DOI: https://doi.org/10.5281/zenodo.20776464

ISR Journal of Medical Case Reports (ISRJMCR)

Homepage: https://isrpublisher.com/isrjmcr/

Volume 02, Issue 03, March 2026 ISSN: 3107-5576 (Online)

The "Eccentric Target Sign" in Cerebral Toxoplasmosis: A Diagnostic Clue in an HIV-Positive Patient

M. Aabid[1]*, N. Ebbadi[1], Y. Bouktib[1], A. El Hajjami[1], F. Amenzouy[1], B. Boutakaiout[1], M. Ouali Idrissi[1], N. Idrissi El Ganouni[1]

[1]Department of Radiology, Arrazi Hospital, Mohammed VI University Hospital Center, Marrakech, Morocco

***Corresponding author:** M. Aabid
Department of Radiology, Arrazi Hospital, Mohammed VI University Hospital Center, Marrakech, Morocco

Article History

Received: 24-12-2025

Accepted: 28-02-2026

Published: 03-03-2026

Abstract: **Case Report**

***Background*:** Among the opportunistic infections affecting the central nervous system in AIDS patients, cerebral toxoplasmosis remains a primary diagnostic concern, especially when CD4 counts drop below the 100 cells/mm³ threshold. ***Case Presentation*:** We describe the clinical course of a 22-year-old HIV-positive male who presented with a sudden onset of consciousness disorders. Brain MRI at 1.5 Tesla identified multifocal nodular lesions involving the basal ganglia, thalami, and corticomedullary junctions. ***Results*:** The lesions exhibited a specific "concentric target sign" on T2/FLAIR sequences. Post-contrast imaging was even more revealing, showing the pathognomonic "eccentric target sign"—a small enhancing nodule located along the internal wall of a ring-enhancing abscess. Diffusion-weighted imaging (DWI) showed only discrete ADC restriction, a key finding to rule out the intense restriction typically seen in CNS lymphoma. Thalamic hemorrhagic stigmata were also identified. ***Conclusion*:** In the setting of severe immunosuppression, these specific MRI signatures provide enough diagnostic certainty to initiate an empirical therapeutic trial. This approach effectively bypasses the need for high-risk brain biopsies and significantly reduces neurological morbidity.

Keywords: Cerebral Toxoplasmosis, HIV/AIDS, MRI, Eccentric Target Sign, Neuro-Opportunistic Infection, Diagnostic Imaging.

1. INTRODUCTION

Cerebral toxoplasmosis, caused by the parasite Toxoplasma gondii, continues to be a major source of neurological complications in immunocompromised patients [1, 2]. Despite the progress made with antiretroviral therapy (ART), this infection is often the inaugural manifestation of AIDS in patients who are either undiagnosed or non-compliant with their treatment [3]. Clinically, the disease is a "great mimicker," with symptoms ranging from simple headaches and seizures to rapid cognitive decline or coma [7]. In this setting, neuroimaging is not just helpful but decisive. The main challenge for the radiologist is to distinguish toxoplasmosis from primary central nervous system lymphoma (PCNSL) or even tuberculosis [5, 8]. Advanced MRI patterns, particularly the "eccentric target sign," offer the high specificity needed to start life-saving therapy without delay [4, 12].

2. CASE PRESENTATION

A 22-year-old male with a known HIV history was brought to the emergency department after a 24-hour onset of altered consciousness (Glasgow Coma Scale 10/15). He was afebrile and had no history of recent head trauma.

The urgent brain MRI revealed a multifocal process with nodular lesions of varying sizes. These were scattered across the cortical-subcortical junctions of all lobes, the

thalami, and the cerebellum. On FLAIR sequences, the lesions showed a complex mixed signal, surrounded by massive vasogenic edema, particularly in the left frontal and parieto-occipital regions **(Figure 1A)**.

Functional study using diffusion-weighted imaging (DWI) showed hyperintensity on B1000 **(Figure 1B)** with only a discrete restriction on the ADC map **(Figure 1C)**. This suggested an infectious abscess content rather than a solid hypercellular tumor. Furthermore, T1-weighted images showed peripheral hyperintense signals in the thalami, consistent with hemorrhagic stigmata.

After gadolinium injection, we observed heterogeneous ring enhancement in most lesions. A pathognomonic "eccentric target sign"—defined by a small enhancing nodule along the internal wall of a larger ring—was clearly visible in the frontal nodules **(Figure 2A)**. Typical ring enhancement was also confirmed in the thalami and occipital cortex **(Figure 2B)**. Given the radiological signature and the patient's immune status, we established a presumptive diagnosis of cerebral toxoplasmosis. The patient responded rapidly to pyrimethamine and sulfadiazine, with clinical recovery noted within 48 hours.

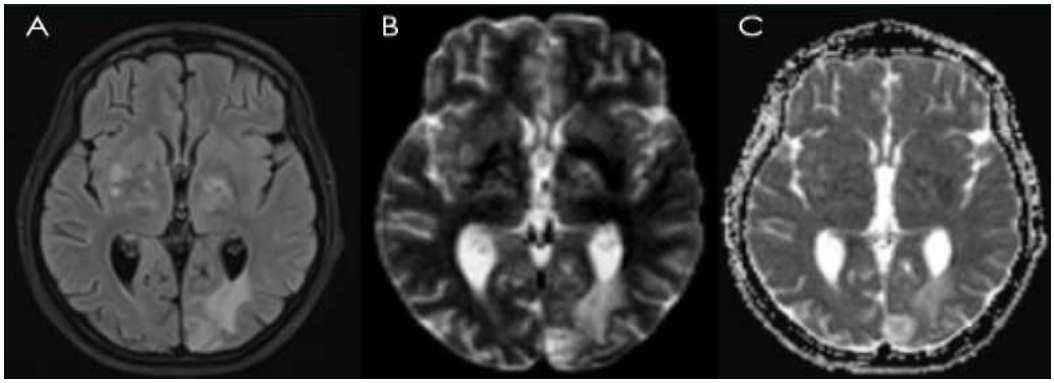

Figure 1: Morphological and functional MRI assessment: (A) Axial FLAIR sequence demonstrating multifocal hyperintense lesions with significant perilesional vasogenic edema. (B) Diffusion-weighted imaging (DWI B1000) showing hyperintense signals within the lesions, with (C) corresponding discrete restriction on the ADC map, consistent with infectious abscesses

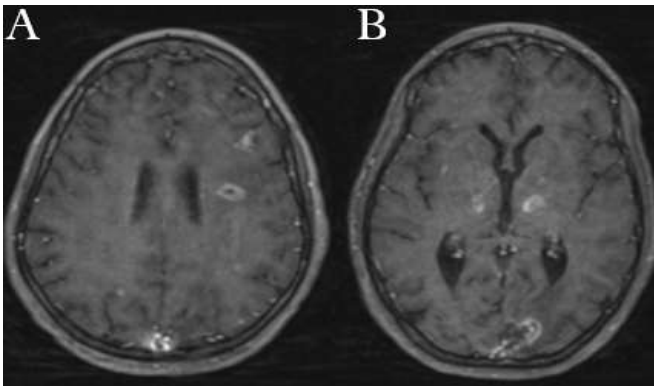

Figure 2: Post-contrast T1-weighted sequences: (A) Axial T1 Gado: pathognomonic "eccentric target sign" (arrow) in the left frontal region. (B) Lower slice: multiple ring-enhancing lesions in the thalami and occipital cortex

3. DISCUSSION

Cerebral toxoplasmosis is usually a reactivated infection that surfaces when cellular immunity is profoundly suppressed [10]. This case demonstrates how MRI morphology can steer the entire management strategy in a critical care setting.

3.1. Understanding the Pathognomonic Signs

The tropism of *T. gondii* for the basal ganglia and corticomedullary junction is likely due to the high capillary density in these zones [5]. We focused on two specific markers:

- **The Eccentric Target Sign (T1 Gado):** Seen in about 30% of cases, it consists of a ring-enhancing abscess with an internal eccentric nodule **(Figure 2A)**. Pathologically, this nodule represents either an inflamed vessel or an invaginated fold of the abscess wall [4]. Its specificity for toxoplasmosis is nearly 95%.
- **The Concentric Target Sign (T2/FLAIR):** This reflects alternating layers of coagulative necrosis and inflammatory zones [6].

3.2. Toxoplasmosis vs. Lymphoma: The Diagnostic Dilemma

Differentiating these two conditions is a classic neuroimaging hurdle in HIV patients [8].

- **Diffusion & ADC:** PCNSL typically shows a very low ADC due to high cellularity, whereas our patient showed only discrete restriction **(Figure 1C)**, which is typical for toxoplasmosis.
- **Hemorrhage:** Thalamic hemorrhage, as seen in our case, is common in toxoplasmosis but quite rare in untreated lymphoma [5, 8].
- **Spectroscopy & Perfusion:** While not performed here, these techniques are valuable; toxoplasmosis shows a "lipid-lactate" peak, while lymphoma is characterized by high choline and high rCBV (neoangiogenesis) [12].

3.3. Regional Context and Tuberculomas

In Morocco and North Africa, cerebral tuberculosis remains a frequent differential. Tuberculomas are often conglomerate, showing a low T2 signal in the center (caseous necrosis), and are frequently associated with basal meningitis [11]. The absence of meningeal involvement in our patient made the parasitic origin much more likely.

3.4. The Value of the Therapeutic Trial

A rapid clinical response (within 3 to 7 days) following antiparasitic therapy is considered a valid "diagnostic test" [9]. This strategy spares the patient from the potential complications of a stereotactic brain biopsy, while radiological regression of the lesions is usually confirmed within two weeks [1, 10].

4. CONCLUSION

The discovery of an "eccentric target sign" on post-contrast MRI in an HIV-positive patient provides sufficient diagnostic confidence to start targeted therapy. By integrating morphological T2 patterns and functional ADC data, radiologists can guide the management of neuro-opportunistic infections non-invasively, optimizing outcomes in the ART era.

REFERENCES

1. Vidal, J. E, *et al*., (2024). Cerebral toxoplasmosis in HIV-positive patients: a review of diagnostic and therapeutic strategies in the ART era. *J Infect Dis*, *229*(2), 341-352.
2. Siqueira, A. M, *et al*., (2024). Target signs in neurotoxoplasmosis: a pathognomonic MRI review. *Neuroradiology Journal*, *37*(1), 12-19.
3. Zeng, Y, *et al*., (2025). MRI features and diagnostic pitfalls of opportunistic brain infections in AIDS: a five-year retrospective study. *Clinical Imaging*, *108*, 110-121.
4. Kumar, G. S., Mahadevan, A., Guruprasad, A. S., Kovoor, J. M., Satishchandra, P., Nath, A., ... & Shankar, S. (2010). Eccentric target sign in cerebral toxoplasmosis: neuropathological correlate to the imaging feature. *Journal of Magnetic Resonance Imaging*, *31*(6), 1469-1472.
5. Smith, A. B, *et al*., (2008). CNS infections in the immunocompromised host. *Radiographics*, *28*(5), 1457-1480.
6. Mahadevan, A, *et al*., (2013). The 'concentric target sign' on T2-weighted MRI: a specific marker for cerebral toxoplasmosis. *Neuroradiology*, *55*(10), 1241-1246.
7. Finsterer, J., & Scorza, F. A. (2023). Opportunistic CNS infections in HIV/AIDS: a practical guide for clinicians. *Neuro AIDS Review*, *19*(4), 215-228.
8. Muley, P, *et al*., (2024). Differentiating Toxoplasmosis from Primary Central Nervous System Lymphoma: The role of advanced MRI sequences. *Int J Neuroradiol*, *15*(3), 45-56.
9. CDC, NIH, HIVMA/IDSA. Guidelines for the Prevention and Treatment of Opportunistic Infections in HIV: Cerebral Toxoplasmosis. Last updated 2023.
10. Tselis, A. (2024). Brain abscess and HIV: A diagnostic and therapeutic update. *Curr Infect Dis Rep*, *26*(1), 1-14.
11. Gaba, S, *et al*., (2023). Toxoplasmosis versus Tuberculosis: Imaging mimics in endemic regions. *North African Medical Journal*, 12, 89-94.
12. Yousaf, M, *et al*., (2025). Neuroimaging of AIDS: Beyond the Basics. *Applied Radiology*, *54*(2), 22-31.