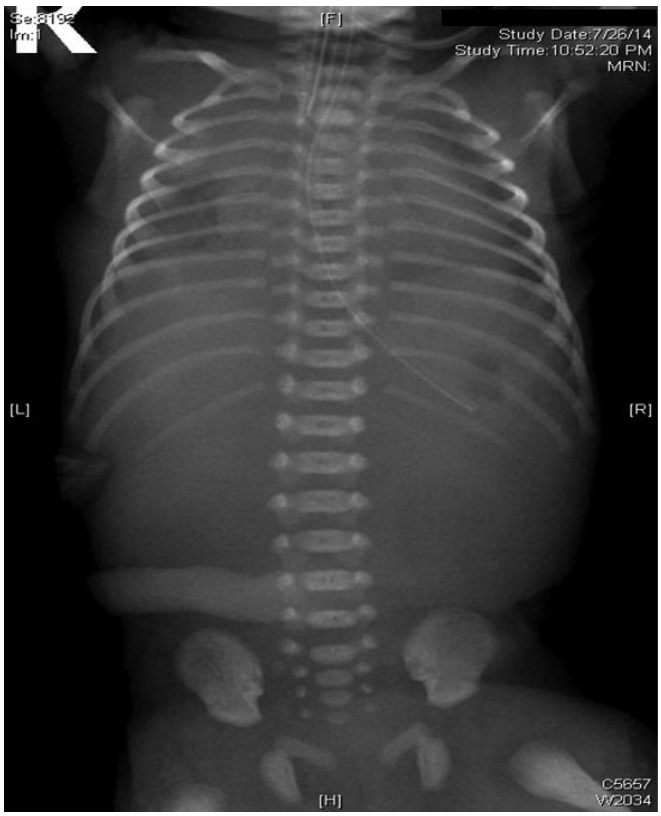
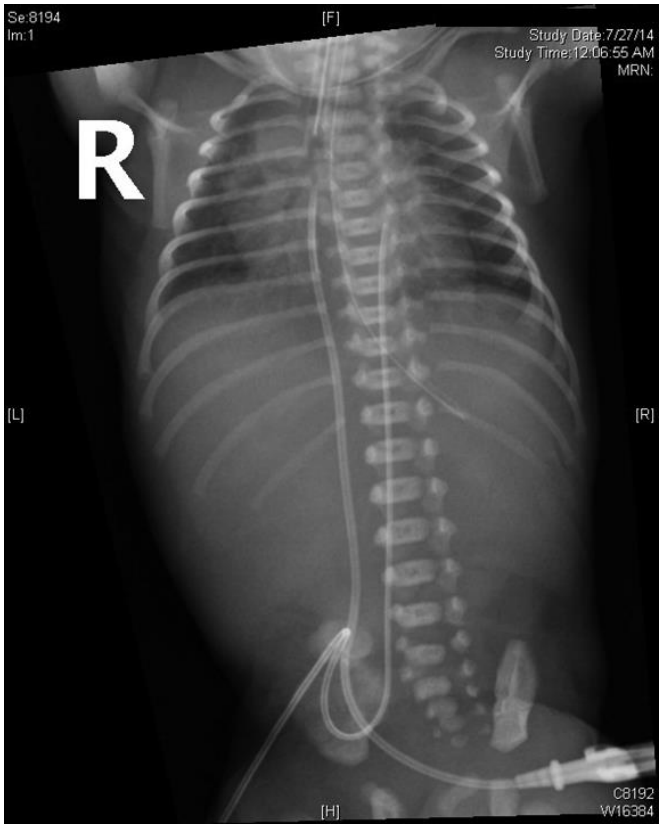


Figure 2. X-Ray AP view after giving surfactant showing clear lung fields.



FiO_2 of 30% on continuous positive airway pressure, weighing 2.33 kg, with head circumference of 31 cm, length of 43 cm, and was tolerating feeds via orogastric tube.

The baby remained on bubble continuous positive airway pressure for a total of 186 days. She was feeding well and gaining weight; respiratory support was withdrawn completely on day 187, as she was saturating well in room air. At discharge on day 203, she was active, attained social smiling and neck holding, and there was no retinopathy of prematurity at 38 weeks of corrected gestational age. She was vaccinated and discharged home weighing 4.81 kg, with head circumference of 38 cm and length of 57 cm.

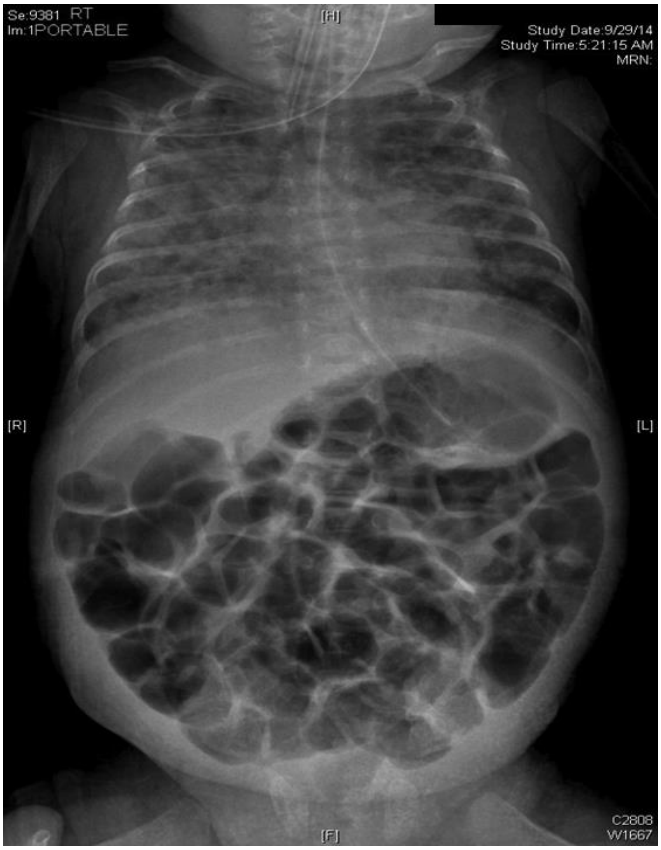
Discussion

A limited number of cases of neonatal brucellosis have been reported in the literature, and modes of transmission remain obscure. Neonatal brucellosis in the present case report was caused by *Brucella abortus* as opposed to the previously reported several cases of neonatal brucellosis caused by *Brucella melitensis* [2,6, 10-12] known to cause more aggressive disease [6]. The history of the mother's frequent visits to the farm and exposure to domestic animals such as cattle, a preferential host for *Brucella abortus*, appears to be a possible source of infection.

Neonatal brucellosis is an example of human-to-human transmission, and little is known about the modes of transmission. Transplacental transmission of *Brucella* infection has frequently been reported in animals [13], and rarely in humans [14]. There are reports of brucellosis transmitted to neonates through breast milk [15] and blood transfusions [8]. These modes of transmission of brucellosis were unlikely in this case, as the neonate was not breastfed and did not receive any blood transfusion. It is possible that the neonate contracted infection at the time of delivery by exposure to the mother's blood or secretions [10]. Furthermore, intrauterine infection of the fetus appears unlikely because of the negative *Brucella* serology in the newborn, as the transplacental passive transfer of *Brucella*-specific maternal IgG could have yielded a positive test in the neonate. Moreover, negative serology in the neonate could possibly be due to early detection of brucellosis and timely commencement of appropriate treatment, denying the neonate's immune responses sufficient time to produce a detectable amount of anti-*Brucella* antibodies.

Brucellosis during pregnancy in animals has been associated with abortions, premature rupture of membranes, and preterm birth, most likely due to the presence of erythritol, which is considered to be a growth stimulant for *Brucella* [16]. Erythritol is not present in the human placenta and could possibly be the underlying reason for low risk of miscarriage in humans, but there are reports contradicting the claim [17]. Untreated *Brucella* infection during pregnancy in humans has been implicated in complications such as premature rupture of membranes, preterm birth, chorioamnionitis, and intrauterine growth retardation, which can be avoided by timely therapeutic intervention [18]. Premature rupture of membranes of the mother in this case report could possibly be a manifestation of untreated *Brucella* infection.

Figure 3. X-Ray AP view on day 98 showing chronic lung disease changes.



A variety of drugs have been recommended for treatment of brucellosis. Empirical treatment with ampicillin of the mother prior to delivery was not only beneficial to the mother but also to the neonate, as ampicillin has been shown to be an effective treatment for premature newborns with brucellosis [19]. Moreover, treatment of the neonate after delivery and prior to isolation of *Brucella abortus* may have contributed significantly to the favorable outcome of the neonate. Treatment with trimethoprim/sulfamethoxazole and rifampin for a

minimum period of six weeks is considered to be safe for children younger than eight years of age. As an alternate, gentamicin for five days followed by rifampin is also an effective treatment for neonatal brucellosis [20]. Treatment of both mother and the neonate with rifampicin and trimethoprim/sulfamethoxazole effectively treated brucellosis without any complications. Combination of rifampicin and trimethoprim sulfa for treatment of brucellosis with favorable outcome has also been reported previously [2-3,21].

Conclusions

Congenital brucellosis is a rare condition associated with significant morbidity and mortality. Clinical manifestations of neonatal brucellosis can vary, and in areas where brucellosis is endemic, it should be suspected after the exclusion of other microbial infections. Timely screening for brucellosis and therapeutic intervention is critical for achieving a favorable outcome.

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