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. 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). Listeria RE can be a diagnostic challenge because of the highly variable clinical presentation, neuroimaging features, and course of the disease. 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 angiogram which revealed normal coronary arteries and impaired consciousness. Respiratory insufficiency is a common manifestation. 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.

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. 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. Myocarditis due to listeria is unlikely in this patient because it has been mostly reported in immunosuppressed individuals.

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. We noted several nodular lesions in the brainstem with significantly restricted diffusion consistent with the necrotic

**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. 

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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 \textit{L. monocytogenes} invades the brainstem along cranial nerves.

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. CSF protein and glucose were normal in our patient. The detection rate in culture is approximately 40% for CSF and 60% for blood.

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. The resistance of \textit{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. 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 participants 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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Nil.

**Conflicts of interest**

There are no conflicts of interest.

**References**

1. Barrt R. Listeria and atypical presentations of Listeria in the central nervous system. Semin Neurol 2000;20:361-73.
2. Charlier C, Ferrodeux E, Lachrq A, Cazenave B, Pilmis B, Henry B, et al. Clinical features and prognostic factors of listeriosis: The MONALISA national prospective cohort study. Lancet Infect Dis 2017;17:510-9.
Dear Editor,

was a female baby born to non-consanguineous parents. At birth, she was a 32 cm (below the 10th centile) and length of 49 cm with no dysmorphisms. Her birth weight was 2750 grams, head circumference of 32 cm (below the 10th centile) and length 49 cm with no dysmorphisms. At 3 months of age, she was alert with ill-sustained gaze, poor neck control, and 8 at 1 minute. She had a delayed cry at birth with an Apgar of 8 at 1 minute. Follow up at 6 months of age revealed a global developmental delay and the encephalogram revealed a slow background activity with no epileptic discharges.

Interictal EEG revealed a chaotic background rhythm with asynchronous high voltage spikes and polyspikes suggestive of hypsarrhythmia. Toxoplasma, Rubella, Cytomegalovirus and Herpes virus IgG and IgM were negative. Tandem Mass Spectroscopy was normal.

In the context of a child presenting with a hypsarrhythmia, prompt treatment of epilepsy and metabolic causes have been ruled out. In children who present with hypsarrhythmia and epilepsy leading to psychomotor retardation, developmental delay and a poor scholastic performance.

Chronic thickened gyral pattern, convolutional features, and hippocampal dysplasia were evident on a delayed sagittal T1-weighted MRI. Patient received adrenocorticotrophic hormone, pyridoxine, and valproate.

3. Moragas M, Martines-Yelamos S, Majos C, Fernandez-Viladrich P, Rubio F, Arbizu T. Rhombencephalitis: A series of 97 patients. Medicine (Baltimore) 2011;90:256-61.
4. Arslan F, Ertan G, Emecen NA, Fillatre P, Mert A, Vahaboglu H. Clinical presentation and cranial MRI findings of Listeria monocytogenes Encephalitis: A literature review of case series. Neurologist 2018;23:198-203.
5. Uldry PA. Kuntzer T, Bogousslavsky J, Regli F, Miklossy J, Bille J, et al. Early symptoms and outcome of Listeria monocytogenes rhombencephalitis: 14 adult cases. J Neurol 1993;240:235-42.
6. Ruggieri F, Cerri M, Beretta L. Infective rhombencephalitis and inverted Takotsubo: Neurogenic stunned myocardium or myocarditis. Am J Emerg Med 2014;32:191.e1-3.
7. Karamitsos TD, Bull S, Ferriera V, Alp NJ, Neubaur S. Acute myocarditis mimicking reverse Takotsubo cardiomyopathy. Circulation 2011;123:226-7
8. Hatpoglu HG, Onbasioglu Gubuz M, Sakman B, Yuksel E. Diffusion weighted MRI in rhombencephalitis due to listeria monocytogenes.

Acta Radiol 2007;48:464-7.
9. Antal EA, Loberg ME, Dietrich E, Machlen J. Neuropathological findings in 9 cases of listeria Brainstem encephalitis. Brain Pathol 2005;15:187-91.
10. Mansbridge TC, Grecu I, Chong J, Venderrvelde C. Two cases of listeria rhombencephalitis. IDCases 2018;11:22-5.

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