

Original Research Article

SCRUB TYPHUS INDUCED SEPSIS PRESENTING AS TAKOTSUBO CARDIOMYOPATHY: DIAGNOSTIC UTILITY OF CARDIAC MAGNETIC RESONANCE IMAGING IN A RARE CASE

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ABSTRACT

Background: Scrub typhus is an endemic rickettsial infection that may progress to severe sepsis with multiorgan involvement when diagnosis is delayed. Although cardiovascular complications such as myocarditis, pericarditis, arrhythmias, and heart failure are increasingly recognized, Takotsubo cardiomyopathy remains an exceptionally rare manifestation. Differentiating Takotsubo cardiomyopathy from acute myocardial infarction and myocarditis is challenging because of overlapping clinical and electrocardiographic features. Cardiac magnetic resonance imaging (CMR) plays an important role in establishing the diagnosis.

Case Presentation: A 62-year-old woman presented with a seven-day history of fever, vomiting, and epigastric pain. She was tachycardic and hypotensive on admission. Electrocardiography demonstrated Q waves in the precordial leads, while N terminal pro B type natriuretic peptide was markedly elevated at 1810 pg/mL. Serological testing confirmed scrub typhus. Transthoracic echocardiography demonstrated mild left ventricular dilatation with an ejection fraction of 30%, apical hypokinesia, preserved basal contractility, and minimal pericardial effusion, raising suspicion of Takotsubo cardiomyopathy. CMR confirmed the diagnosis by demonstrating characteristic mid to apical hypokinesia with apical ballooning and myocardial oedema on T2 weighted imaging, without late gadolinium enhancement, thereby excluding myocardial infarction and myocarditis. The patient was managed with targeted antibiotic therapy, inotropic support, and standard supportive care for sepsis and heart failure. She showed progressive clinical improvement with recovery of cardiac function.

Conclusion: This case highlights Takotsubo cardiomyopathy as a rare but important cardiovascular complication of scrub typhus induced sepsis. Clinicians should maintain a high index of suspicion for stress cardiomyopathy in patients with scrub typhus presenting with acute cardiac dysfunction. CMR is invaluable for confirming the diagnosis, differentiating it from other causes of myocardial injury, and guiding appropriate management, thereby avoiding unnecessary invasive interventions.

Keywords: Scrub typhus; Takotsubo cardiomyopathy; Stress cardiomyopathy; Cardiac magnetic resonance imaging; Sepsis.

INTRODUCTION

Scrub typhus is an acute zoonotic infection caused by *Orientia tsutsugamushi* and transmitted to humans

through the bite of infected larval trombiculid mites, commonly known as chiggers. The disease is endemic throughout the Asia Pacific region within the so called "tsutsugamushi triangle," which

includes India, China, Japan, South Korea, Sri Lanka, Thailand, Taiwan, the Philippines, and several other countries. Although traditionally considered a tropical disease, scrub typhus has emerged as an important public health problem because of its increasing incidence, expanding geographical distribution, and potential to cause severe multisystem disease if diagnosis and treatment are delayed.^[1]

The clinical presentation of scrub typhus is highly variable, ranging from a mild febrile illness to life threatening sepsis with multiorgan dysfunction. The organism primarily infects vascular endothelial cells, resulting in widespread vasculitis and perivascular inflammation. This triggers an exaggerated immune response characterized by the release of multiple cytokines and chemokines, leading to endothelial injury, increased vascular permeability, and tissue damage. As a result, patients may develop complications involving the liver, kidneys, lungs, central nervous system, and cardiovascular system. Delayed diagnosis further increases the risk of severe disease, prolonged hospitalization, and mortality.^[2]

Cardiac involvement in scrub typhus is increasingly recognized but remains underdiagnosed because its manifestations often resemble those of other cardiovascular disorders. Proposed mechanisms include direct myocardial invasion by the organism, immune mediated myocardial injury, endothelial dysfunction, systemic vasculitis, macrophage activation, electrolyte disturbances, and an overwhelming inflammatory response associated with sepsis.^[3] Reported cardiovascular complications include myocarditis, pericarditis, heart failure, arrhythmias, acute coronary syndrome, and, rarely, stress induced cardiomyopathy. Among these, myocarditis is the most frequently reported cardiac complication, whereas Takotsubo cardiomyopathy remains exceptionally uncommon.^[4,5]

Takotsubo cardiomyopathy, also known as stress induced cardiomyopathy or transient left ventricular apical ballooning syndrome, is characterized by reversible systolic dysfunction of the left ventricle in the absence of obstructive coronary artery disease. First described by Sato et al. in 1990, the syndrome predominantly affects postmenopausal women and is usually precipitated by intense emotional or physical stress.^[1] Although its exact pathogenesis is not completely understood, excessive catecholamine release resulting in myocardial stunning is considered the principal mechanism. Additional factors such as coronary microvascular dysfunction, coronary vasospasm, oxidative stress, and altered autonomic regulation have also been implicated.^[3,6] Infectious illnesses, particularly severe sepsis, have emerged as uncommon physical triggers capable of inducing this syndrome through intense sympathetic activation and systemic inflammation.

Because patients with Takotsubo cardiomyopathy often present with chest pain, electrocardiographic abnormalities, elevated cardiac biomarkers, and impaired left ventricular function, the condition

closely mimics acute myocardial infarction and myocarditis. Cardiac magnetic resonance imaging has become an important diagnostic tool as it demonstrates the characteristic pattern of ventricular dysfunction and myocardial oedema while excluding myocardial infarction and inflammatory cardiomyopathies through the absence of late gadolinium enhancement.^[6,7] Early recognition is essential because appropriate treatment of the underlying trigger and supportive cardiac care usually result in complete recovery of ventricular function.

Here, we report a rare case of Takotsubo cardiomyopathy occurring secondary to scrub typhus induced sepsis in a 62-year-old woman. This case highlights the importance of considering reversible stress cardiomyopathy in patients with scrub typhus who develop acute cardiac dysfunction and emphasizes the pivotal role of cardiac magnetic resonance imaging in establishing the diagnosis and excluding important differential diagnoses.

CASE PRESENTATION

A 62-year-old woman presented to the emergency department with a 7-day history of high-grade fever, recurrent vomiting, and epigastric pain. On arrival, she appeared acutely ill and was found to be tachycardic and hypotensive. Physical examination revealed mild epigastric tenderness without signs of peritonitis. Given the clinical presentation of sepsis with hemodynamic instability, further laboratory and cardiac evaluation was undertaken.

Electrocardiography demonstrated Q waves in the precordial leads (V1 to V3), raising the possibility of an acute coronary event. Laboratory investigations revealed a markedly elevated N terminal pro B type natriuretic peptide (NT proBNP) level of 1810 pg/mL, indicating significant cardiac dysfunction. Serological testing confirmed scrub typhus infection, establishing the underlying infectious etiology. In view of the patient's hypotension, elevated cardiac biomarker, and electrocardiographic abnormalities, cardiac involvement secondary to scrub typhus was suspected.

Transthoracic echocardiography demonstrated mild left ventricular dilatation with a reduced left ventricular ejection fraction of 30%. Regional wall motion abnormalities were evident in the form of apical hypokinesia, while basal myocardial contractility was preserved. A minimal pericardial effusion was also noted. The characteristic pattern of apical dysfunction with preserved basal contraction raised a strong suspicion of Takotsubo cardiomyopathy.

To further characterize the myocardial abnormality and exclude other potential causes of acute left ventricular dysfunction, cardiac magnetic resonance imaging was performed. The examination demonstrated a left ventricular end diastolic dimension of 4.6 cm with characteristic mid to apical

hypokinesia and apical ballooning [Figure 1]. T2 weighted sequences showed myocardial oedema involving the affected myocardial segments [Figure 2]. Importantly, late gadolinium enhancement imaging showed no evidence of myocardial fibrosis or infarction [Figure 3], thereby excluding ischemic cardiomyopathy and myocarditis and confirming the diagnosis of Takotsubo cardiomyopathy.

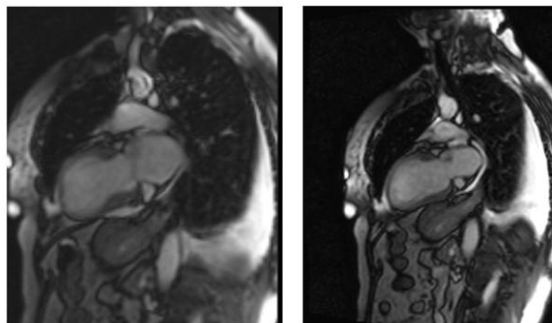


Figure 1: Cine cardiac magnetic resonance (CMR) still frame demonstrating mid-to-apical hypokinesia with classical apical ballooning, characteristic of Takotsubo cardiomyopathy.

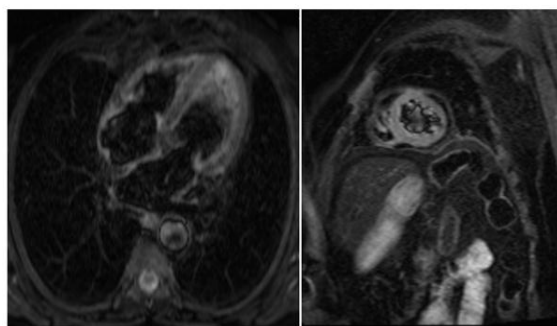


Figure 2: T2-weighted cardiac magnetic resonance image showing myocardial hyperintensity in the apical segments, consistent with myocardial oedema.

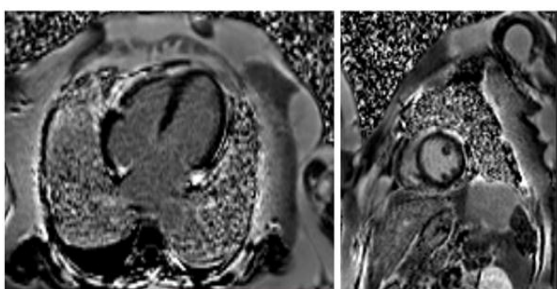


Figure 3: Late gadolinium enhancement sequence demonstrating absence of enhancement, excluding ischemic or fibrotic myocardial injury.

The patient was managed with targeted antibiotic therapy for scrub typhus, inotropic support for hemodynamic stabilization, and standard supportive treatment for sepsis and acute heart failure. She responded well to treatment, with progressive clinical improvement, stabilization of blood pressure, and gradual recovery of cardiac function during the course of hospitalization.

DISCUSSION

Takotsubo cardiomyopathy (TTC), also known as stress induced cardiomyopathy, is a transient and reversible form of non-ischemic cardiomyopathy characterized by acute left ventricular systolic dysfunction in the absence of obstructive coronary artery disease. First described by Sato et al. in 1990, TTC typically presents with chest pain, electrocardiographic abnormalities, elevated cardiac biomarkers, and regional wall motion abnormalities that closely resemble acute myocardial infarction, making differentiation challenging during the initial evaluation.^[8] Although the prognosis is generally favorable, prompt recognition is important because inappropriate management may expose patients to unnecessary invasive procedures and delay treatment of the underlying precipitating condition.

The pathophysiology of TTC remains incompletely understood. The most widely accepted mechanism involves catecholamine mediated myocardial stunning triggered by intense emotional or physical stress, resulting in transient myocardial dysfunction.^[9] The characteristic apical ballooning pattern is believed to arise from the greater density of β adrenergic receptors in the apical myocardium, rendering these segments more susceptible to catecholamine induced injury. Additional mechanisms, including coronary microvascular dysfunction, coronary vasospasm, oxidative stress, and endothelial dysfunction, have also been proposed.^[10] The predominance of TTC among postmenopausal women further suggests that estrogen deficiency may increase susceptibility by reducing endothelial protection and enhancing sympathetic activity.^[11]

The present case highlights scrub typhus as an uncommon infectious trigger for TTC. Scrub typhus is a rickettsial infection that may progress to severe sepsis with widespread endothelial injury, systemic inflammation, and multiorgan dysfunction. Although cardiac involvement in scrub typhus most commonly manifests as myocarditis, pericarditis, arrhythmias, or heart failure, Takotsubo cardiomyopathy has been reported only rarely. In our patient, severe infection and sepsis likely produced an excessive catecholamine surge together with a marked inflammatory response, ultimately precipitating transient left ventricular dysfunction. This case broadens the spectrum of cardiovascular complications associated with scrub typhus and emphasizes that reversible stress cardiomyopathy should be considered in patients presenting with acute cardiac dysfunction, particularly in endemic regions.

Cardiac magnetic resonance imaging played a pivotal role in establishing the diagnosis. In addition to demonstrating the characteristic pattern of mid to apical hypokinesia with apical ballooning, CMR identified myocardial oedema on T2 weighted imaging while showing no late gadolinium

enhancement. The absence of late gadolinium enhancement effectively excluded myocardial infarction and myocarditis, both important differential diagnoses in patients presenting with elevated cardiac biomarkers and impaired left ventricular function. Advanced CMR techniques, including T1 and T2 mapping, extracellular volume quantification, and feature tracking strain analysis, may further improve tissue characterization and provide additional prognostic information in patients with suspected TTC.^[9,12]

Management of TTC is largely supportive and focuses on hemodynamic stabilization, treatment of the underlying trigger, and guideline directed therapy for heart failure when indicated. Most patients recover ventricular function completely within days to weeks, although complications such as cardiogenic shock, arrhythmias, heart failure, and thromboembolism may occur during the acute phase. In the present case, prompt recognition of scrub typhus, early initiation of targeted antibiotic therapy, and appropriate supportive management resulted in progressive clinical improvement and recovery of cardiac function. This case underscores the importance of maintaining a high index of suspicion for TTC in patients with scrub typhus who develop acute cardiac dysfunction and highlights the indispensable role of cardiac magnetic resonance imaging in confirming the diagnosis and excluding alternative causes of myocardial injury.

CONCLUSION

Takotsubo cardiomyopathy is an uncommon but potentially reversible cardiovascular complication of scrub typhus induced sepsis that can closely mimic acute myocardial infarction and myocarditis. This case highlights the importance of maintaining a high index of suspicion for stress cardiomyopathy in patients with scrub typhus who develop acute cardiac dysfunction, particularly in endemic regions. Cardiac

magnetic resonance imaging plays a pivotal role in confirming the diagnosis by demonstrating characteristic ventricular dysfunction and excluding ischemic or inflammatory myocardial injury. Early recognition, prompt initiation of targeted antimicrobial therapy, and appropriate supportive cardiac care can result in favorable clinical outcomes and complete recovery of ventricular function.

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