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Salmonella Enteritidis Septicaemia and Meningitis in an Extremely Preterm and Extremely Low Birthweight Infant

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ABSTRACT

While Salmonella typhi and paratyphi affecting both mother and infant are well documented Salmonella enteritidis infection from transplacental spread is exceedingly rare and often fatal. We report a case of intrauterine infection of a 25-weeks preterm and extremely low birthweight infant (610gm at birth) with Salmonella enteritidis born via spontaneous vaginal delivery to a mother with Hodgkin's lymphoma. Soon after birth the infant was diagnosed to have severe septicaemia, meningitis and later probable osteomyelitis. After prolonged intensive care and parenteral nutritional support, she recovered fully and was discharged after 5 months of hospital stay having attained sufficient weight.

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Case Report

A 29-year-old primigravida mother was diagnosed with Hodgkin's lymphoma and underwent chemotherapy, 2 years prior to current admission. She had preterm rupture of membranes 4 days prior to onset of labour. History of diarrhoea or travel was denied. Febrile and with generalized lymphadenopathy she was empirically treated with intravenous ampicillin. Full blood count revealed hemoglobin of 102g/L, total white cell count 12.4 x 10^9/L (98% neutrophils, without abnormal white blood cells) and platelet 248 x 109/L. Three days later Salmonella enteritidis was isolated from blood, urine and placental swabs. Stool cultures did not yield Salmonella enteritidis. The isolates were sensitive to amoxycillin/clavulanate, ampicillin, ceftriaxone, chloramphenicol, and ciprofloxacin. Ampicillin was replaced with ceftriaxone. A course of dexamethasone (12mg 12 hourly) was completed prior to delivery of the infant.

A baby girl weighing 610g was born normally at 25 weeks of gestation. With Apgar scores of 4/10 and 8/10 at 1 and 5 minutes respectively she was intubated and ventilated immediately. As the initial ventilator requirements were low (18/5cm of water, rate of 20/minute, FiO_2 of 30%) and features on chest radiograph disclosed mild respiratory distress syndrome no surfactant was given. At birth, she was found to be scleraemic, without signs of meningitis. Hepatosplenomegaly was noted.

Initial full blood count soon after birth revealed a white cell count of 10.7 x 10^9/L, platelet 31x109/L and C-reactive protein of 23 mg/dL. Intravenous penicillin and gentamycin were commenced. However, when S enteritidis was isolated from maternal samples penicillin was replaced with ceftriaxone on 2nd day of life. Cultures of infant's blood samples and tracheal aspirate grew Salmonella enteritidis which had an antibiogram similar to that of the isolates from mother, indicating intra-uterine transmission of the causative organism. Since the infant was very sick lumbar puncture was deferred to the second day of life. The biochemical and cytological features of the cerebrospinal fluid (CSF) were consistent with those of meningitis: glucose of 0.1mmol/L, protein 2.4g/L and leucocyte 432/µL, predominantly polymorphs. No micro-organism was grown on culture.

Ultrasonography of the brain on day three of life demonstrated grade 3 intraventricular haemorrhage and mild ventriculomegaly. This gradually resolved with return of the ventricular size to normal. On the 12th day of life a bedside echocardiography demonstrated a patent ductus arteriosus measuring 1.5cm. This resolved spontaneously with fluid restriction and frusemide. On 14th day of life, she developed swelling of the right leg – below the knee, probably due to osteomyelitis although the long bones appeared on a plain radiograph. Her lower limb swelling resolved 14 days later. The possibility of osteomyelitis extended the use of ceftriaxone which was discontinued when the swelling of the lower limb subsided.

Nutritional support was provided parenterally (TPN) through a percutaneously inserted central venous catheter via the left superficial temporal vein from day three of life. Full enteral feeding was finally established after 60 days of life. Mild conjugated hyperbilirubinaemia noted from 35th days of life resolved progressively after cessation of parenteral nutrition. The hepatobiliary tract appeared normal on ultrasonography. It is noteworthy that biochemical evidence of metabolic bone disease (elevated serum alkaline phosphatase levels) improved with oral vitamin D supplement. She was successfully extubated at 59th

day of life and weaned off supplemental oxygen on 78th day of life. Serial measurements of the occipito-frontal circumference and the ventricular widths (ultrasonography) demonstrated that these parameters were increasing normally. After 5 months of hospitalization, weighing 3 kg, she was discharged well from the hospital.

Discussion

Early onset neonatal sepsis is predominantly caused by group B Streptococcus, Escherichia coli, Listeria monocytogenes, Haemophilus influenzae, Enterococcus species, Staphylococcus aureus, and Klebsiella pneumoniae [1]. Neonatal salmonella infection is rare the majority are caused by Salmonella typhi while infection caused by Salmonella paratyphi is very infrequent [2]. Furthermore, Salmonella enteritidis infection in this group of patients is even more scarce and often results in fatality [3, 4].

Salmonella infection not only can be transmitted to neonates through vertical or intrauterine transmission from the mother but also from exogenous sources [5]. Vertical transmission of salmonella during the second trimester of pregnancy can lead to spontaneous abortions. Over the years increasing incidence of salmonellosis among adults had been reported - majority was due to Salmonella enteritidis PT4 - through increased consumption of contaminated eggs and poultry meat. Suspecting salmonella infections in pregnant mothers remains a challenge. Scialli et al[6] recommended that pregnant women presenting with diarrhoeal illness be screened for salmonella infection. A history of consuming contaminated food, having immunodeficiency state or hemoglobinopathy help to identify mothers at risk for Salmonella sepsis [7]. In the present case Hodgkin's lymphoma was a predisposing factor to infection. Thus, expectant mothers with risk factors warrant investigation for salmonella infection.

The presentations of salmonella bacteremia in infants and neonates vary: often anorexic, floppy and irritable with pyrexia, jaundice, dehydration, respiratory distress and diarrhoea, while others present with hypothermia, abdominal distension, seizures and cough [5]. Other manifestations include meningitis and brain abscess, neonatal cholecystitis and osteomyelitis. This particular case presented with severe sepsis with scleraema neonatorum, and meningitis immediately after birth indicating intra-uterine transmission of pathogenic organism, further supported by isolation of same micro-organism with same antibiogram from mother and infants Salmonella cholecystitis in a neonat [8,9].

Table 1 summarizes the presentation of three cases of neonatal S. enteritidis infection in the English literature. It is noteworthy that most of them presented with septicaemia and gastrointestinal symptoms. The prognosis is poor for transplacental Salmonella enteritidis sepsis in the neonates. It is believed that the current case is the only extremely preterm and extremely low birth weight infant who survived severe Salmonella enteritidis infection against all odds. This case further highlights the need to consider Salmonella enteritidis in an immunocompromised expectant mother and to initiate early appropriate antibiotics treatment.

Table 1: Reported cases of vertical transmission of neonatal S. enteritidis infection

Author	Patient profile	Weight	Symptoms and signs	Antenatal history	Outcome
Wessalowski et al, 1993[8]	Term	3200g	Fever, diarrhoea, septicaemia, seizures	Gastroenteritis	Multiple brain abscesses, alive
Roll et al, 1996[4]	Preterm 29 weeks	1450g	Septicaemia	Gastroenteritis	Death within 4 hours after birth
Pumberger et al, 2000[3]	Term	2840g	Abdominal distension, high gastric residuals, bilious vomiting, bloody diarrhoea	Gastroenteritis	Death within 24 hours after birth
Current report	Preterm 25 weeks	610g	Septicaemia, meningitis, probable osteomyelitis	Hodgkin's lymphoma	Alive

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