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Dengue Salmonella Coinfection - A Case Report

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Abstract
Dengue is one of the most commonest viral infection that is present throughout the year with high rate of transmission during winter season due to increase in breeding of the transmission vector Aedes aegypti mosquito. It leads to various condtions like primary dengue fever, secondary dengue fever, thromocytopenia, hemorrhagic syndrome and shock syndrome .The bacterial diseases like Enteric fever, typhoid and paratyphoid fever is caused by the species Salmonella species. It is a gram negative bacilli belonging to Enterobacteriaceae, responsible for causing wide range of acute febrile illness in pediatric and adult patients. In South Asia, infectious diseases are associated with significant complications. typhoid, and dengue are the most common infectious diseases, and patients may be co-infected with these diseases, resulting in diagnostic and treatment dilemmas. In this study a we diagnose of case of Bacterial infection - Typhoid infection by utilizing a molecular technique (Truenat) in the patient with dengue infection(dengue co infection with Salmonella typhi).

Introduction

Undifferentiated febrile illness is the most common syndrome during monsoon season. In India, the incidence of Dengue, Typhoid and Malaria are quite common[1]. However, the co-infection of Dengue and Typhoid are sparsely reported. Here, we report a case of Acute febrile illness- (Concomitant Dengue & Typhoid) in a patient with persistent high- grade fever (> 7 Days), myalgia, headache and other constitutional symptoms. Typhoid is a food -borne disease caused by a gram negative motile bacterium belonging to the family Enterobacteriaceae, genus Salmonellae, species Salmonella typhi[2]. It causes range of infection like acute febrile illness responding to antibiotics. It can be complicated by various illness like sepsis, multi organ dysfunction, distant organ abscess like brain abscess and osteomyelitis[3]. Where as Dengue is a arthropod borne viral disease transmitted by the bite of infected female Aedes mosquito like Aedes aegypti and Aedes albopictus. It causes range of infections like primary dengue fever, secondary dengue fever, hemorrhagic syndrome and shock syndrome.

Case Report

A 16 years old male was admitted in our tertiary care hospital with history of persistent fever for more than 5 days associated with nausea, generalised myalgia, joint pain, headache for which he underwent symptomatic treatment elsewhere. Clinical examination of the patient showed the following findings - The patient was febrile (102 Degree C), Tachycardia present (PR 110 / minute), features of some dehydration was present. Blood pressure was oxygen saturation was within normal limit. Systemic examination showed splenomegaly and generalized rash. The patient was admitted upon the diagnosis of acute febrile illness. Initial Haematological evaluation revealed the following:

Total leukocyte count: TC-3300CU/mm,
Hemoglobin -13.9 gm/dl, PCV-40.9%,
Platelets-130,000/ml,
CRP-81.5mg/L,
SGOT – 109 U/L.

Renal function test results such as Serum urea, Serum creatinine, Serum uric acid and eGFR was with in normal biological limits.

Owing the the scenario of acute febrile illness, Blood culture was carried out following aseptic precaution using BD Bactec culture bottles (Automated Blood Culture). Serological investigations was carried out for Dengue NS1 Ag, Dengue IgM and Dengue IgG antibodies, Leptospira IgM Antibodies and Scrub typhus IgM using ELISA methodology. Owing the high grade continous fever, the patient was started on parenteral fluids, antipyretics and other supportive medications. The bottles were flagged positive after 12 hours of incubation and immediate gram staining revealed the presence of gram negative bacilli .The blood culture specimen were inoculated onto culture media like blood agar and MacConkey agar. The plates were incubated aerobically at 37 degree C for 18 hours and reviewed, which showed growth of non hemolytic grey colonies in blood agar and non lactose fermenting colonies in MacConkey agar.

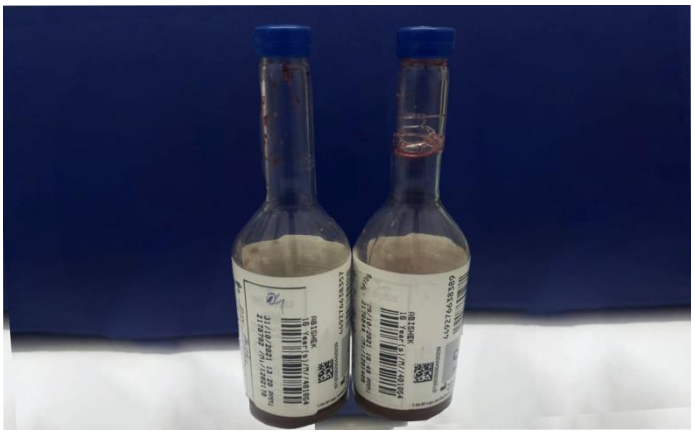

Image 1: BACTEC Automated culture bottles

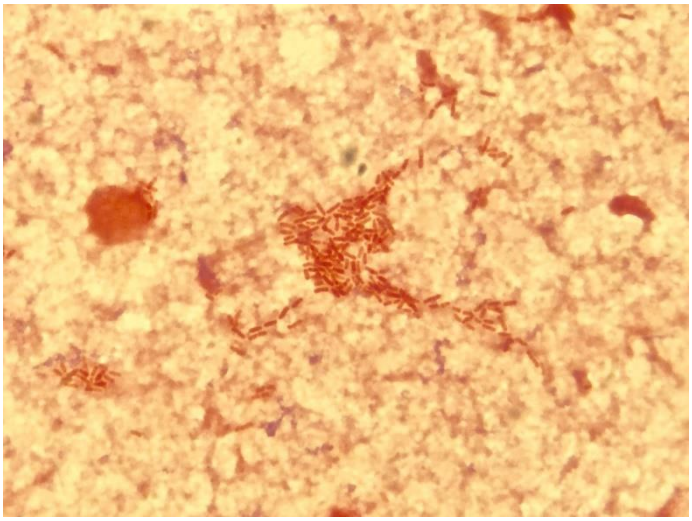

Image 2: Culture broth smear - Gram stain showing the presence of Gram negative bacilli.

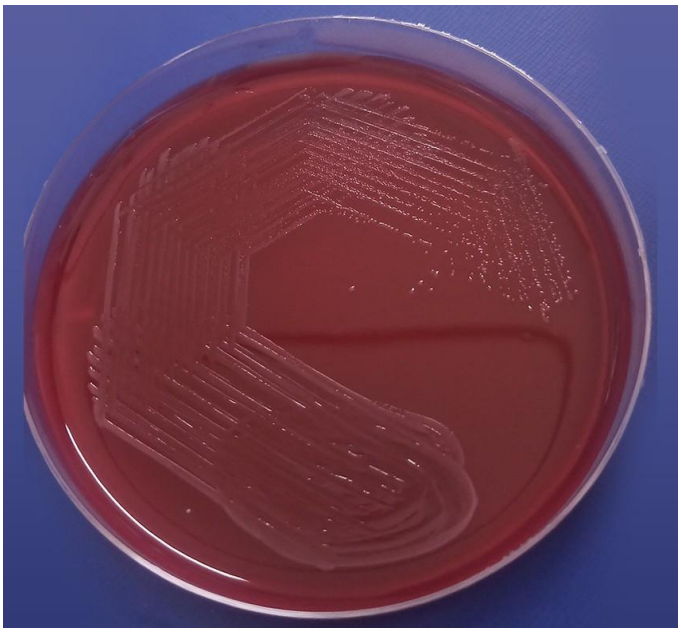

Image 3: Growth of non hemolytic grey colonies in Blood agar

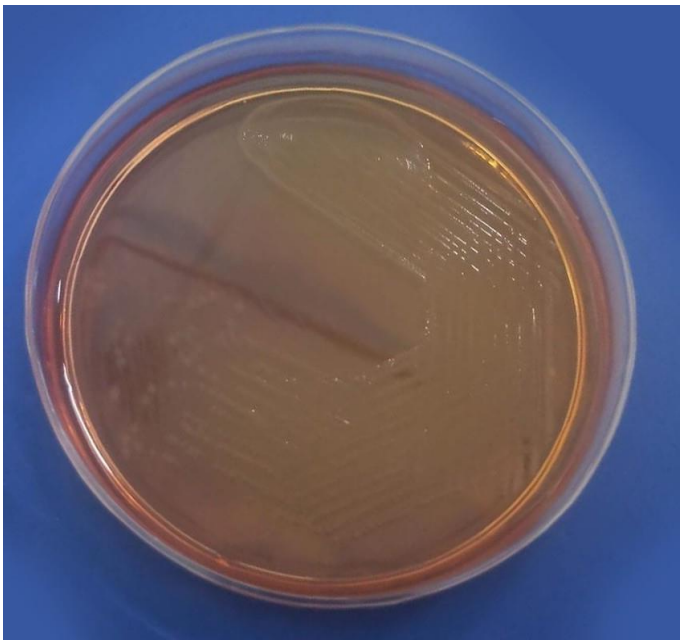

Image 4: Growth on MacConkey agar showing growth of non lactose fermenting colonies

The whole blood sample from the blood culture bottle were subjected to molecular assay- Truenat Salmonella – a chip based Real time PCR assay for rapid detection of Salmonella Spp -True lab Realtime Micro PCR workstation consisting of True prep Sample prep device, micro PCR analyser, micro PCR printer, micropipette and microtube stand. Truenat assay includes specimen collection (1ml of blood & empty into blood culture bottle & incubate @ 37°C for 5 hrs) followed by Nucleic acid extraction in True prep device and then analysis by micro PCR analyser by transferring the extract to the sample chamber of cartridge provided in the KIT. Entire procedure to be performed as per manufacturer's Kit instructions and safety precautions to be followed during the procedure. This assay detects the presence of Salmonella Spp. in blood in less than 9 hours (5 hrs incubation period + Run time 2 hrs max). The target sequence for this kit has been taken from 'pmp' gene encoding the plasmid maintenance protein. This sequence is highly conserved and specific for the species of S.Typhi & Paratyphi. Truenat Salmonella test was found to be positive in our case. Further, blood culture and sensitivity was carried out by routine biochemicals also identified the organism as Salmonella Typhi. Antibiotic susceptibility testing was carried out using conventional disk diffusion test using CLSI guidelines was reported as sensitive to Ampicillin, Ceftriaxone, Cotrimoxazole, Tetracycline, Azithromycin and Ciprofloxacin. Dengue Serology was found to be positive for IgM and IgG by ELISA method. Other tests done in Infectious panel were negative.

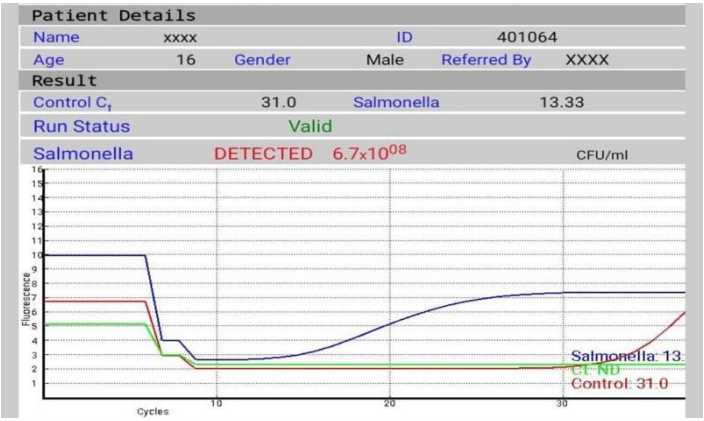

Image 5: Truenat test positive for Salmonella

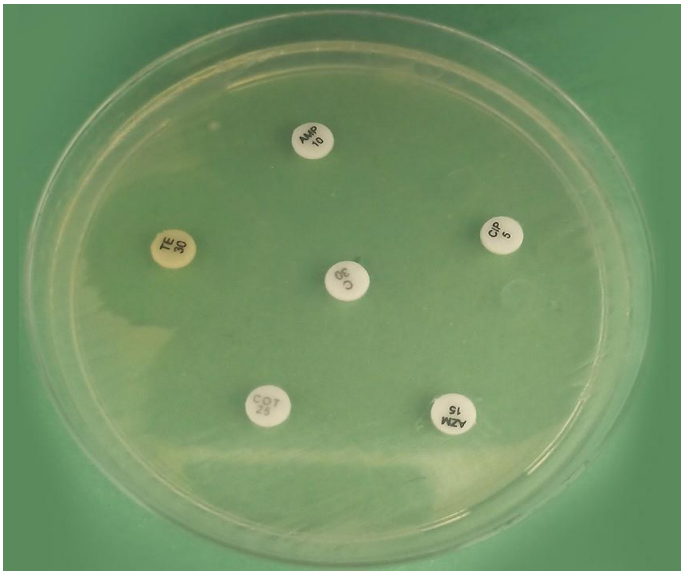

Image 6: Antibiotic susceptibility testing - Disk diffusion methodology following CLSI guidelines

Discussion

Dengue is the most common vector-borne disease transmitted by Aedes mosquito. It is common in tropics and subtropics. Typhoid is most common in urban and semi-urban areas. It is usually spread by contaminated food and water. Both these infections are notifiable in India and creates a major public

health problem. These infections are characterized by fever with myalgia and headache. Such concomitant infections can change the clinical spectrum of disease to more fulminant course and poses a great challenge to the clinicians. However, these dual infections are rarely reported and mostly under reported. Dengue comprises of classic dengue, Dengue Haemorrhagic fever and Dengue shock syndrome If not managed promptly with IV fluids & other supportive medications, it might lead to multi-organ failure and eventually death. The risk of contracting typhoid is more common in people who lack access to safe water and adequate sanitation. The most dangerous complication of typhoid is intestinal perforation and bleeding. This is a life-threatening complication which needs immediate attention. In this case study, Patient was spiking persistent temperature with dehydration. CBC revealed persistent thrombocytopenia and eosinopenia. Liver enzymes were increased. Patient was started on empirical antibiotics in 24 hours and deescalated later based on sensitivity report after 72 hours. Here, early detection of Salmonella spp. in blood sample was possible by True Nat assay. Although the blood culture is currently the gold standard, it is time consuming and takes atleast 3-5 days to release the final report. Truelab RT micro PCR technology is rapid, simple, robust and user friendly which allows same-day initiation of treatment. This fast and highly sensitive (LOD-1-2 CFU/ml) blood culture RT PCR method can be performed in resource limited settings which aids in early diagnosis. With proper antibiotic and supportive management, patient condition was improved and got discharged in a haemodynamically stable state.

Conclusion

Dual infection of Dengue and Typhoid results in overlapping symptoms which makes the treatment difficult. If these infections are not detected early and treated promptly, it might lead to dreadful complications like multi-organ failure. Accurate diagnosis of typhoid fever at an early stage is not only important for etiological diagnosis to initiate prompt treatment but also to identify & treat potential carriers and prevent further outbreaks. Utilization of molecular techniques like Truenat reduces the test turnaround time and fast pathogen detection. The more fast the microbial etiological diagnosis helps in appropriate antimicrobial approach, thereby reducing the chance of complications resulting in good prognosis of the patient.

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