Enteric fever still affects 17 million people per year worldwide. They are endemic in the Indian subcontinent, southeast and far East Asia, the Middle East, Africa, Central America and South America where the sanitary conditions are poor. In the United States the rate of enteric fever among patients with HIV is 60 times greater than those of the general population.

Based on DNA studies, all salmonellae are now considered a single species (S. choleraesuis), separated into 7 distinct subgroups. Multiple serotypes of Salmonella cause the syndrome of enteric fever, of which typhoid fever is the best studied and described. Caused by Salmonella typhi and occurring only in humans, typhoid fever is a severe multisystem illness and potentially fatal if untreated. Death may occur from overwhelming toxemia, myocarditis, intestinal hemorrhage, or perforation.

Toxic myocarditis is reported in 1-5% of patients of typhoid fever. A study done in the department of Medicine, KMC, Mangalore, India in a series of 100 bacteriologically or serologically proved enteric fever 7 cases were found with clinical evidence of myocarditis and 46 cases with ECG evidence of myocarditis. Those with systemic complications had the highest chance of having myocarditis (p<0.01). So, it is well established that, ECG must be recorded in all cases of enteric fever. Also those with ECG changes must be observed carefully for clinical evidence of myocarditis.

In September 2005, a 22 year old febrile man was admitted to the department of internal medicine, BIRDEM with the complaints of productive cough and exertional dyspnoea. He was febrile for last 10 days; fever was high grade intermittent in nature, associated with mild headache and myalgia. Highest temperature recorded was 105°F. For the last 5 days he developed cough, first mucoid then becoming productive along with progressive dyspnoea later on orthopnoea. He gave history of loose motions 2-3 times a day for the last 3 days but there was no vomiting. He was non-smoker, non asthmatic. He refused any recent travel abroad, or to the hill-tracts. He took a course of oral ciprofloxacin 500mg bid for 5 days.

On admission he was conscious, icteric and dyspnoeic. He felt better on propped up position. Respiratory rate was 33 breaths/min, pulse 100/min and blood pressure 100/60 mm of Hg. He was not cyanosed or anaemic and there was no digital clubbing or oedema.

Systemic examination revealed fine crepitations in mid and lower zone of both lung fields with vesicular breath sound. Right hypochondrium was mildly tender. Liver, spleen and lymph nodes were not palpable.

So our provisional diagnosis was atypical pneumonia. Viral hepatitis and leptospirosis was kept as differentials.

Address for Correspondence:
Dr. Kawkab Mahmud, Department of Internal Medicine, Ibrahim Medical College & BIRDEM
122 Kazi Nazrul Islam Avenue, Shahbag, Dhaka-1000
On routine investigations, complete blood count showed total count of WBC was at lower normal range with normal distribution and thrombocytopenia. (TC-4100, P/C-33000, DC-N=79%, L=15%, M=6%, E=1%). Liver enzymes were slightly raised. SGPT-68 U/L, SGOT-72 U/L and serum bilirubin 3.2 mg/dl. Blood urea and s. creatinine were normal. On the 10th day blood, urine and sputum samples were sent for culture along with blood for triple antigen and viral markers. Bedside urine examination was normal. ECG showed nonspecific ST change. There was bilateral patchy opacities on CxR in mid and lower zone.

From the above parameters leptospirosis was excluded as WBC count was not raised. Bilateral patchy shadows and raised liver enzymes pointed towards atypical pneumonia or viral hepatitis. Enteric fever then came to focus. As the patient had already taken a course of ciprofloxacin, IV ceftriaxone was started empirically. But on the 3rd day of admission, i.e. 13th day of the onset of fever, patient was still febrile, respiratory distress worsened. He also complained of palpitation. On examination there was undue tachycardia (142 b/min) and tachypnoea (34 breath/min). On auscultation fine basal crepitations were found on both lungs. Urgent chest X-ray showed cardiomegaly with evidence of pulmonary edema along with the previous radiological findings. Arterial blood gas analysis revealed Type I respiratory failure. (PO₂=55 mm of Hg, PCO₂=23 mm of Hg, SaO₂=76%, pH=7.45, HCO₃=20 mmol/L). Viral markers for hepatitis were negative.

All these clinical features suggested acute pulmonary oedema. Patient’s dyspnoea rapidly improved after administering IV frusemide. So the next plan was echocardiography and cardiac enzymes to prove our suspicions.

Then investigations supported the clinical suspicion. Echocardiography revealed global hypokinesia with ejection fraction only 37%. CPK-583u/l, CK-MB 70u/l, S. LDH-1510 u/l. Troponin-I was found normal. Diuretic was continued. On the 4th day patient was not dyspnoeic any more but fever still persisting with cough.

Finally the c/s reports were available which showed growth of Salmonella typhi in blood. No growth was found in stool and urine.

So we reached our final diagnosis-Enteric fever with myocarditis with acute left ventricular failure. Inj. Ceftriaxone was continued. Fever subsided after 16 days of onset. Patchy shadows disappeared in CxR and general condition of the patient improved.

**Discussion**

Myocarditis is used to describe simply as an inflammatory process with necrosis involving myocardium. According to Dallas criteria, the diagnosis of active myocarditis is defined as an inflammatory infiltrate of the myocardium with injury to the adjacent myocyte not typical for ischaemic damage associated with coronary artery disease. It usually forms part of a generalized infection, so far most commonly initiated by viral infection but can also be due to drugs, toxin, hypersensitivity reaction, collagen vascular disease and autoimmune reaction and less commonly with other infections like bacteria, rickettsia, spirochete, fungi, protozoa.

Clinically most often myocarditis is asymptomatic. Spectrum of clinical expression varies from mild local inflammation to fulminant congestive cardiac failure also including dizziness, syncope, palpitation caused by atrial and ventricular arrhythmia. In our case the patient presented with typical symptoms of left ventricular failure. He improved after empirical treatment with diuretics which prompted us towards further investigations which were clearly suggestive of myocarditis. Those included global hypokinesia in echocardiography, raised cardiac enzymes. His ECG was normal except sinus tachycardia.

ECG changes of myocarditis are often nonspecific usually appearing only in the first two weeks of illness. Commonest ECG abnormality was Q-Tc prolongation (29%) followed by ST-T changes (20%), bundle branch block (7%), first degree A-V Block and arrhythmia (2%). Other evidence for myocarditis include myocardial imaging, cardiac catheterization. Endomyocardial biopsy is considered the gold standard. But according to the ‘Myocarditis Treatment Trial’ it is no longer mandatory in the evaluation of unexplained heart failure.

This was a case of myocarditis due to enteric fever which was confirmed by blood culture sensitivity report. Usually diagnosis of enteric fever is suggested by assays that identify *Salmonella* antibodies, antigens, or DNA and is then confirmed by isolation of the organism. The most sensitive method of isolating *S. typhi* is obtaining a bone marrow aspirate (BMA).
culture, positive in 90% cases8. Blood, urine, and stool cultures are still frequently used but the yield is only about 70%8. Rectal swab and bile from duodenal string test can also be used8,9. The Widal reaction is indicative in only 40-60% of patients during admission10. Although not commercially available, DNA probes have been developed for identifying *S typhi* from bacterial culture isolates and directly from blood11.

Our patient improved with ceftriaxone, diuretics and bed rest. He did not respond to oral ciprofloxacin though this drug combines a lower documented resistance rate with excellent penetration into macrophages and the biliary system12. Since 1989, *S typhi* strains with simultaneous plasmid-mediated resistance to chloramphenicol, ampicillin, and co-trimoxazole have emerged and spread rapidly in the Indian subcontinent and parts of Southeast Asia13,19. Between 10% and 20% of patients treated with antibiotics have a relapse after initial recovery. Thus now the fluoroquinolones and the third-generation cephalosporins are the antibiotics of choice to treat these multidrug-resistant (MDR) strains, both in children and adults14-16. Furazolidone and Azithromycin are also used to treat typhoid in children in some parts of the developing world17,18.

Case fatality rates of 10-50% have been reported from endemic countries when diagnosis is delayed or in cases of severe typhoid fever not treated with high-dose corticosteroid therapy and antibiotics20. The two most common complications of enteric fever are intestinal hemorrhage and perforation21. Among other complications, pancreatitis and simultaneous acute renal failure and hepatitis, cholangitis, meningism, encephalomyelitis, subclinical disseminated intravascular coagulation, osteomyelitis, arthritis have been reported22-26. Early antibiotic therapy has reduced the rate of these systemic complications transforming a previously life threatening illness into a short time febrile illness with negligible fatality.

Parenteral corticosteroid is recommended in severe typhoid fever with shock or depressed level of consciousness. As far our case is concerned, supportive treatment for myocarditis included absolute bed rest and diuretics. Judicious use of corticosteroids is indicated in selected cases of severe myocarditis. In conclusion, our case again emphasizes the utmost importance of early and proper use of antibiotic therapy in determining the prognosis of disease.

References


