

Takotsubo Cardiomyopathy as a Presenting Manifestation of Listeria Rhombencephalitis

Sir,

Listeria monocytogenes, the food-borne pathogen, is a gram-positive bacillus, responsible for listeriosis, a severe systemic infection. Though it commonly affects immunosuppressed individuals, it can rarely affect healthy adults.^[1] *Listeria* has a tropism for the central nervous system, especially the brainstem. Common manifestations of neurolisteriosis include meningitis, meningoencephalitis, cerebritis, cerebral abscess, and rhombencephalitis (RE) (involvement of brainstem and cerebellum).^[2,3] *Listeria* RE can be a diagnostic challenge because of the highly variable clinical presentation, neuroimaging features, and course of the disease.^[4,5] Herein, we report a case of *Listeria* RE in an immunocompetent patient who had an acute cardiac failure due to Takotsubo cardiomyopathy at presentation.

A 56-year-old, previously healthy lady, resident of the northern part of Kerala state, India presented to the emergency department with right hemiparesis and respiratory distress. Her symptoms began 5 days ago with fever, myalgia, and headache. Two days later she developed mild right hemiparesis and was being treated as a case of a stroke at another center. Later she developed acute respiratory distress and became drowsy and was transferred to our center. On arrival at our emergency department, she was drowsy and had features of pulmonary edema. She was intubated and ventilated. Electrocardiography (ECG) showed ST elevation in anterior leads and echocardiogram revealed global hypokinesia. She underwent an emergency coronary angiogram which revealed normal coronary arteries and diagnosis of Takotsubo cardiomyopathy was made. A detailed neurological examination later revealed gaze deviation to the right and vertical gaze restriction of both eyes. She had left lower motor neuron (LMN) facial palsy, left-sided cerebellar signs, and bilateral pyramidal signs (brisk deep tendon reflexes [DTRs] and extensor plantar) suggestive of brainstem involvement. Blood investigation revealed neutrophilia, elevated creatinine (1.8 mg/dL), and low sodium (127 meq/L). Magnetic resonance imaging (MRI) brain [Figure 1] revealed T2 and FLAIR hyperintensities involving medulla, dorsal pons, left middle cerebellar peduncle, and cerebellum. There were small areas of restricted diffusion over the left middle cerebellar peduncle and left side of the medulla [Figure 1]. The initial diagnosis was a probable posterior circulation stroke. Cerebrospinal fluid (CSF) analysis done showed an elevated WBC count of 108/cmm (90% lymphocytes) with normal protein and sugar. Gram stain and acid-fast bacilli (AFB) stain was normal. Both CSF and blood culture grew *L. monocytogenes* confirming the diagnosis of *Listeria* RE presenting with Takotsubo cardiomyopathy. She was treated with IV ampicillin and cotrimoxazole. Her clinical status

continued to deteriorate and on the next day of admission, she became quadriplegic and stuporous. Later she underwent tracheostomy and was slowly weaned off from a ventilator. She made a slow neurological recovery and her cardiac status also improved well. Repeat magnetic resonance imaging (MRI) brain was performed 1-month post-admission and revealed a decrease in the size of the brainstem and cerebellar lesions. Repeat echocardiogram done at 3 months showed normal left ventricular (LV) function and no regional wall motion abnormality. At 12-months follow-up, she was fully conscious and had only mild residual left hemiparesis.

DISCUSSION

RE is a form of encephalitis that affects the hindbrain. *L. monocytogenes* is one of the most common infectious causes of RE. Diagnosis can be difficult because it may present with a variety of neurological features. It has a characteristic biphasic course. A nonspecific prodrome of fever, headache, vomiting is followed by abrupt, progressive neurological syndrome characterized by multiple cranial nerve palsies, cerebellar signs, hemiparesis or quadriparesis, and impaired consciousness. Respiratory insufficiency is a common manifestation.^[5] Our patient developed respiratory distress due to acute cardiac failure secondary to Takotsubo cardiomyopathy before developing cranial nerve deficits and cerebellar signs. Takotsubo cardiomyopathy is an extremely rare phenomenon reported in *Listeria* RE.^[6]

Takotsubo cardiomyopathy or stunned myocardium, firstly described as stress cardiomyopathy, is characterized by severe and hyperacute left ventricular dysfunction with disproportionately low levels of cardiac troponin and occurs in the absence of coronary artery occlusion. This has been described in association with acute neurologic diseases responsible for sudden sympathetic activation such as stroke, encephalitis, seizures, and acute hydrocephalus.^[6] Two mechanisms have been postulated for acute cardiac failure in *Listeria* RE. Disruption of the cardiac regulatory center located in the brainstem could theoretically lead to sympathetic activation and subsequent neurogenic cardiac damage. Another mechanism for acute cardiac failure could be myocarditis due to listeriosis.^[6,7] Myocarditis due to *Listeria* is unlikely in this patient because it has been mostly reported in immunosuppressed individuals.^[7]

MR imaging findings in *Listeria* RE are similar to other RE, high signal lesions involving brainstem, peduncles, and cerebellum. A specific finding in *Listeria* RE is the formation of ring-enhancing abscess in these locations.^[4,8] We noted several nodular lesions in the brainstem with significantly restricted diffusion consistent with the necrotic

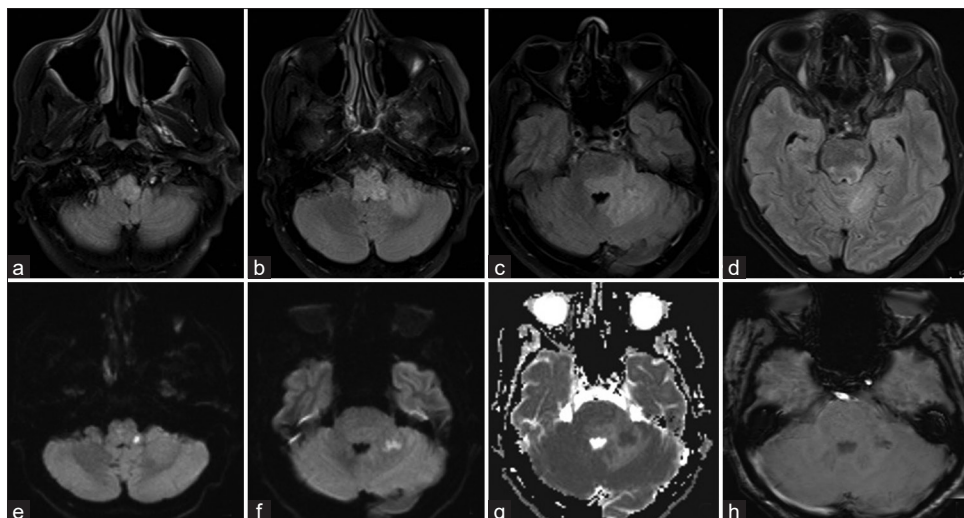


Figure 1: Magnetic resonance imaging axial view [a, b, c, d] T2 FLAIR sequence showing hyperintense signals in the medulla (a), left cerebellum (b), middle cerebellar peduncle (c), dorsal pons (d). [e] DWI sequence showing hyperintensity in left lateral medulla (f) DWI sequence showing hyperintensity in left middle cerebellar peduncle [g] Corresponding ADC sequence showing hypointensity of left middle cerebellar peduncle suggestive of diffusion restriction [h] SWI sequence showing blooming of focal area in left middle cerebellar peduncle suggestive of microhemorrhage

process. The regions of diffusion restriction were surrounded by hyperintense signal intensity on diffusion-weighted imaging (DWI), apparent diffusion coefficient (ADC) map, and T2-weighted and FLAIR images, which most likely denotes edema consistent with T2 shine through. A neuropathological study of *Listeria* RE had shown inflammatory infiltrates located predominantly within nuclei and tracts of cranial nerves innervating oropharynx, supporting the hypothesis that *L. monocytogenes* invades the brainstem along cranial nerves.^[9]

CSF findings in *Listeria* RE may reveal only mild abnormalities. It may show pleocytosis, with a differential that can range from 100% neutrophils to 100% lymphocytes. Our patients had lymphocytic predominant pleocytosis. *Listeria* is the one nontuberculous bacterium that causes a lymphocytic pleocytosis in the CSF in the absence of antibiotic therapy. CSF protein is often moderately elevated and normal or low glucose may be seen.^[10] CSF protein and glucose were normal in our patient. The detection rate in culture is approximately 40% for CSF and 60% for blood.^[11]

Management of RE includes appropriate antibiotic therapy, supportive treatment, and management of comorbid conditions. Ampicillin or amoxicillin is generally considered as the most effective antimicrobial for listeriosis and is part of empirical treatment for central nervous system (CNS) infections if patients are at higher risk of listeriosis.^[5,10] The resistance of *L. monocytogenes* to antimicrobials is of increasing concern and hence antibiotic combinations are usually employed to provide synergy. Both cotrimoxazole and gentamicin have been used.^[10] We used cotrimoxazole along with ampicillin in this patient and she recovered without any significant sequelae. We preferred cotrimoxazole over gentamicin because of acute kidney injury at presentation.

In conclusion, Takotsubo cardiomyopathy is a rare complication of *Listeria* RE and can be the presenting manifestation. MRI is useful for diagnosis if *Listeria* encephalitis is suspected but unconfirmed by microbiological tests and for follow-up. Early diagnosis and prompt commencement of appropriate antimicrobial therapy can improve outcomes.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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