Case Report

An atypical case of neurotoxoplasmosis in immunocompetent patient

Karilla Danielle Ferreira Lima, MDa,*, André Luiz Guimarães de Queiroz, MDa, Hennan Salzedas Teixeira, MDa, Victor Mantelatto Bonsi, MDa, Bruno Shigueo Yonekura Inada, MDb, Carmen Lucia Penteado Lancellotti, MD, PhDb, Alex Machado Baêta, MD, PhDa

a Hospital Beneficência Portuguesa de São Paulo, Department of Neurology, rua Mestro Cradim, 769, 01323001 São Paulo, SP, Brazil
b Hospital Beneficência Portuguesa de São Paulo, Department of Neuroradiology, São Paulo, SP, Brazil

Article history:
Received 3 September 2020
Revised 4 April 2021
Accepted 6 April 2021

Keywords:
Encephalitis
Parasitic infections
Neurotoxoplasmosis
Immunocompetent

Abstract

Toxoplasmosis is an infection caused by Toxoplasma gondii, an intracellular protozoan that is often associated with immunocompromised patients and is rare in immunocompetent. A 60-year-old man was admitted with a history of 2 days of headache and right-sided weakness. There was no history of fever, surgeries, or any other comorbid illness. Cerebrospinal fluid showed just mild pleocytosis with 15 cells/mm³, predominantly lymphomononuclear. MRI showed Peripheral enhancing lesion with central diffusion restriction and perivascular enhancing lesion with restricted diffusion with vasogenic edema and leptomeningeal enhancement in the white matter.

Viral serologies, tumor markers, protein electrophoresis were normal. The patient was submitted to brain biopsy, revealing necrotic brain parenchyma with predominantly acute inflammation, with diffuse encephalitis pattern, and cysts with bradyzoites (cystozoites) of Toxoplasma gondii in the brain parenchyma. The central nervous system infection by Toxoplasma gondii can present as meningoencephalitis during primary infection in an immunocompetent, although it is rare. Central nervous system lymphoma is the main differential diagnosis of neurotoxoplasmosis by imaging, especially in our case.

© 2021 The Authors. Published by Elsevier Inc. on behalf of University of Washington. This is an open access article under the CC BY-NC-ND license (http://creativecommons.org/licenses/by-nc-nd/4.0/)

Introduction

Toxoplasmosis is an infection caused by Toxoplasma gondii, an intracellular protozoan. Human beings can be infected by ingestion of undercooked, raw meat or water/food containing cysts/oocysts and most individuals are infected inadvertently [9]. Factors such as virulence of the organism, sex, genetic phenomena, and immunity seem to affect the course of the disease and seem to affect the course of infection [13]. Damage to the CNS (central nervous system) by T gondii is characterized

* Competing Interests: None.
* Corresponding author.
E-mail address: karilla.df@gmail.com (K.D.F. Lima).
https://doi.org/10.1016/j.radcr.2021.04.013
1930-0433© 2021 The Authors. Published by Elsevier Inc. on behalf of University of Washington. This is an open access article under the CC BY-NC-ND license (http://creativecommons.org/licenses/by-nc-nd/4.0/)
Neurotoxoplasmosis is often associated with immunocompromised patients, however, is often rare in immunocompetent ones. In healthy individuals, the acquired infection is usually asymptomatic causing self-limited lymphadenopathy or mononucleosis-like syndrome [3].

**Case report**

We present a case of a 60-year-old man who was admitted with 2 days history of headache and right-sided weakness without altered state of consciousness. There was no history of fever, surgeries or any other comorbid illness. Neurologic examination included right hemiparesis. Cerebrospinal fluid showed (CFS) just mild pleocytosis (15 cells/mm$^3$, predominantly lymphomononuclear). Glucose, protein and flow cytometry immunophenotypic analysis were normal. Viral serologies, tumor markers, protein electrophoresis were normal. Immunodeficiency was excluded with T-3 lymphocyte count, serum immunoglobulin levels and normal complement. Computerized tomography of the abdomen and thorax without changes.

MRI showed (Figs. 1-3) perivascular enhancing lesion with restricted diffusion with vasogenic edema and leptomeningeal enhancement in the frontoparietal white matter. Spectroscopy showed an elevated lipid lactate peak. Perfusion demonstrated increased microvascular permeability.

Initially, a diagnosis of neoplastic lymphoproliferative disorder was suspected due to the patient’s age, history, and imaging features, although it may not rule out inflam-
matory/infectious diseases. The investigation was complemented with brain biopsy, revealing (Fig. 4) necrotic brain parenchyma with predominately acute inflammation, with diffuse encephalitis pattern and cysts with bradyzoites (cytozoites) of T. gondii. Treatment is consisted of sulfadiazine and pyrimethamine for 6 weeks. His neurological features improved completely as well as resonance findings, showing regression of the lesions with no pathological contrast enhancement.

Discussion

Up to one-third of the world’s population is infected by T. gondii [4]. Infection with T. gondii may be subclinical or it may cause clinical signs and symptoms that vary according to the patient’s immune status and their clinical situation. Immunocompetent hosts have a primary asymptomatic and self-limited T. gondii infection, which usually does not require treatment [2,12].

A definitive diagnosis of neurotoxoplasmosis requires a compatible clinical context and brain imaging and also the detection of the protozoan in a biopsy [1]. The treatment of choice is a combination of sulfadiazine and pyrimethamine for 6 weeks [10]. In an immunocompetent host the probability of CNS infection by T. gondii is low and meningoencephalitis as a primary infection is rare in this group of patients [5]. Therefore, the diagnosis is not usually considered initially.

The spectrum of neurological symptoms includes headache, altered mental status, visual disturbances, seizures, cranial nerve abnormalities, and sensory disturbances. The most common neurological signs include motor weakness and speech disturbances [7].

On MRI, neurotoxoplasmosis presents as hypointense lesions on T1-weighted images and may show peripheral hyperintensity. The lesions on T2 and FLAIR images have high or mixed signal intensity. On contrast-enhanced T1-weighted images, the lesions show rim-like enhancement with surrounding hypointense areas. The most common affected areas in CNS include the basal ganglia, corticomedullary junction, white matter and periventricular regions [7,11]. The imaging features reflect the pathogenesis of reactivation and hematogenous spread, with a reduced inflammatory response depending upon the immune status [14].

Central nervous system lymphoma (PCNSL) is the main differential diagnosis of neurotoxoplasmosis by imaging, especially in our case. They have in common findings of unifocal or multifocal involvement that may occur anywhere in the brain, as well as varied patterns of enhancement, edema and mass effect, with hyperintense signal on T2-weighted MRI images and predilection for the basal ganglia [7,11].

PCNSL has predilection for the periventricular and superficial regions, often in contact with ventricular or meningeal surfaces and linear enhancement along perivascular spaces that is highly suggestive of PCNSL. Both perfusion MR imaging and perfusion CT may demonstrate increased microvascular permeability in tumor tissue and MR spectroscopy has demonstrated elevated lipid peaks combined with high Cho/Cr12 [6].

Conclusion

We present a case of an immunocompetent patient with focal signs and neuroimaging demonstrating lesion of undetermined meaning. MRI showed a perivascular enhancing lesion and contact with meningeal surfaces, which suggested the possibility of PCNSL but without enough findings that could rule out infectious or inflammatory disorders, therefore cerebral biopsy was proceeded.

Neurotoxoplasmosis should be considered as an important differential diagnosis in immunocompetent patients with neurological findings that suggest lymphoproliferative disease.
REFERENCES

[1] AIDSinfo. Panel on Opportunistic Infections in HIV-Infected Adults and Adolescents. Guidelines for the prevention and treatment of opportunistic infections in HIV-infected adults and adolescents: recommendations from the Centers for Disease Control and Prevention, the National Institutes of Health, and the HIV Medicine Association of the Infectious Diseases Society of America. http://aidsinfo.nih.gov/contentfiles/lvguidelines/adult_oiai.pdf [accessed 26.06.19].

[2] Akturk HK, Sotello D, Ameri A, Abuzaid AS, Rivas AM, Vashisht P. Toxoplasma infection in an immunocompetent host: possible risk of living with multiple cats. Cureus 2017;9(3):e1103 Published 2017 Mar 19. doi:10.7759/cureus.1103.

[3] Hurt C, Tammaro D. Diagnostic evaluation of mononucleosis-like illnesses. Am J Med 2007;120(10).

[4] Dalimi A, Abdoli A. Latent toxoplasmosis and human. Iran J Parasitol 2012;7(1):1-17. 7.

[5] Dukes CS, Luft BJ, Durak DT. Toxoplasmosis. In: Scheld WM, Whitley RJ, Durak DT, editors. Infections of the central nervous system. Philadelphia: Lippincott-Raven; 1997. p. 785-804.

[6] Haldorsen IS, Espeland A, Larsson EM. Central nervous system lymphoma: characteristic findings on traditional and advanced imaging. AJNR Am J Neuroradiol 2011;32(6):984-92.

[7] Lee GT, Antelo F, Mikotic AA. Cerebral toxoplasmosis. RadioGraphics 2009;29:1200-5.

[8] Luft BJ, Conley F, Remington JS, Laverdiere M, Wagner KF, Levine JF, et al. Outbreak of central-nervous system toxoplasmosis in western Europe and North America. Lancet 1983;1(8328):781-4.

[9] Montoya JG, Liesenfeld O. Toxoplasmosis. Lancet 2004;363(9425):1965-76.

[10] Nath A, Sinai AP. Cerebral toxoplasmosis. Curr Treat Options Neurol 2003;5(1):3-12.

[11] Ramachandran R, Radhan P, Anand R, Subramanian I, Santosham R, Sai V. CNS toxoplasmosis in an immunocompetent individual. Radiol Case Rep 2014;1:908.

[12] Robert-Gangneux F, Dardé ML. Epidemiology of and diagnostic strategies for toxoplasmosis [published correction appears in Clin Microbiol Rev. 2012 Jul;25(3):583]. Clin Microbiol Rev 2012;25(2):264-96. doi:10.1128/CMR.05013-11.

[13] Su C, Howe DK, Dubey JP, Ajioka JW, Sibley LD. Identification of quantitative trait loci controlling acute virulence in Toxoplasma gondii. Proc Natl Acad Sci USA 2002;99(16):10753-8.

[14] Vastava PB, Pradhan S, Jha S, Prasad KN, Kumar S, Gupta RK. MRI features of toxoplasma encephalitis in the immunocompetent host: a report of two cases. Neuroradiology 2002;44(10):834-8 Epub 2002 Aug 24. PMID: 12389133. doi:10.1007/s00234-002-0852-5.