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Case Report

Scrub typhus manifesting as electrocardiographic disturbance: A case report and review of literature

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Abstract:

Scrub typhus (ST) has wide organ system involvement, but cardiac involvement is paramount in this spectrum due to early hemodynamic compromise. Various forms of cardiac involvement have been described in the literature, but we are describing rare electrocardiographic changes in the ST infection. A young male presented in our emergency department with complaints of restlessness and vomiting of 2 days' duration. The patient was having stable vitals on presentation, but his electrocardiogram (ECG) demonstrated second-degree atrioventricular block type 1 (also known Mobitz 1) and Osborn wave in the precordial leads. Further, he was having thrombocytopenia and eventually diagnosed with ST. For this, appropriate antibiotic treatment was given, which led to considerable symptomatic improvement and reversal of the ECG changes.

Keywords:

Atrioventricular block, cardiovascular system, *Orientia tsutsugamushi*, Osborn wave, scrub typhus

Introduction

Scrub typhus (ST), a vector-borne disease, is caused by *Orientia tsutsugamushi*, which is prevalent in different parts of the world, especially in Southeast Asia. In most of the cases, the presentation includes benign features such as fever with chills, malaise, arthralgia, abdominal discomfort, and vomiting,^[1] but unfortunate cases can have vital organ system involvement. This mite transmitted infection has a wide clinical spectrum, ranging from mild febrile illness to severe life-threatening complications of liver (hepatic dysfunction), kidney (acute renal injury), lungs (acute respiratory distress syndrome), hematopoietic system (disseminated intravascular coagulation and hemophagocytic syndrome), and cardiac system (ischemic

heart disease).^[2] Specifically, cardiac rhythm abnormalities have also been reported in the literature, but concurrent presence of atrioventricular (AV) block and Osborn wave is rarely described.

Case Report

A 20-year-old male presented in the emergency department with complaints of intermittent vomiting for the last 2 days and restlessness of 8–12-h duration. He also had tolerable abdominal discomfort, which started approximately with vomiting. The patient had no history of recent fever, diarrhea, chest pain, or palpitations. He denied any form of substance use history and was laborer by occupation. On presentation, physical examination of cardiovascular, respiratory, and abdominal systems revealed no abnormality and the patient had no skin rashes. Vital observations were as follows: blood pressure 108/62 mmHg,

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respiratory rate 16/min, temperature 37.9°C (rectal), and capillary oxygen saturation 98%. For his symptoms, the patient was given intravenous fluids and ondansetron twice a day.

In the initial assessment, the patient had a normal chest roentgenogram, but surprisingly, his electrocardiogram (ECG) demonstrated gradual prolongation of the P-R interval and missed ventricular beats, which was suggestive of second-degree AV block type 1 (also known Mobitz 1) [Figure 1]. The ECG also depicted Osborn waves in precordial lead V5 and V6. Instantly, the patient was shifted to the cardiac care unit for close monitoring of vital parameters and future need of pacemaker insertion. Additionally, his troponin T qualitative analysis was negative and echocardiography suggested no abnormality. In view of Osborn waves, the patient was asked if he was exposed to any hypothermic event like a cold water bath or exposure to the cold surroundings while working but denied for such subjection. Likewise, on biochemical analysis, he had no electrolyte abnormalities and had normal renal and liver function tests. However, the complete blood count of the patient demonstrated thrombocytopenia (platelet count of $78,000 \times 10^9/L$, normal 150,000–410,000) and leukocytosis of $14.5 \times 10^9/L$ (normal 4.0–11.0). This raised the suspicion of infectious illnesses and autoimmune disorders. Therefore, intravenous ceftriaxone 1 g twice a day was added to his ongoing treatment.

The patient had an ultrasound scan of the abdomen, which showed no pathology. His antinuclear antibody, rheumatoid factor, and anti-double-stranded deoxyribonucleic acid antibodies were inconclusive, but C-reactive protein levels were mildly raised (13 mg/L, normal <5). Furthermore, blood culture was sterile after 48 h of incubation. Being in an endemic zone, he was investigated for dengue, malaria, and ST infestations, but serological test for dengue virus and malaria parasite was negative. Strikingly, his IgM serology by enzyme-linked immunosorbent

assay (ELISA) for ST came out as positive and he was immediately shifted from ceftriaxone to injectable doxycycline 100 mg twice a day. This led to considerable symptomatic improvement from day 2, and the patient had a completely normal platelet count by day 4. Similarly, his ECG demonstrated normal sinus rhythm and the Osborn wave disappeared by day 5 [Figure 2]. The patient was further monitored for the next 3 days and discharged subsequently on oral doxycycline. Follow-up at 2 weeks revealed a normal healthy individual with normal ECG and platelet count.

Written patient consent is present, obtained at the time of discharge. The patient was explained that his identity will not be revealed and the case information will be used for education purpose only.

Discussion

ST is most prevalent in the “tsutsugamushi geographic triangle,” made by Pakistan at the one end and Japan and northern Australia at the other end.^[3] The disease spreads due to the bite of larvae *Leptotrombidium* and forms a typical skin eschar due to bite site necrosis. The incubation period for the disease ranges from 5 days to 2 weeks, and the causative bacteria predominantly involves the endothelial cells and macrophages of various organ systems.^[3]

Nonspecific symptoms in most of the cases and unusual clinical presentations can mislead to the wrong diagnosis, but the presence of eschar and thrombocytopenia warrants the evaluation for ST. As in our case, there was no eschar mark, but thrombocytopenia and low threshold for tropical disease serological tests led to timely diagnosis. Moreover, a study by Lee *et al.* demonstrated eschar absence as a risk factor^[2] for mortality and morbid organ system involvement. This can be one reason of having an eccentric cardiac rhythm complication in our patient. A research by Fang *et al.*^[4] demonstrated several ECG changes in ST including

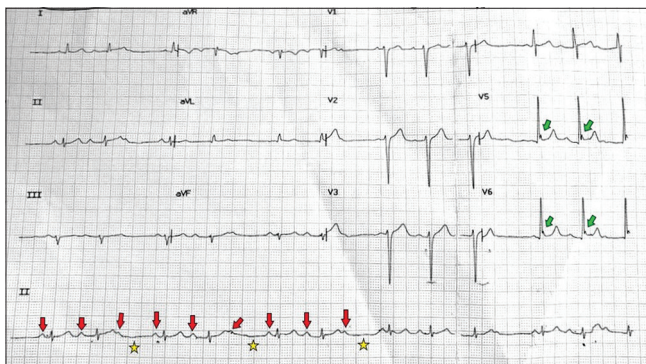


Figure 1: The initial electrocardiogram of the patient demonstrating gradual P-R interval prolongation in long lead II (red arrow) with missed QRS complex (yellow star) and Osborn waves in lead V5 and V6 (green arrow)

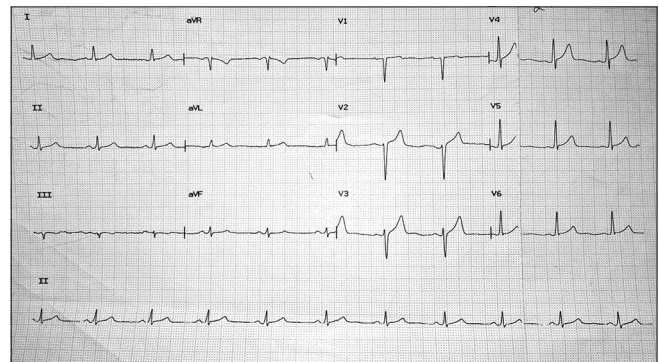


Figure 2: The subsequent electrocardiogram of the patient demonstrating normal study (normal P-R interval and absence of Osborn waves)

ST-segment elevation, T-wave inversion, first-degree AV block, QT interval prolongation, junctional beats, and P-R segment depression. Likewise, various other studies have also demonstrated different cardiovascular manifestations in this malady, which describes its prominent effect on this particular system [Table 1].^[5-13] Some of these studies concluded the long-term effect of this bacteria on the cardiovascular system, which delineates a permanent association between these two elements.

The diagnosis of ST requires immunological tests, and indirect immunofluorescence assay is considered as the gold standard in this context. Further, ELISA and indirect immunoperoxidase assay can also be useful for the diagnosis and the former test has a sensitivity and specificity of 93% and 97.5%, respectively.^[3] The Weil–Felix agglutination test is obsolete nowadays but still functional in poor-resource settings. All these tests require adequate antibody levels for positive response and thus can be utilized 5–7 days after infection acquisition. This difficulty can be overcome by polymerase chain reaction, which can detect the infection from day 3.^[3]

Antibiotics form the pivotal treatment remedy in the management of ST. Doxycycline, tetracycline, azithromycin, and chloramphenicol are customarily used drugs, and doxycycline is the current drug of choice^[3] for this infection. The medication can be given as 100 mg twice a day, oral or intravenous, for a minimum of 1-week time period. Azithromycin, which is the drug of choice in pregnancy, can be given as 500 mg once a day for at least 5 days' duration. Like in other infectious agents, resistance in *O. Tsutsugamushi* is common and can lead to failure of initial treatment. The AFSC-3 and AFSC-4 strains of the pathogen are identified as resistant to doxycycline from Thailand.^[3] Azithromycin and rifampicin are two drugs being used in resistant cases and the former being antibiotic of choice in treatment failure. The outcome of ST depends on the

timely administration of antibiotics, and the measure can significantly decrease the complication development. Additionally, the antibiotic utilization can reduce the mortality^[3] from 6% to 1.4%.

Conclusion

ST can manifest as serious cardiovascular abnormalities, and we presented one rare case scenario in this context. This report highlights the differential of ST in cardiac rhythm irregularities, and one should be thoughtful of this infirmity, especially in the presence of thrombocytopenia. Fever, an important sign in the natural course of the infection, can be absent and cannot mitigate the diagnosis. Further, in our case, ECG abnormalities of AV block and Osborn waves were reversed on prompt instillation of antibiotics, which describes the reversible effect of this pathogen on the conduction system.

Author contribution statement

SG and GJ: Case presentation, management, data collection, investigations, and writing of original draft.

MG and SG: Clinical management, discussion, literature review, writing of original draft including conclusion, references, and formatting.

Conflicts of interest

None Declared.

Ethical approval

Proper written consent is present, which was obtained from the patient for the use of the data related to this case.

Declaration of patient consent

Written patient consent is present, duly signed by the patient. The authors obtained the consent after explaining that no identity will be revealed and the case information, including ECG pictures, will be used for education purpose only. He was also explained that the journal publication will not contain any material or picture, disclosing his identity. The patient gave positive consent for publication.

Funding

None.

Table 1: Various studies describing different cardiac manifestations in scrub typhus

Name of the study	Type of the study	Cardiac involvement	Number of patients
Aronoff and Watt ^[5]	Original research	Relative bradycardia in 53% of the study participants	100
Lee et al. ^[2]	Original research	Pericardial effusion in 0.003%, new-onset atrial fibrillation in 0.003%, and ischemic heart disease in 0.003% of the study participants	297
Sittiwangkul et al. ^[6]	Original research	Acute fulminant myocarditis in 44% of the study participants	9
Tsay and Chang ^[7]	Original research	Myocarditis in 3% of the study participants	33
Zhang et al. ^[8]	Original research	Toxic myocarditis in 0.01% and heart failure in 0.01% of the study participants	102
Chung et al. ^[9]	Review study	Acute coronary syndrome in 37% of the study participants	5215
Jang et al. ^[10]	Review study	New-onset atrial fibrillation in 1% of the study population	233,473
Chang et al. ^[11]	Case report	Pericarditis	1
Ray et al. ^[12]	Case report	Acute heart failure	1
Kim et al. ^[13]	Letter to editor	Myocardial infarction	1

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