Cytomegalovirus Encephalitis and Cerebral Toxoplasmosis in an Immunocompetent Patient: A Rare Case Report

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ABSTRACT

Cytomegalovirus (CMV) and Toxoplasma gondii infections are typically associated with immunocompromised individuals, in whom they can cause severe central nervous system (CNS) complications. However, their concurrent manifestation in immunocompetent hosts (IMCh) is exceptionally rare and underreported. We present the case of a 51-year-old immunocompetent male with a three-month history of progressive headache, nausea, and intermittent joint pain, without neurological deficits. Imaging revealed chronic infarcts in the basal ganglia and frontal lobe, as well as multifocal lesions in the periventricular area. Serological testing indicated high-avidity IgG for both CMV and T. gondii, consistent with chronic latent infections. Despite being HIV-negative and without prior immunosuppressive therapy, the patient exhibited hematologic abnormalities, including thrombocytopenia, lymphopenia, and eosinophilia. Treatment with valganciclovir, cotrimoxazole, and clindamycin led to symptomatic improvement. This case underscores the diagnostic challenges of CMV encephalitis and cerebral toxoplasmosis in IMCh, where nonspecific symptoms and overlapping radiological findings may mimic other etiologies such as stroke. Given the neurotropic nature of T. gondii and the hematologic impact of CMV, coinfection—though rare—should be considered in patients with atypical CNS symptoms and hematological abnormalities, even in the absence of immunodeficiency. This report showed the need for heightened clinical suspicion and thorough evaluation to avoid misdiagnosis and ensure timely intervention. Clinicians should recognize that serious manifestations of CMV and toxoplasmosis are possible in IMCh and may present subtly, necessitating comprehensive serologic and imaging workups for accurate diagnosis and management.

Keywords: *CMV, encephalitis, cerebral toxoplasmosis, immunocompetent host.*

INTRODUCTION

Cytomegalovirus (CMV), or human herpesvirus 5 (HHV-5), is a common virus with a global seroprevalence between 45% and 100%, often acquired during childhood.[1] Although CMV infections in immunocompetent hosts (IMCh) are typically asymptomatic or cause mild mononucleosis-like symptoms, recent findings suggest that severe, life-threatening complications—including encephalitis—may be more common than previously recognized, even in IMCh.

Toxoplasma gondii, the causative agent of toxoplasmosis, also has a high global and regional prevalence, with rates in Southeast Asia ranging from 13.3% to 85.3%, and in Indonesia,

around 40–60%.[2,3] Though often asymptomatic in IMCh, T. gondii is neurotropic and capable of causing significant disease, including acute encephalitis and ocular involvement.[4] Reactivation in immunosuppressed individuals is well-documented, but awareness and recognition in IMCh remain low.[5]. In this report, we present a rare case where an immunocompetent patient presented with only nonspecific symptoms—headache, nausea, and joint pain—for three months, without neurological deficits. This report aims to present a rare case to offer readers a different clinical perspective.

CASE ILLUSTRATION

A 51-year-old man came to the neurology polyclinic with a chief complaint of headache that had lasted for three months. The pain was mainly felt in the back of the head and worsened day by day, especially at night. In addition, the patient also complained of pain in the left eye and stiffness and pain in the middle finger of the left hand. Complaints were accompanied by nausea and vomiting. Previous medical history showed that the patient had hypertension and routinely consumed amlodipine 5 mg p.o. o.d. In his daily life, the patient was known to raise pigs.

Based on the findings of the head CT scan, the patient was given antiplatelet therapy in the form of Aspilet 80 mg once a day.

Further examination in the form of non-contrast MRA showed no major blood vessel abnormalities. HIV serology examination showed negative results. The initial diagnosis was chronic cephalgia suspected of being due to cervical syndrome. However, the patient was then referred to the internal medicine department because of a progressive decrease in platelet levels (from 132,000/mcL to 113,000/mcL), relative lymphopenia, and hypereosinophilia. MDT examination confirmed the presence of giant platelets. Serology results showed that the patient was negative for HBsAg, anti-HCV, and HIV. Immunology examination showed IgG Toxoplasmosis and IgG CMV with high avidity, indicating a long-standing or chronic infection. The D-dimer value was 580, and uric acid was within normal limits. The therapy given included valganciclovir 900 mg p.o. b.i.d., trimethoprim sulfamethoxazole 960 mg p.o. b.i.d., and clindamycin 600 mg p.o. q.d.s. for three weeks to treat toxoplasmosis and CMV infection.

A DSA examination was performed, which showed cerebral infarction in the M1 perforator artery and severe tortuosity of the blood vessels. As a follow-up action, trigger point and stump injection were performed, which gave positive results with reduced patient headaches.

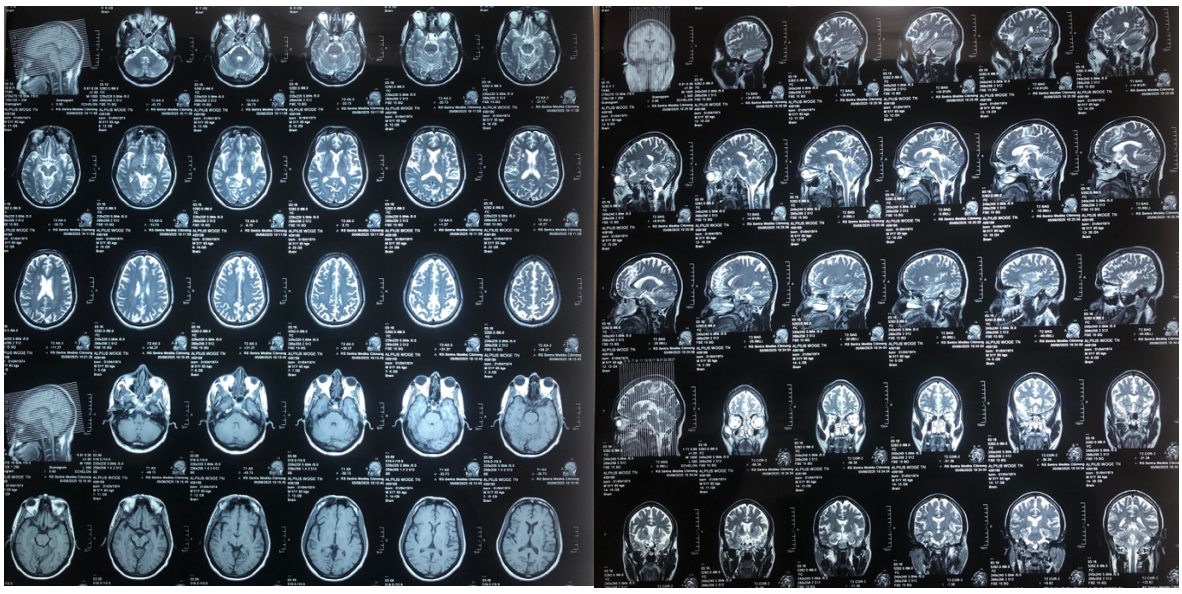

Figure 1. CT scan results. Multiple chronic cerebral infarcts in the basal ganglia and right frontal lobe.

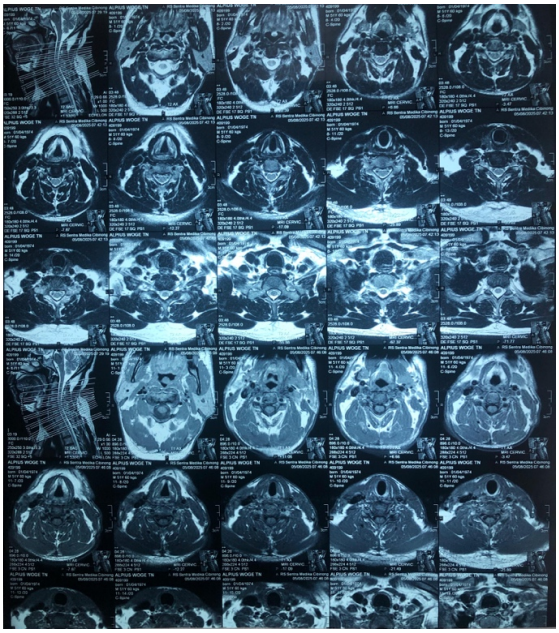

Figure 2. MRI result. Multifocal cerebral infarction periventriculo lateralis right in the anterior horn and genu of the right internal capsule

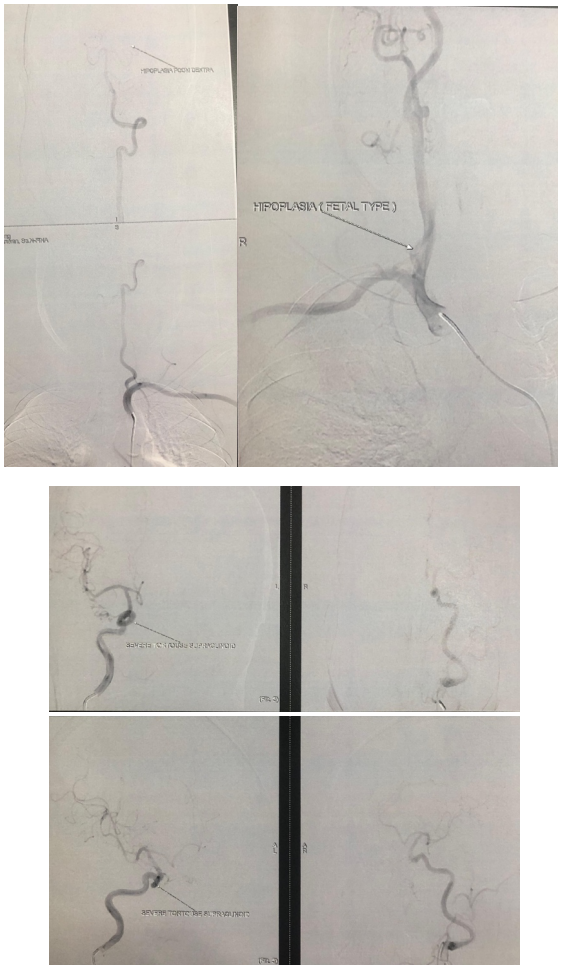

Figure 3. DSA result. Severe tortoise supraclinoid, hypoplasia of the right vertebral artery, hypoplasia of the right PCOM

DISCUSSION

In immunocompetent individuals, cerebral toxoplasmosis is rare and usually asymptomatic or presents with mild, nonspecific symptoms such as headache, myalgia, and lymphadenopathy, with serious complications like encephalitis or uveitis occurring only in rare cases due to the parasite's ability to persist and disseminate[4,14]. Acute *T. gondii* infection in these patients is typically self-limited, and treatment is usually reserved for more severe or prolonged presentations[14].

In the case presented, the patient was known to be HIV-negative and immunocompetent, with positive Toxoplasma IgG and CMV serologies with high avidity, suggesting a chronic or past infection rather than an active one. However, the patient exhibited neurological symptoms and had multiple cerebral infarctions in regions typically affected by toxoplasmosis, namely the basal ganglia and frontal lobe[4,6].

Additional laboratory findings included eosinophilia, lymphocytopenia, and thrombocytopenia. These abnormalities could be associated with CMV infection, which, while typically mild in immunocompetent hosts, can still impact hematopoiesis and immune cell function[9–11]. CMV may directly infect bone marrow hematopoietic cells, leading to suppression of blood cell production and thrombocytopenia, and can even cause severe encephalitis in rare cases in otherwise healthy individuals[10–12]. Eosinophilia in viral infections, including CMV, may reflect interactions with T cells and antigen-presenting cells contributing to adaptive immunity[9].

The patient's occupation as a pig raiser increases the risk of *Toxoplasma gondii* exposure, as pigs can act as intermediate hosts and shed oocysts in feces[2,3]. Although infection is more common and severe in immunocompromised patients (e.g., HIV/AIDS or those on immunosuppressive therapy), latent toxoplasmosis may rarely reactivate in immunocompetent individuals, especially under stress or co-infection[4,5,13].

From a radiological perspective, contrast-enhanced CT or MRI commonly reveals multiple nodular or ring-enhancing lesions with vasogenic

edema that is often disproportionate to lesion size and may lead to mass effect. These lesions are frequently located in the basal ganglia, frontal lobe, and parietal lobe, consistent with this patient's imaging results[6]. On CT, primary CNS lymphoma can present as iso- or hyperattenuating mass lesions due to high cellularity. After contrast, these often enhance homogeneously and show variable edema, typically in a multifocal or periventricular pattern[7].

MRI features may help differentiate between cerebral toxoplasmosis and primary CNS lymphoma. The "eccentric target" sign—comprising an enhancing eccentric core, an intermediate hypointense zone, and a peripheral hyperintense rim has been associated with toxoplasmosis, though it appears in only about one-third of cases.[7]

In this patient, CT findings showed multiple chronic infarctions in the basal ganglia and right frontal lobe, while MRI revealed multifocal infarctions in the right lateral periventricular area, including the anterior horn and internal capsule genu—locations consistent with typical toxoplasmosis lesion distribution[6]. Nevertheless, the absence of typical risk factors, such as immunosuppression, makes the diagnosis of cerebral toxoplasmosis less likely, despite imaging overlap.

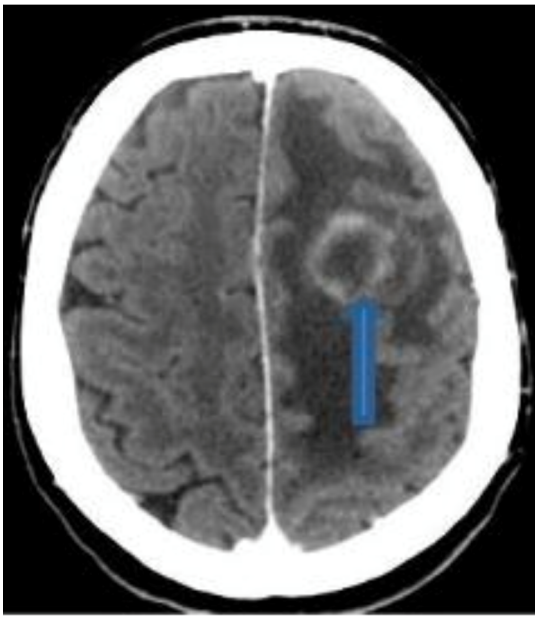

Figure 4. Axial CT scan in an IMCh. Hypodense, annularly enhanced left parafalcoral lesion surrounded by edema.

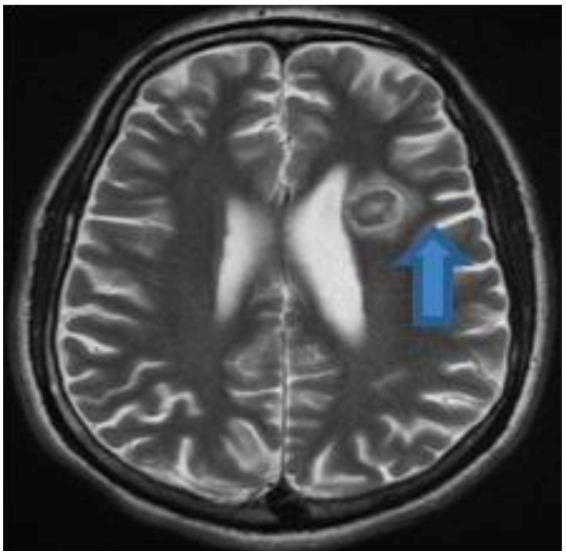

Figure 5. MRI. Cortico-subcortical lesion opposite the frontal horn of the left lateral ventricle, roughly rounded, with heterogeneous T2 signal

Importantly, while toxoplasmosis lesions may mimic ischemic infarcts, especially in IMCh (Immunocompetent Multifocal Chronic infarcts), they usually lack a vascular territorial distribution and often show ring enhancement, which helps distinguish them from classic cerebral infarction patterns[8].

CONCLUSION

In conclusion, this rare case highlights that serious CNS infections such as CMV encephalitis and cerebral toxoplasmosis can occur even in immunocompetent individuals, presenting with subtle, nonspecific symptoms like chronic headache and hematologic abnormalities. Despite the absence of typical immunosuppressive risk factors, latent infections may reactivate or cause atypical manifestations, making diagnosis challenging. A comprehensive clinical, serological, and radiological evaluation is essential to differentiate these infections from other neurological conditions, such as stroke. Early recognition and appropriate antimicrobial therapy can lead to favorable outcomes, emphasizing the importance of maintaining a high index of suspicion for opportunistic infections even in patients without overt immunodeficiency.

CONFLICT OF INTERESTS

The authors have no conflict of interest to declare related to this study.

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REFERENCES

1. Matias-Lopes I, Atalaia-Barbacena H, Guiomar M, et al. Cytomegalovirus infection in an immunocompetent host presenting as hemophagocytic lymphohistiocytosis. Eur J Case Rep Intern Med. 2024;11(12):005071.
2. Bisetegn H, Debash H, Ebrahim H, et al. Global seroprevalence of Toxoplasma gondii infection among patients with mental and neurological disorders: a systematic review and meta-analysis. Health Sci Rep. 2023;6(6):e1531.
3. Dwi Pramardika D, Kasaluhe DM, Sambeka Y, et al. Studi literatur: Analisis faktor risiko toksoplasmosis pada wanita Indonesia. In: prosiding seminar nasional penelitian poltekkes kemenkes tasikmalaya; 2022. p. 15–25.
4. Layton J, Theiopoulou DC, Rutenberg D, et al. Clinical spectrum, radiological findings, and outcomes of severe toxoplasmosis in immunocompetent hosts: a systematic review. Pathogens. 2023;12(4):496.
5. Madireddy S, Mangat R. Toxoplasmosis. [Updated 2024 Oct 14]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2024.
6. Zawadzki R, Modzelewski S, Naumowicz M, et al. Evaluation of imaging methods in cerebral toxoplasmosis. Pol J Radiol. 2023;88:e389–e398.
7. Marcus C. Imaging in differentiating cerebral toxoplasmosis and primary CNS lymphoma with special focus on FDG PET/CT. Am J Roentgenol. 2020;216(1):44–52.
8. Farrar J, Hotez PJ, Junghanss T, et al., editors. Manson's tropical diseases. 24th ed. Elsevier; 2023.
9. Salah S, Alshanbari SN, Masmali HM. A term infant with severe hypereosinophilia secondary to CMV infection and the STAT1 gene mutation: a case report. BMC Pediatr. 2024;24(1):408.
10. Zhan C, Wang W, Chen L. Predictive significance of neutrophil-to-lymphocyte and platelet-to-lymphocyte for cytomegalovirus infection in infants less than 3 months: a retrospective study. J Clin Lab Anal. 2022;36(1):e24131.
11. Maita H, Tonosaki K, Ozawa A, et al. Severe thrombocytopenia caused by cytomegalovirus infection in an immunocompetent adult: a case report. SAGE Open Med Case Rep. 2024;12:2050313X241266766.
12. Newcomb G, Mariuz P, Lachant D. CMV encephalitis/radiculitis: the difficulty in diagnosing in an intubated patient. Case Rep Crit Care. 2019;2019:8067648.
13. Attias M, Teixeira DE, Benchimol M, Vommaro RC, Crepaldi PH, De Souza W. The life-cycle of Toxoplasma gondii is reviewed using animations. Parasitol Vectors. 2020;13(1):588.
14. Dunay IR, Gajurel K, Dhakal R, Liesenfeld O, Montoya JG. Treatment of toxoplasmosis: historical perspective, animal models, and current clinical practice. Clin Microbiol Rev. 2018;31(4):e00057-17