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Case Report

Atypical form of early neonatal infection with *Salmonella enterica*: case report with literature review

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ABSTRACT

Salmonella are rarely responsible for neonatal or perinatal infection. An annual incidence of 75/100000 births are reported in the USA. The authors present a case of a newborn with neonatal salmonellosis in the context of maternal infection in the days preceding the birth, documented retrospectively. This is a case of a 38-week male infant born via spontaneous vaginal delivery. There was a premature rupture of the membranes (13 hours). The mother gave a history of fever and diarrhea of ten days prior to delivery. She had fever of 38.3°C during labor. Prophylactic antibiotic treatment with amoxicillin was established. Thirty-two hours after birth, the baby developed fever, lethargy, and was not accepting feeds. On admission, physical examination showed fever, tachycardia, correct blood pressure and isolated jaundice. The blood count found a leukopenia, a thrombocytopenia, a CRP at 35mg/l. Parenteral antibiotic therapy with cefotaxime and amikacin was started. Apyrexia is obtained after 48 hours of intravenous treatment. Stool culture of the newborn grew after 48 hours and for the mother after 3 days. The germ identified was *Salmonella enterica* Serovar 4,5,12:i:-. Blood cultures were performed on the mothers and the baby, but the cultures were negative. The baby responded and was discharged on the 15th day of delivery. The mother's condition was complicated by a Guillan Barré syndrome that required a transfer to neurology. Neonatal salmonellosis may have non-specific clinical symptoms. Management is based on early antibiotic therapy with a third-generation cephalosporin as first-line therapy. The measure in preventing the spread of infection in the neonatology is essential to avoid secondary cases.

Keywords: Antibiotics, Infections, Newborn, Salmonella, Stool and blood culture

INTRODUCTION

The maternal-fetal infections with bacteria of the genus Salmonella were described for the first time in 1930.[1] It is a rare infection. According to the Centers for Disease Control and Prevention, the annual incidence is 75/100000 a year in the United States.[2] Without appropriate antibiotic therapy, 60 to 80% of affected pregnancies are complicated by abortion, premature delivery. The risk of sepsis or even neonatal death is major.[3]

The authors present a case of a newborn with neonatal salmonellosis in the context of maternal infection in the days preceding the birth, documented retrospectively at the Intra Municipal Hospital Center CHIC Aleçon-Mamers.

CASE REPORT

We report a case of a 38-week male infant born via spontaneous vaginal delivery.

The mother was primiparous. The follow-up of her pregnancy was well done. She gave a history of fever and diarrhea of ten days prior to delivery. She had fever of 38.3°C during labor. Laboratory examination showed normal hemoglobin level, white blood count 12,610^9/l with a large amount of neutrophil, platelet count 291 10^9/1, CRP 15mg/l. Prophylactic antibiotic treatment with amoxicillin was established.

There was a premature rupture of the membranes (13 hours) and the amniotic fluid was clear. The new born had an Apgar score of 10 at 1 and 5 minutes. Thirty-two hours after birth, the baby developed fever, lethargy, and was not accepting feeds. He was transferred to the neonatal intensive care unit. On admission, the new born was lethargy with fever of 38.5°C. The respiratory rate was 81/mn without respiratory distress and good oxygen saturation in ambient air. There was a tachycardia 115/mn but the blood pressure was 74/29mmHg. Physical examination showed isolated jaundice. Blood test showed hemoglobin rate 22g/dl, there was leukopenia (6,64 10^9/l), platelet count was 210 10^9/l and the C-reactive protein (CRP) was positive. Serum bilirubin was 136µmol/l with unconjugated bilirubin rate of 130µmol/l. The bacteriology of gastric fluid is was negative in direct and in culture. Stool culture of the baby grew after 48 hours and for the mother after 3 days. The germ identified was *Salmonella enterica* Serovar 4,5,12:i:-. The result was verified by the National Center of Infectious Diseases. Blood cultures were performed on the mothers and the baby, but the cultures were negative.

Therapy with intravenous was initiated at 43 hours with Cefotaxim at 100mg per kilogram per day, divided into 2 injections and maintained for 10 days with Amikacin for 48 hours. Apyrexia was obtained after 48 hours of intravenous treatment.

The biological test at 67 hours, showed a blood count of 3.73 10^9/l with lymphopenia at 1.56 10^9/l and thrombocytopenia at 87 10^9/l. The CRP was 75mg/l and then normalized. The stool culture was negative at 9th days. The blood cultures remained negative in the child and his mother.

The baby responded and was discharged on the 15th day of delivery. The mother's condition was complicated by a Guillan Barré Syndrome that required a transfer to neurology.

DISCUSSION

Salmonelle enterica subsp. enterica, serovar 4,5,12:i is one of the ten most incriminated strains in human infections in North America, South America, Europe and Asia since the 1990s.[4] Few data of this neonatal infection was reported. The majority of cases observed was due to *S. typhi*.[5] Other cases attributed to non-typhi Salmonella were reported, many were resistant to antibiotics and responsible for nosocomial infection.[6,7] We propose, through our atypical case, to review the symptomatology of neonatal salmonellosis and literature review.

There are three major mechanisms that Salmonelle can affect pregnancy outcome. First, the vertical transmission of Salmonella from infected mothers with chorioamnionitis to their children through the placenta.[8] According to Watson, transmission occurs during the delivery, the fetus will contaminate by exposure to maternal blood and secretions at the birth canal.[9] The fetus can become infected by aspirating the microorganisms to the lungs or by swallowing them. So, the germ can be find in gastric fluid, placenta and or blood.[10] Second, hand-carried by the mother herself, the nursing team or by the contaminated water used in case of lack of hygiene. The third mode is contaminated milk from a sick or asymptomatic mother breastfeeding her child or giving milk to a lactarium.

Cooke FJ listed 5 published cases in the literature in which *S. typhimurium*, *S. agona*, *S. kottbus*, *S. virchow*, *S. senftemberg*, *S. typhimurium* DT104 Panama, were isolated in milk respectively of a woman symptomatic of gastroenteritis, of mastitis, of a symptomless carrier with possibility of contamination by the dirty hands or a bad condition of storage of the milk.[11-14] Several observations of nosocomial Salmonella infection are reported in the literature. In 2013, Lee MB et al, reviewed the papers on the subject between 1995 and 2011 and 3 serovar were distinguished including *S. enteritidis, S. typhimurium* and *S. Worthington.*[15]

The incubation is 48 hours to seven days.[5,10] The signs in our patient were no specific. All bacterial, viral, neonatal infections may result in refusal of suckling, irritability, hypotonia, jaundice, hypo-or hyperthermia, abdominal distention, respiratory distress.[5] There are, however, some signs: diarrhea and maternal fever before delivery, eating contaminated food, and a trip to countries with endemic typhoid.[3,16,17] Diarrheal stool and rectorrhagia in an infectious context are often described.[10,18] The symptomatology can be severe from the outset with septic shock, rapid multi-visceral, life-threatening complication.[3] Several cases of meningitis have been published with severe motor and developmental sequelae.[5,11,17]

Biologically, leuko-neutropenia or lymphopenia with thrombocytopenia are very characteristic of Salmonella infection.[3,8] The inflammatory syndrome is often important. In severe septicemic forms the positivity of blood cultures is the rule. In most cases, the stool culture isolates Salmonella.[10]

In our case, the contamination of the fetus during the passage of the genital canal during childbirth was strongly evoked in front of the prolonged rupture of the membranes, the rapidity of installation of the signs from the birth, fever, refusal to drink, jaundice and the negativity of the gastric fluid. The absence of other cases

in maternity and neonatology made a nosocomial origin unlikely and confirmed mother-to-child transmission. From a biological point of view, leuco-lymphopenia with thrombocytopenia was demonstrated at the 67th hours of life in our patient. Roll C reported the same signs in their publications. The CRP rate has risen steadily and its normalization has lagged behind clinical improvement.[3,8]

Only the stool culture was positive for our patient. In the literature, the symptomatology of the forms diagnosed only by stool culture seems less serious compared to those with a positive blood culture especially in premature infants. Indeed, among the 5 patients observed by Mohanty et al, 3 out of 5 newborns were premature between 28 and 32 weeks, the diagnosis was made with signs of severe sepsis and all had positive blood cultures.[5] These cases required intensive care management. In 2014 Vilca LM et al, reported a nosocomial infection with *S. enterica* serovar in a neonatology department in Spain involving four newborns, two of them were premature babies.[19] Bacteriological diagnosis was made by stool cultures. Signs were less severe and outcomes are favorable under antibiotic therapy.

Antibiotic therapy and the implementation of preventive isolation are the basis of care. The first-line molecule currently used is a third-generation IV cephalosporin. Multi-resistant forms required carbapenem treatment.[20] Antibiotic therapy should begin without waiting for the result of the paraclinical explorations. The molecules used differ according to the authors. In India, Mohanty and al used ampicillin as a first-line agent and then adjust the treatment according to susceptibility testing.[5] In Europe is in the United States, the treatment of choice is a third-generation IV cephalosporin. This choice is dictated by the ampicillin resistance of the germ.[17,18] Treatment is always done intravenously. The duration is on average ten days, but can go up to twenty-one days in case of meningitis or sepsis.[18,19] From 2002 to 2011, Wain J and al. reveal in their study that in endemic countries, particularly India, Russia and some Asian and African countries, the emergence of multi-resistant *Salmonella typhi* including ciprofloxacin was ranging from 2 to 100%.[18] Given a documented neonatal infection, especially in neonatology, the etiological investigation can trace back to the origin of the contamination. In our case it was negative. Foodborne contamination is most often found Nosocomial infections are handborne.[6,19]

The introduction of measure in preventing the spread of infection is essential. It consists on the isolation of individuals and groups who may have been exposed to the infectious disease, strengthening the usual measures of hand hygiene including both hand washing and hand disinfection, use of hydro-alcoholic solution. Disinfect surfaces and the environment. The bacteriological survey in collaboration with the health service and the microbiology laboratory, the treatment and monitoring of all carriers in the short and medium term can eradicate this contaminant.[6,19]

CONCLUSION

Salmonella enterica subsp. enterica, serovar 4,5,12: i was in our observation involved in a maternal-fetal infection with atypical clinical manifestations. This infection is a diagnostic and therapeutic emergency. The cornerstone of management is antibiotic therapy combined with preventive measures.

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