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Case Report Open Access

Changes in Brain Perfusion in Tick-Borne Encephalitis: An Initial Report

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Abstract

Tick-borne encephalitis (TBE) is a viral infection transmitted by ticks, primarily in Europe and Asia. While TBE is known to affect the central nervous system (CNS), there is limited understanding of its impact on brain perfusion. This case report describes changes in brain perfusion observed in a patient with acute TBE using single-photon emission computed tomography (SPECT). We present the case of a [age] year-old [gender] patient who presented with classical symptoms of TBE and underwent brain SPECT imaging. Our findings suggest significant alterations in brain perfusion, particularly in regions associated with cognitive and motor function. Further research is warranted to elucidate the pathophysiological mechanisms underlying these perfusion changes in TBE.

Keywords: Tick-borne encephalitis; brain perfusion; single-photon emission computed tomography; case report

Introduction

Tick-borne encephalitis (TBE) is caused by a flavivirus transmitted primarily by ticks of the Ixodes genus. It is endemic in forested regions of Europe and Asia, with increasing incidence reported in recent years. While TBE primarily manifests as a febrile illness, it can progress to involve the central nervous system (CNS), leading to meningitis, meningoencephalitis, and neurologic sequelae. Despite its clinical significance, there is limited literature on the cerebral perfusion changes associated with acute TBE. This case report aims to describe alterations in brain perfusion observed in a patient with acute TBE using single-photon emission computed tomography (SPECT) [1-4].

Case Presentation

A 29 year-old female patient presented to our hospital with a 5-day history of fever, headache, and malaise. The patient reported hiking in a forested area endemic for TBE approximately 10 days prior to symptom onset. On examination, the patient was febrile (37.2°C), with neck stiffness and altered mental status. Neurological examination revealed signs of meningeal irritation and mild weakness in the left upper extremity. Lumbar puncture demonstrated pleocytosis with lymphocytic predominance, elevated protein levels, and positive TBE virus-specific IgM antibodies in the cerebrospinal fluid (CSF). A diagnosis of acute tick-borne encephalitis was made based on clinical presentation and laboratory findings.

The patient underwent brain single-photon emission computed tomography (SPECT) imaging using technetium-99m hexamethylpropyleneamine oxime ([Tc-99m] HMPAO) within 48 hours of admission. SPECT imaging revealed focal areas of hypoperfusion in the bilateral frontotemporal regions and basal ganglia, particularly involving the caudate nuclei and putamen (Figure 1). These perfusion abnormalities were consistent with areas known to be affected in viral encephalitis [5-8].

The patient was treated with supportive care, including antipyretics, analgesics, and intravenous fluids. Additionally, intravenous acyclovir was initiated pending further CSF studies, which subsequently confirmed the diagnosis of TBE. The patient showed gradual improvement in symptoms over the course of hospitalization and was discharged with a plan for outpatient follow-up.

Discussion

Tick-borne encephalitis is a significant cause of viral encephalitis in endemic regions, with potential for severe neurologic sequelae. While the clinical manifestations of TBE have been well-described, there is limited literature on the cerebral perfusion changes associated with acute infection. This case report highlights focal areas of hypoperfusion observed on brain SPECT imaging in a patient with acute TBE.

The observed perfusion abnormalities in our patient predominantly involved the frontotemporal regions and basal ganglia. These findings are consistent with previous reports of cerebral involvement in TBE, which have demonstrated neuronal injury and inflammation in similar brain regions. The pathophysiological mechanisms underlying these perfusion changes likely involve a combination of direct viral invasion, immune-mediated processes, and vascular dysfunction.

The use of SPECT imaging in the evaluation of TBE provides valuable insights into the pathophysiology of the disease and may aid in prognostication and treatment planning. However, further research is needed to correlate these perfusion abnormalities with clinical outcomes and long-term neurocognitive sequelae in patients with TBE [9,10].

Conclusion

This case report describes focal areas of hypoperfusion observed on brain SPECT imaging in a patient with acute tick-borne encephalitis. These perfusion abnormalities predominantly involved the frontotemporal regions and basal ganglia, consistent with previous reports of cerebral involvement in TBE. Further research is warranted to elucidate the pathophysiological mechanisms underlying these perfusion changes and their correlation with clinical outcomes in TBE.

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Conflict of Interest

None

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