

# Cerebral toxoplasmosis in a multiple sclerosis patient

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## ABSTRACT

Toxoplasmosis is an ubiquitous infection caused by an intracellular parasite with specific tropism for brain and muscle tissue, most frequently encountered in HIV infected patients. Multiple sclerosis is the most prevalent immune-mediated demyelinating disease of the central nervous system, especially in young women. The co-occurrence of these two pathologies in an immunocompetent patient should not be missed out, as it requires particular approach regarding treatment.

**Keywords:** cerebral toxoplasmosis, multiple sclerosis, immunocompetent

## INTRODUCTION

Toxoplasmosis is a world-wide distributed infection, determined by contamination with an intracellular protozoan parasite, *Toxoplasma gondii*, with a specific tropism for muscle and brain tissue, the II genotype being the most frequent (1). Its seroprevalence is around 11% in people over 6 years in United States, being higher in areas of the world with hot and humid climates and lower altitudes (2). Transmission occurs through ingestion of infectious oocytes from the environment, from contaminated felines, from mother-to-fetus or during organ transplantation (3).

Around 2/3 of infections occur in immunocompromised patients, usually HIV infected, in which it is the most frequent cause of cerebral abscess (4). Immunocompetent patients rarely develop acute systemic infection, usually the infection is latent and can persist for a life-long period (5).

Multiple sclerosis is the most frequent immune-mediated inflammatory disease of the central nervous system, mostly affecting young adults, especially women (6).

## CASE REPORT

We present the case of an immunocompetent 37-year old woman, known with relapsing-remitting multiple sclerosis (RRMS) (diagnosis established in 2006). Her initial treatment was started in 2007 with Glatiramer acetate, on which she developed numerous relapses, therefore in 2015 she was switched to Natalizumab. In 2008, apart from previous lesions, there were identified numerous ring-enhancing lesions, with a hypointense core and crenelated outline, located in the right temporal lobe, bilaterally in the frontal and parietal lobe paraventricular on a repeated cerebral MRI. The diagnosis of toxoplasmosis was suspected, which was confirmed by positive laboratory tests and the patient underwent etiologic treatment for 3 weeks with Pyrimethamine 25 mg/d and Sulfadiazine 4 g/d as well as folic acid 25 mg/d supplementation. Currently she came to our clinic due to worsening of her previous gait disorder, paresthesia in the left upper limb and fatigability. It is significant to mention that the patient discontinued treatment for RRMS for a few years in the period between 2012

and 2015, due to a personal decision, thus undergoing serious deterioration of her neurological condition.

Neurologic examination revealed the following – ataxic-spastic gait with a walking-perimeter of about 50 m, bilateral diminished visual acuity, Romberg with disorganized laterodeviation, left spastic hemiparesis 4/5 MRC, left superior limb adiadochokinesia, brisk osteotendinous reflexes (superior limbs > inferior ones), Hoffman, Rossolimo and Babinski reflex present on the left, tactile hypoesthesia of the left hemibody, urinary retention, hypoprosexia. EDSS = 6.0.

We performed a contrast-enhanced cerebral MRI, on which there were numerous stationary bilateral T2 and FLAIR hyperintense lesions, none of them gadolinium-enhanced. Apart from those, there was a lesion of about 2 cm in diameter with peripheral hyperintensity and a hypointense core on T2 and FLAIR, located paraventricular in the right frontal lobe.

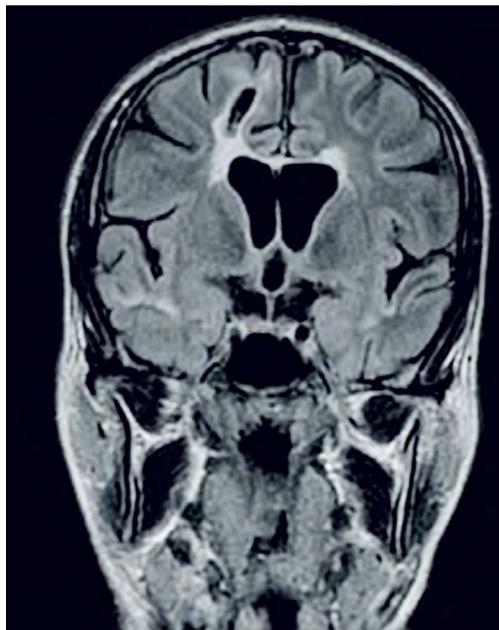
The patient underwent treatment with Gabapentin for the paresthetic syndrome as well as a neuro-motor rehabilitation program with a moderate gait disorder improvement and continues monthly treatment with Natalizumab.

## DISCUSSION

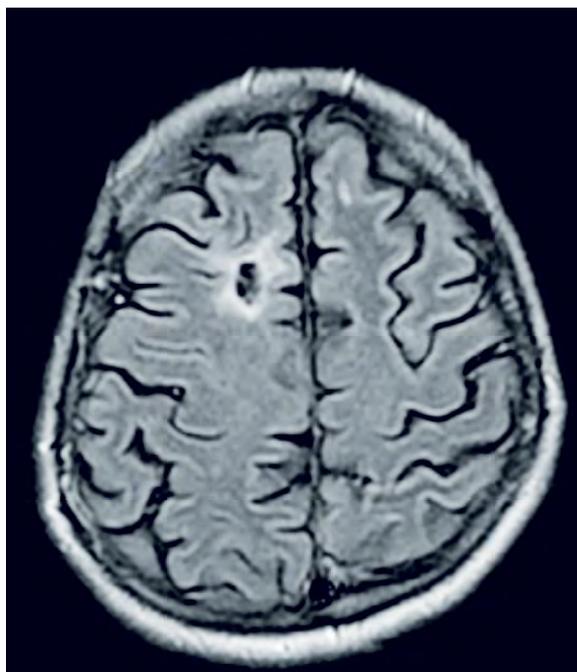
The presence of anti-Toxoplasma IgG antibodies in multiple sclerosis (MS) patients ranges between 32.4% and 39.1% (7). The relation between multiple sclerosis and *Toxoplasma gondii* infection seems controversial. In 2 studies (one from 2015 and the other from 2017) the presence of seropositive toxoplasmosis appears as a protective factor for the development and progression of MS, the explanation being supported by the hypothesis of immunomodulatory effects of parasitic infections in autoimmune diseases (8,9), whereas in another study with a smaller group, it proved to be as a risk factor for MS (10).

The peculiarity of the case relies in the fact that cerebral toxoplasmosis was accounted in an immunocompetent patient with multiple sclerosis under immunomodulatory treatment with Glatiramer acetate, who remained with a residual cystic lesion on MRI (Fig. 1 and 2). Cystic lesions can also be detected in chronic multiple sclerosis lesions (11);

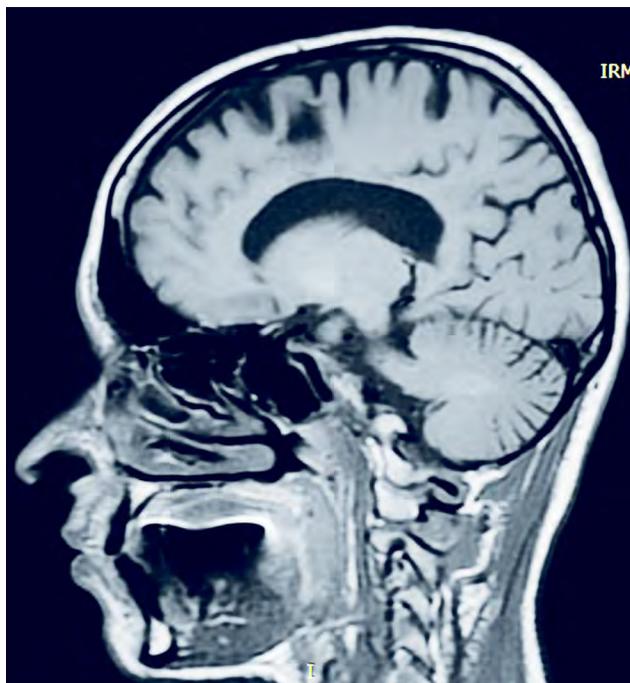
therefore, it should be kept in mind, in patients with extensive multiple sclerosis lesions, that there can be another concomitant disease that needs specific treatment. Glatiramer acetate proved to be as one of the safest treatments in multiple sclerosis that needs no specific monitoring in regard to patients' immunity, because it induces the expansion of the T CD8<sup>+</sup> cells, which seems to be crucial in host defense against the infection with *Toxoplasma gondii* (12).



**FIGURE 1.** Coronal FLAIR – peripheral enhancement with a hypointense core paraventricular in the right frontal lobe



**FIGURE 2.** Axial FLAIR – cystic oval lesion with peripheral hyperintensity and hypointense core, right frontal lobe



**FIGURE 3.** T1 sagittal – extensive hypointense paraventricular lesion in the right frontal lobe

Regarding MRI specific cerebral toxoplasmosis features, on T1 – lesions are typically iso- or hypointense (Fig. 3), in contrast to T2 – where they vary from hyperintense to isointense. Also, there is usually a concentric alternating zone of hypo/hyper/isointense signal, known as the “concentric target sign” (13). On T1 gadolinium enhanced sequences, lesions frequently present ring or nodular enhancement as well as the eccentric target sign on post-contrast images (14,15).

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