

# Solitary Cerebral Toxoplasmosis Presenting with Characteristic Magnetic Resonance Imaging Findings

## Karakteristik Manyetik Rezonans Görüntüleme Bulguları ile Ortaya Çıkan Soliter Toksoplazmozis Olgusu

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**ABSTRACT** Toxoplasmosis is caused by an intracellular protozoan called *Toxoplasma gondii*, and is seen worldwide. In patients with acquired immunodeficiency syndrome (AIDS), it constitutes the most common opportunistic central nervous system (CNS) infection. Magnetic resonance imaging (MRI) is the modality of choice for the evaluation of CNS involvement in these patients. In our case report, we described a 53-year-old male patient presenting with a right side hemiparesis and sensorial loss, who also had a history of AIDS. He underwent computed tomography examination where a hypodense left thalamic mass lesion was found. For further characterization, an MRI examination was performed and on T1 weighted images, a hypointense mass with a peripheral incomplete hyperintense rim at the left thalamic region was found, exhibiting a lamellar appearance on T2 weighted images. The mass showed slight peripheral contrast enhancement. Multivoxel MR spectroscopy demonstrated a conspicuous lactate peak. A biopsy procedure was performed and the pathological evaluation revealed cerebral toxoplasmosis.

**ÖZET** Toksoplazmozis, *Toxoplasma gondii* olarak adlandırılan bir hücre içi protozoan tarafından oluşturulan ve dünyada yaygın olarak görülen bir enfeksiyondür. Edinilmiş bağışıklık eksikliği sendromu [acquired immunodeficiency syndrome (AIDS)] olan hastalarda, santral sinir sisteminin (SSS) en sık görülen fırsatçı enfeksiyonudur. Manyetik rezonans görüntüleme (MRG), bu hastalardaki SSS tutulumunun değerlendirilmesinde tercih edilmesi gereken modalitedir. Olgu bildirimizde, geçmişinde AIDS hikâyesi bulunan ve sağ tarafta hemiparezi ve duyu kaybı olan 53 yaşında bir erkek hastayı tanımladık. Hastanın bilgisayarlı tomografi incelemesinde sol talamusta hipodens karakterde kitle lezyonu saptandı. İleri değerlendirme için MRG incelemesi gerçekleştirildi ve sol talamusta, T1 ağırlıklı görüntülerde periferik tam olmayan hiperintens halkası bulunan hipointens karakterde, T2 ağırlıklı görüntülerde ise lamellar bir görünüm sergileyen kitlesel lezyon bulundu. Kitle, hafif tarzda periferik kontrastlanma göstermekteydi. Multivoksel MR spektroskopik incelemede, belirgin laktat piki saptandı. Hastaya biyopsi yapıldı ve patolojik değerlendirme sonucu serebral toksoplazmozis tanısı konuldu.

**Keywords:** Cerebral toxoplasmosis; computed tomography; magnetic resonance imaging

**Anahtar Kelimeler:** Serebral toksoplazmozis; bilgisayarlı tomografi; manyetik rezonans görüntüleme

Toxoplasmosis accounts for 50-70% of all intracranial mass lesions in acquired immunodeficiency syndrome (AIDS) patients. It is also the most common opportunistic infection involving the brain in this patient population.<sup>1</sup> Untreated infections in these patients can result in catastrophic implications. However, accurate diagnosis still remains as a challenging issue.

### CASE REPORT

A 53-year-old man was admitted to the hospital with both motor hemiparesis and sensorial loss in his right arm and leg. He was recently diagnosed with AIDS. The patient was referred to computed tomography (CT) examination. On axial CT scan, a hypodense mass lesion measuring 30x24 mm in diameter in the

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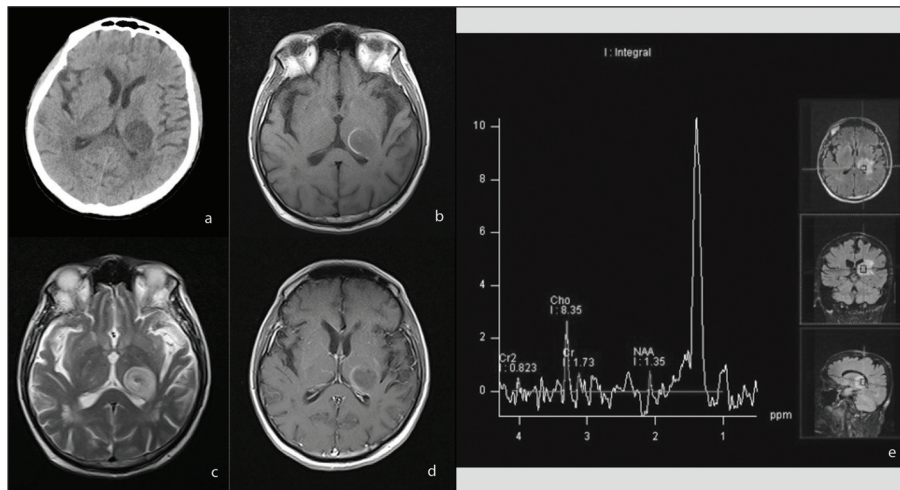
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**FIGURE 1:** a) Axial computed tomography scan shows a hypodense mass lesion in the left thalamus region 30x24 mm in diameter. b) Axial T1 weighted magnetic resonance image, a hypointense mass lesion with a medial peripheral hyperintense rim is seen. c) Axial T2 weighted magnetic resonance image, the mass exhibits a lamellar fashion with hyperintense signal intensity. d) On axial post-contrast T1 weighted magnetic resonance image, the mass shows slight peripheral rim enhancement. e) Multi-voxel magnetic resonance spectroscopy image reveals a prominent lactate peak with substantial decrease in other metabolite levels.

left thalamic region was found (Figure 1a). For further characterization, the patient underwent a magnetic resonance imaging (MRI) examination. Prior to both examinations, informed consents were obtained from the patient. On T1 weighted image, a hypointense mass lesion with a surrounding incomplete peripheral hyperintense rim was observed in the left thalamus (Figure 1b). On T2 weighted image, the lesion had a heterogenous hyperintense appearance with a lamellar fashion (Figure 1c). On post-contrast T1 weighted images, the mass exhibited a slightly peripheral rim enhancement (Figure 1d). Multivoxel MR spectroscopy was performed which revealed a conspicuous lactate peak, although a prominent decrease was detected in other metabolite levels (Figure 1e). The patient then underwent a biopsy procedure due to poor response to prior medical therapy and was finally diagnosed with cerebral toxoplasmosis. The resulting strategy was to start a new medical treatment protocol specific for toxoplasmosis with a close follow-up plan by infection clinicians.

## DISCUSSION

*Toxoplasma gondii* is an intracellular protozoan parasite and can lead to fatal disease in immunocompromised individuals. The most common presenting symptoms seen in these patients is headache which

is often accompanied by fever and altered mental status. On unenhanced CT, cerebral toxoplasmosis is usually seen as multiple isodense or hypodense lesions, although a solitary mass lesion is also probable.<sup>2</sup> Mass effect and surrounding vasogenic edema can be found. These lesions are compatible with abscess and show a propensity for the basal ganglia and periventricular regions. On MRI, T1 weighted images without contrast enhancement, these lesions may show a peripheral hyperintensity as it was in our case. This feature can be pathognomonic for cerebral toxoplasmosis and may help in the distinguishment from lymphoma cases.<sup>2,3</sup> On T2 weighted and FLAIR sequences, lesions usually demonstrate a high or mixed signal intensity pattern. On contrast-enhanced T1 weighted images, a rim-like contrast enhancement pattern can be detected. Batra et al. in their study evaluated 8 patients manifesting with 23 cerebral toxoplasmosis lesions and demonstrated that all lesions exhibited a predominant lipid peak on MR spectroscopy and were found to be exceedingly hypovascular on perfusion MR studies.<sup>4</sup> The main differential diagnosis for cases of cerebral toxoplasmosis is with primary central nervous system lymphoma. Multiple, rim enhancing lesions seen in the basal ganglia region should be suspected for cerebral toxoplasmosis.

Here, the typical solitary periventricular or subependymal lesions would mostly be in favour of a lymphoma case. However, substantial overlapping in imaging findings may occur in toxoplasmosis versus lymphoma cases.<sup>5</sup> On MR spectroscopy examination, the detection of lipid and lactate peaks may refer to toxoplasmosis, although significant overlapping between metabolites can occur.<sup>4</sup> Diffusion weighted imaging may also contribute to differential diagnosis in which the apparent diffusion coefficient lesion/normal white matter ratios of greater than 1.6 will be considered as toxoplasmosis rather than lymphoma.<sup>6</sup> On thallium single-photon emission, CT and positron emission tomography can play a role in the discrimination of toxoplasmosis and lymphoma cases. Poor uptake on these examinations indicates toxoplasmosis.<sup>7,8</sup> In conclusion, we would like to emphasize the characteristic imaging findings of toxoplasmosis abscess especially on

MRI and highlight some diagnostic clues such as T1 hyperintensity rim sign and elevated lactate peak for differential diagnosis.

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#### **Conflict of Interest**

*No conflicts of interest between the authors and / or family members of the scientific and medical committee members or members of the potential conflicts of interest, counseling, expertise, working conditions, share holding and similar situations in any firm.*

#### **Authorship Contributions**

*This study is entirely author's own work and no other author contribution.*

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