Abstract

Invasion of the central nervous system is a severe and frequently fatal event during the course of many infectious diseases and those who survive are often left with permanent neurological dysfunction. Non typhoidal Salmonella commonly cause invasive bacterial infections in children associated with high mortality. A 20 day old female child was admitted to neonatal intensive care unit with the symptoms suggestive of septicemia and meningitis. Blood and CSF samples were submitted for biochemical and microbial analysis. Salmonella enterica serotype typhimurium was isolated from both blood and CSF of the neonate. The child recovered well with Ceftriaxone and Amikacin and discharged after 3 weeks with mild hydrocephalus.

Keywords:-Nontyphoidal salmonella, Salmonella typhimurium, Neonatal meningitis.

Introduction:
Salmonellosis constitutes an important public health problem throughout the world. Nontyphoidal salmonellae represent principal pathogens implicated in foodborne gastroenteritis worldwide. Invasive complications like septicemia, bacteremia and meningitis are more common in infants, elderly and immunocompromised patients [1]. Salmonella infections in the newborn, infants and paediatric age group carry special significance as they are associated with high morbidity and mortality[2]. Salmonella spp. are frequently isolated from the cerebrospinal fluid (CSF) of infants 2 months to 2 years of age. The common Salmonella isolates associated with meningitis in the United States and elsewhere are Salmonella enterica subsp. enterica serovar Typhimurium (conventionally designated as Salmonella Typhimurium or Salmonella typhimurium) followed by Salmonella enterica subsp. enterica ser. Heidelberg, Salmonella enterica subsp. enterica ser. Enteritidis, Salmonella enterica subsp. enterica ser. Typhi and others[3]. Approximately 0.1 to 0.9% of the CNS infections are due to nontyphoidal salmonellae [4].

Case Notes:
A 20-day old female baby weighing 3.8kg was admitted at Neonatal Intensive Care Unit of Gandhi Hospital, Secunderabad with 2-day history of fever, vomiting, dull activity and refusal of feeds. There was no history of seizures. The baby was born by normal hospital delivery at full term with no complications. There was no recent history of diarrhea or fever in close contacts.

Examination and investigations:
The baby was febrile and in a mild tonic position. Pulse rate and respiratory rate were 150/min and 52/min respectively. The baby was empirically started on intravenous antibiotics, ceftriaxone and Amikacin. Samples of Blood and CSF were collected for various investigations. 0.5 ml Cerebrospinal fluid (CSF) specimen and approximately 1ml each of three blood specimens collected in 10ml Brain heart infusion broth (BHI broth) bottles, under strict aseptic precautions on three consecutive days, one before initiation of treatment and two after initiation of treatment were submitted to microbiology lab. Simultaneously blood samples were also submitted to biochemistry and clinical pathology where the complete blood picture showed slight rise in Neutrophils, and normal blood sugar (90mg/dl) and blood urea (22mg/dl). C-reactive protein was raised to 96mg/lit. Serum sample was nonreactive for HIV and HBsAg. On gross examination, the CSF appeared light yellow in colour, microscopic analysis revealed 50 cells/cmm, of which 80% were polymorphs and 20% lymphocytes. Biochemical analysis of the CSF showed rise in proteins to 280mg% along with the presence of globulins and the CSF sugar was reduced to 40mg%. The CSF picture was strongly suggestive of pyogenic meningitis. Both the Blood samples and the CSF were processed in the microbiological laboratory for the possible etiological agents. Gram staining of the smear from centrifuged...
sediment of the CSF revealed presence of pus cells and short, slender Gram-negative bacilli. Sediment was inoculated on Blood agar, Chocolate agar and MacConkey agar plates. All the blood culture BHI bottles were initially incubated for overnight at 37°C, later everyday subcultures were made on to Blood agar, Chocolate agar and MacConkey agar on 3 consecutive days and all the plates were incubated at 37°C for 24 – 48 hours. Chocolate agar plate was incubated in Candle jar for isolation of fastidious bacteria. All the plates were observed for growth at 24 hours, if no growth observed, plates were further incubated. Growth was seen on the blood agar, chocolate agar and MacConkey agar plates inoculated with CSF and 1st set of blood culture (collected before treatment). Grey moist, small, circular, convex colonies were observed on Blood agar and Chocolate agar plates and non-lactose fermenting colonies were seen on MacConkey agar plates. The growth showed Gram negative bacilli. The bacilli are motile (hanging drop preparation). Further identification of the organism was made by biochemical tests using standard bacteriological techniques[5] in which both the isolates from CSF and Blood were oxidase negative, catalase positive, nitrites were reduced, methyl red positive, Voges-Proskauer Test negative, Lysine decarboxylase positive, TSI agar showed nonlactose fermenter with H2S production, citrate was utilized, urease negative and Indole negative. Based on these reactions both the isolates were identified as members of the family Enterobacteriaceae and the genus Salmonella. Slide agglutination with specific antisera performed to confirm and both the isolates were identified as Salmonella Typhimurium. The isolates were subjected to antibiotic susceptibility testing by the Kirby-Bauer disk diffusion method according to Clinical and Laboratory Standards Institute (CLSI) guidelines. Both the isolates were found to be sensitive to chloramphenicol, ciprofloxacin, amikacin, gentamicin, ceftriaxone and cefotaxime and resistant to ampicillin. The treatment with ceftriaxone and amikacin was continued and the baby was discharged after 3 weeks. The baby recovered well at the time of discharge.

Discussion:
Neonatal septicemia is the commonest cause of neonatal mortality. The incidence of sepsis in neonates is 30 per 1000 live births and contributes to about 19% of all deaths in neonates [6]. The late onset sepsis which occurs 72 hours after birth, usually presents as septicemia, pneumonia or meningitis. Various factors that predispose to an increased risk of nosocomial sepsis include low birth weight, prematurity, admission in intensive care unit, mechanical ventilation, invasive procedures, administration of parenteral fluids and use of stock solutions. Salmonella, after entering the blood stream, have a unique capability to metastasize and cause a suppurative infection in almost any organ, most commonly bones and meninges. Focal infections including brain abscess and empyema, have been reported in the literature. Salmonella Typhimurium meningitis differs considerably from other cases of pyogenic meningitis in children. The disease is characterized by a high incidence of complications, especially in neonates [6,7]. Salmonella infections in neonates are of particular importance in developing countries like India. Invasive complications like septicemia, bacteremia and meningitis are more common in infants. Approximately 50-75% of nontyphoidal salmonellae septicemias occur during the first 4-months of life [2] and about 0.1 to 0.9% of the CNS infections are due to nontyphoidal salmonellae[4]. The actual percentage may be even higher as the published studies are usually tertiary care based and no documented statistics are available from rural centres due to lack of facilities for complete identification and serotyping.

According to Rajkumar et al [8] Salmonella Typhimurium is the most common isolate causing salmonella septicemia. He also reported Salmonella Typhimurium from the CSF of four cases in his study, out of which 3 were below the age of 1-year. He also noted that the mortality was high in young children. Douglas et al (2004)[4] studied 144 cases of nontyphoidal salmonella bacteremia in children and observed the average age of 10.5 months and three cases developed meningitis (2.1%). The common complications observed in cases with salmonella meningitis are seizures and hydrocephalus. Up to 63 % of the survivors can have severe neurological sequelae[9]. In the present case, Salmonella Typhimurium was isolated both from the blood and cerebrospinal fluid of the baby. Exact source of infection could not be established in this case. Both the isolates showed similar antibiogram with sensitivity towards aminoglycosides and cephalosporins. The baby responded well to the intravenous therapy with ceftriaxone and amikacin. At the time of discharge, the general condition of the baby was good but for mild hydrocephalus.

Conclusion:
The most significant factor in reducing the mortality and in preventing the residual sequelae in cases of neonatal septicemia and bacterial meningitis is high index of suspicion coupled with prompt initiation of appropriate antibacterial therapy. It is also equally essential that the appropriate samples (blood and CSF) be collected before the initiation of therapy to enhance recovery of the microorganisms from the samples. A constant dialogue between the microbiologist and the clinician can greatly contribute in reducing the mortality and morbidity in cases of neonatal septicemias.

REFERENCES


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