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Identifying myocarditis in severe scrub typhus

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CASE VIGNETTE

A 55-year-old previously healthy woman was admitted with a 15-day history of fever, 5 days of jaundice, abdominal pain, vomiting, and 4 days of shortness of breath. She developed an altered sensorium for the last day. Her daughter denied dependences, and history of sudden cardiac death in the family.

On examination, her Glasgow Coma Scale (GCS) was E3V3M5. She had a temperature of 102°F, a pulse rate of 149 bpm, blood pressure of 80/62 mm of Hg, and a respiratory rate of 38/min and required oxygen support to maintain saturation. Bilateral pedal edema was observed, with decreased air entry and fine inspiratory crackles noted in the axillary region upon chest auscultation. Arterial blood gas analysis revealed respiratory acidosis, and endotracheal intubation was done for airway protection and respiratory distress. Point-of-care ultrasonography revealed bilateral diffuse bilateral B lines and a non-collapsing inferior vena cava. The chest X-ray and 12-lead electrocardiogram are shown in the image 1a & 1b. Troponin I levels were measured at 59 ng/L (reference range: 10 – 23 ng/L), NT-pro BNP levels were noted at 6107 ng/L (reference range: 70 – 133 ng/L), and CRP levels were significantly elevated at 106.9 mg/L (reference range: 0 - 1 mg/L). The tropical fever workup was positive for scrub typhus, and she was started on intravenous doxycycline along with azithromycin.

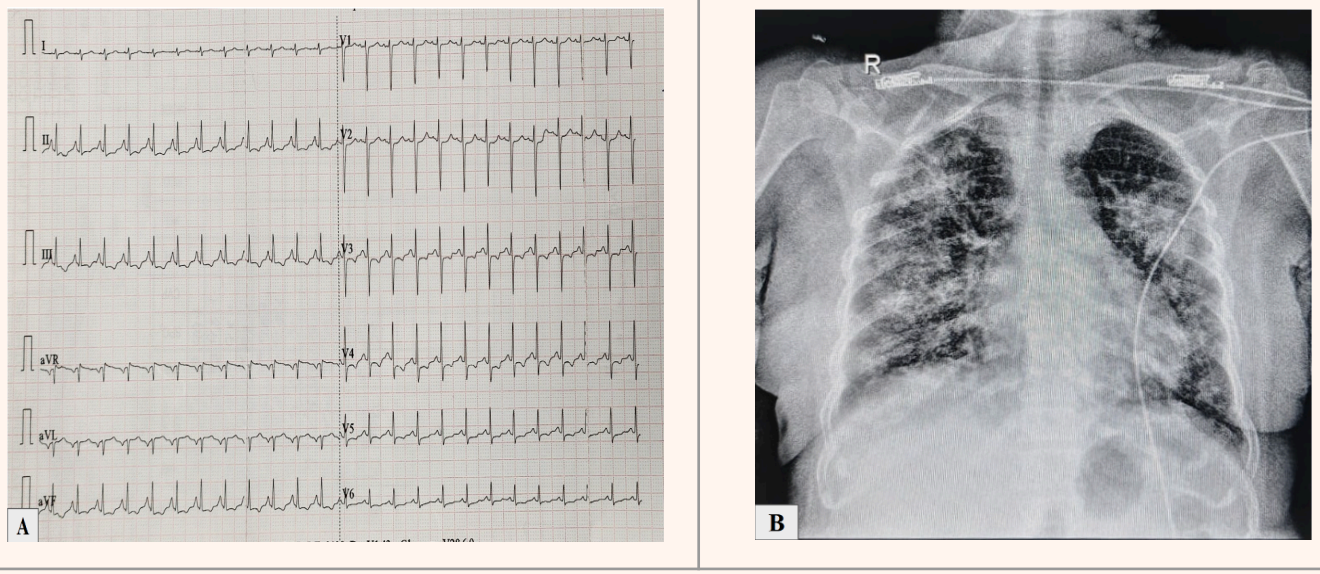

Image: 1A: 12-lead electrocardiogram taken in emergency department; **1B**: portable chest x-ray antero-posterior view.

Ques. Which of the following features does not point towards myocarditis?

A) Elevated CRPH, troponin, and NT-pro BNP levels

B) Sinus tachycardia

C) Hypotension with tachycardia

D) Respiratory distress, and bilateral fine inspiratory crepitations

E) Leucocytosis and thrombocytopenia

ANSWER: E. Leucocytosis and thrombocytopenia

COMMENTS

The clinical presentation of a 55-year-old lady with a 15-day history of fever, followed by jaundice, abdominal pain, vomiting, dyspnea, and examination findings such as tachycardia, hypotension, bilateral pedal oedema, decreased air entry with fine inspiratory crackles, and respiratory acidosis. These findings along with positive IgM ELISA for scrub typhus and raised cardiac biomarkers suggest a diagnosis of scrub typhus complicated by myocarditis leading to acute heart failure. The electrocardiogram (ECG) indicative of sinus tachycardia in the case of scrub typhus may be indicative of myocardial inflammation. Other causes can be respiratory distress and hypotension. Leucocytosis and thrombocytopenia are not directly indicative of myocarditis; rather, they are components of the inflammatory response and multiple organ dysfunction syndrome (MODS) in scrub typhus.

Scrub typhus causes endothelial dysfunction, leading to T cell, macrophage, and monocyte activation, which may result in uncontrolled cytokine release and multiple organ dysfunction syndrome (MODS). Raised C reactive protein reflects the ongoing inflammation and elevated cardiac troponin reflects the myocardial injury. Whereas nT pro-BNP is a sensitive marker of heart failure released due to ventricular dysfunction and wall stress.

Cardiac complications of scrub typhus include myocarditis, pericarditis, endocarditis, heart failure, arrhythmias, and myocardial ischemia. Risk factors for myocarditis paroxysmal atrial fibrillation, elevated bilirubin, short duration of symptoms before presentation, liver disease, elevated CRPH, and creatinine levels. The incidence of myocarditis is 4.3%-14%, and it presents with chest pain, palpitations, and heart failure; it has a high mortality rate (up to 24%) and is diagnosed using ECG, echocardiography, troponin, cardiac MRI, and endomyocardial biopsy (EMB).[1]

The ECG is commonly used as an initial screening tool for diagnosing myocarditis, even though it has a low sensitivity of 47%. In patients with myocarditis, ECGs often show a variety of nonspecific findings, such as sinus tachycardia, nonspecific ST/T-wave changes, low voltage, and PR-segment depression. However, none of these findings are specific to myocarditis.[2] The most common ECG finding in scrub typhus-associated myocarditis is sinus tachycardia followed by T-wave and ST-T segment abnormalities. Atrial fibrillation can be seen which is associated with a 1.3-fold increase in mortality over three months.[1] Cardiac MRI is the gold-standard non-invasive imaging technique for diagnosing myocarditis. Updated 2018 Lake Louise Criteria increased its sensitivity from 74% to 87.5% and specificity from 86% to 96.2% for diagnosis of acute myocarditis. However, EMB remains the gold standard for confirming myocarditis and identifying the underlying aetiology.[2]

A high index of suspicion should be kept for the diagnosis of scrub typhus myocarditis. Approach and treatment depend upon the condition of the patient, and are summarised in the illustration (image 2).[3] The symptoms of scrub typhus myocarditis can resemble those of a secondary bacterial infection or a hospital-acquired infection. In such cases, it is important to use antibiotics judiciously while adhering to antibiotic stewardship principles. Additionally, one should always monitor electrolytes such as calcium, potassium, and sodium, as well as potential drug interactions, to

prevent life-threatening arrhythmias.

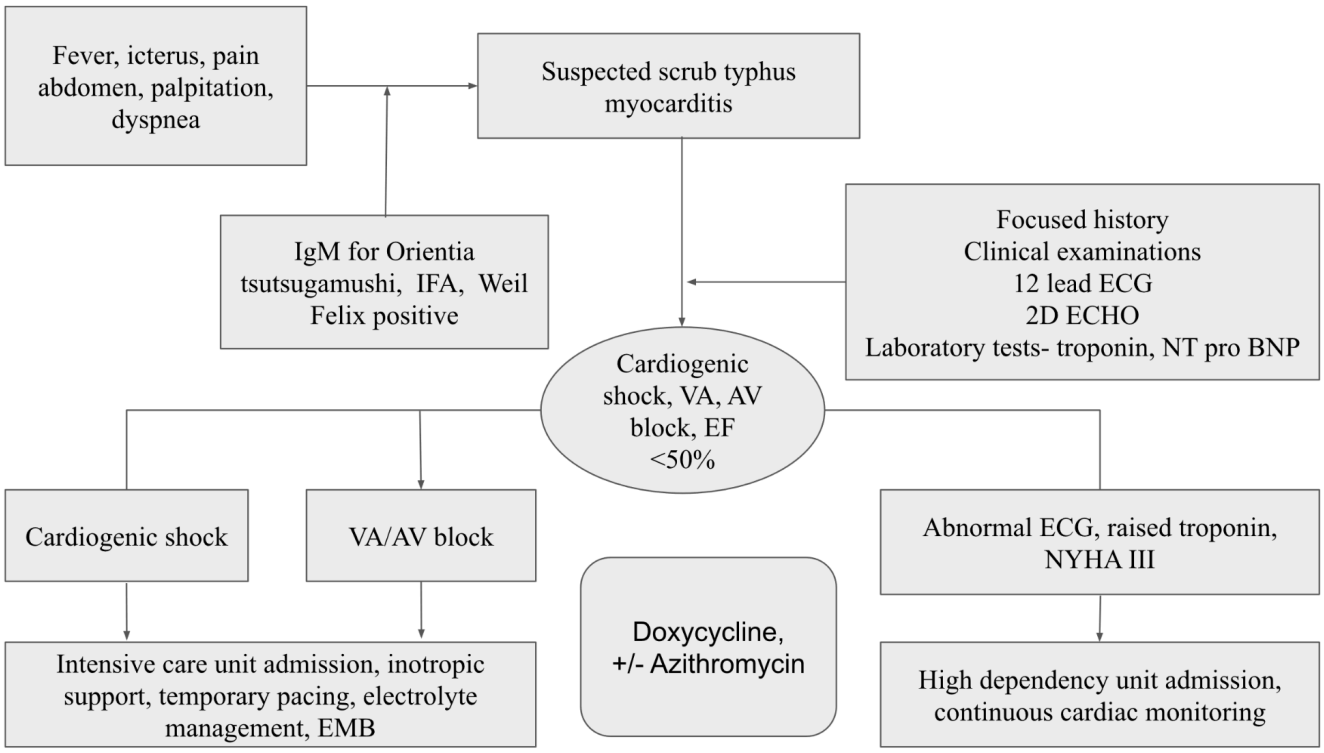

Image 2: Illustration showing the outline of management of scrub typhus myocarditis.
AV block: atrioventricular block; ECG: electrocardiogram; EMB: endomyocardial biopsy; ECHO: echocardiogram; NYHA: New York heart association; IgM: immunoglobulin M; IFA: indirect immunofluorescence assay; VA: ventricular arrythmia.

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