Case report

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NEUROTOXOCARIASIS: CORRELATION OF CLINICAL SYMPTOMS AND RADIOGRAPHIC IMAGING: A CASE REPORT

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Human toxocariasis is a parasitic infection caused by the roundworms *Toxocara canis* or *Toxocara cati*. *Toxocara* larvae can cross the blood-brain barrier leading to the neurotoxocariasis. Involvement of the central nervous system is extremely rare. The clinical presentation consists of a wide spectrum of neurological manifestation. Here we present a case of a 63-year-old woman with a rapidly progressive form of neurotoxocariasis. Her initial head computed tomography scan showed multiple hypervascular lesions in her brain and a contrast enhanced magnetic resonance imaging scan showed multiple T1W and T2W enhancing lesions in basal ganglia and cerebellum. Thereafter, in further processing, serological tests showed the presence of higher titer of anti-Toxocara antibody in the serum, as well as the presence of eosinophilia in the serum or cerebrospinal fluid. This case highlights an unusual case of neurotoxocariasis in the nonendemic area, in a patient who was not immunocompromised, who was diagnosed with serological tests and reviews of the relevant radiological findings.

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Key words: *toxocariasis, central nervous system, neurotoxocariasis*

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Introduction

Human toxocariasis is a rare parasitic zoonosis with variable clinical picture, caused by the larval ascarids *Toxocara canis* and *Toxocara cati*, that can lead to infection of central nervous system (1). The clinical presentation consists of a wide spectrum of signs and symptoms, but human infection can also be asymptomatic. Clinical presentation depends on immune status, host age, number of ingested larvae, previous contact to larvae, affected tissue. Involvement of the central nervous system is extremely rare. Neurotoxocariasis is a potentially fatal parasitic infection that most commonly occurs in immunocompromised individuals.

The case highlights the difficulties in diagnosing cerebral toxocariasis. Here we present the case of a 63-year-old woman with a rapidly progressive form of the disease, and without other significant diseases. Computed tomography (CT) and magnetic resonance imaging (MRI) scans noted multiple lesions in the right basal ganglia and cerebellum. Clinical presentation and such imaging findings have led the diagnosis in the wrong direction. During the diagnostic processing, numerous diagnostic tests were performed, including a serological blood test for Toxocara antibody, which contributed to the establishment of final diagnostics.

Case report

A 63-year-old woman was receivedto hospital forheadache, forgetfulness, dizziness, instability when standing andwalking and peripheral facial nerve paresis. A week before admission to hospital treatment, the patient became confused, forgetful and complained of dizziness and instability when standing and walking. She was examined by a neurologist (e.g., art. Vertebrobasalis, HTA), after which she was referred to outpatient treatment. The following day, the weakness of the musculature of the right half of the face occurred, with an exacerbation of earlier subjective problems. She returned to the Clinic of Neurology and she was hospitalized.

CT scan showed multiple hypervascular tumoral lesion in the posterior limb of internal capsule, thalamus and mesencephalon. In the further diagnostic processing we also performed magnetic resonance imaging scan which showed multiple T1W and T2W enhancing lesions in basal ganglia (Figure 1) and cerebellum (Figure 2). Such a finding may have

corresponded to multifocal metastasis disease at that moment. For this reason, we have expanded our diagnostic work-up to detect a possible primary tumor process.

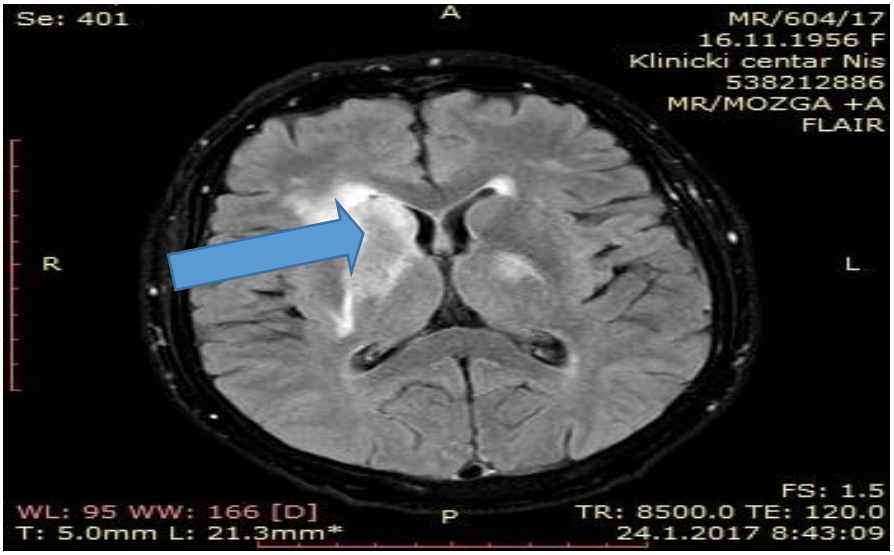

Figure 1. Axial Flair MR image showed multiple hyperintense lesions in the right basal ganglia

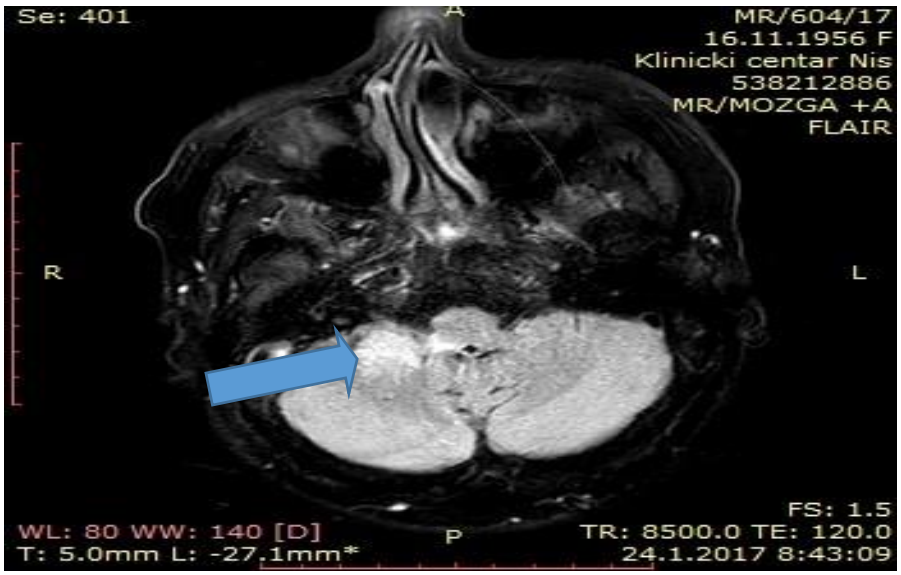

Figure 2. Axial Flair MR tomogram image showed multiple hyperintense lesions in the right cerebellar peduncle

As we did not receive a confirmed primary tumor, we continued with the diagnostic processing. Immunohistochemical stains for cANCA antibodies, HIV, cytomegalovirus (CMV), HSV, varicella zoster virus (VZV), Brucella, *Toxoplasma gondii* were all negative. We have detected the presence of eosinophilia in serum or cerebrospinal fluid, and serological tests showed presence higher titer of anti-Toxocara antibody in the serum. In addition, we confirmed the high level of IgE immunoglobulin. Then we started therapy with antiparasitic drugs (Albendazole) and corticosteroids. Further, after the diagnosis was confirmed, we conducted an epidemiological survey, but did not determine the possible way of infection

(direct contact with an infected animal or ingestion through food).

Her neurological status continued to decline and she died. Her entire hospital stay was 28 days. The family did not consent for autopsy.

Discussion

Human toxocariasis is a zoonosis, which may result in central nervous system injury. Toxocariasis is caused by *Toxocara canis* and *Toxocara cati*, whose definitive host is digestive tract of dogs and foxes for *T. canis* and cats for *T. cati*. The parasite tends to be more prevalent in tropical regions. In our country the frequency of this infection is relatively low (2).

Toxoplasmosis is a parasitosis that most often occurs in people with a weakened immune status. The female *Toxocara* can produce more than hundreds of thousands of eggs per day. Eggs reach to the environment through the dogs or cats feces (3). Human can become infected by direct contact with dogs or cat or by the ingestion of contaminated food. Toxocara eggs hatch in the small intestine and release immature larvae, and then penetrate through the small intestine mucosa, migrate to the portal circulation, lungs and left heart, form where they disseminate via systemic circulation, including the central nervous system (4).

Toxocara canis larve can cross the blood-brain barrier, invading the CNS, leading to neurotoxocariasis. Neurotoxocariasis is rare and occurs mainly in middle aged people. Numerous autopsy studies have proven the presence of *Toxocara larvae* in the leptomeninges, cerebellum, and the spinal cord (5).

Typical clinical presentation of toxocariasis include general clinical symptoms such as hyperthermia, headache, anorexia, nausea, vomiting, body weight loss, cough, dyspnea, possible development of bronchitis or pneumonia, hepatomegaly, cardiac, rheumatological and lymphatic signs and symptoms. Neurotoxocariasis in humans is rare. The clinical presentation of neurotoxocariasis includes a wide range of neurological manifestations such as meningitis, encephalitis, myelitis, cerebral vasculitis. In addition to the central nervous system, the peripheral nervous system may also be affected. Peripheral nervous system manifestation involves radiculitis or inflammation skeletal muscles, but that manifestation is extremely rare. In many scientific literature, the possible association of neurotoxocariasis and some other neuropsychiatric disorders such as schizophrenia, seizure, cognitive deficits, idiopathic Parkinson's disease, and dementia have been discussed. Cognitive and developmental delays have been observed in some infected children. The main clinical manifestations of neurotoxocariasis are vasculitis, obstructive hydrocephalus, encephalitis, meningitis and myelitis (6).

The diagnosis of neurotoxocariasis is a challenge because there is no distinct clinical syndrome. Clinical and radiological picture, laboratory blood test, biochemical, cytological examination of cerebrospinal fluid (CSF), determination of antibodies against *Toxocara* spp. in blood or CSF, are necessary to confirm the diagnosis.

Positive serum IgG antibody by ELISA is required to confirm the diagnosis.

On the other hand, peripheral eosinophilia and CSF pleocytosis are also important for diagnosis. Increased serum IgE levels were almost always positive.

Metastatic disease has the greatest differential diagnostic significance in terms of imaging. Magnetic resonance showing single or multiple subcortical, cortical, or white matter hyperintense lesions on FLAIR and T2WI, with enhancement after contrast. Although such imaging findings are important for diagnosis, they are not specific to neurotoxocariasis. Therefore, postcontrast MRI findings usually indicate multiple enhancing lesions, which often overlap with CNS metastatic disease (7).

Definitive diagnosis is made by histological confirmation, but it is rarely followed.

Treatment is still matter of debate. The drugs used in therapy are anthelmintic drugs and corticosteroids. Albendazole is the drug of first choice in treatment due to a better pharmacological profile than other anthelmintic drugs, with a dosage 800 mg per day (8).

Conclusion

This case emphasizes the difficulties of diagnosing neurotoxocariasis. Clinical diagnosis can be difficult due to atypical clinical presentation that may indicate other neurological diseases. On the other hand, imaging findings may overlap with metastatic disease. Heightened awareness of the occurrence of neurotoxocariasis is needed because clinical and radiological presentation may be unspecific. These can make difficulties to establish an accurate diagnosis. In our case, the final diagnosis was rendered by serological tests, which once again proved to be the gold standard for diagnosis.

Neurotoxocariasis can result in varying and atypical neurological manifestation. It is typical that the infection occurs in immunocompromised patients, but rare cases can be seen in relatively immunocompetent patients. Neurotococariasis is a serious parasitic disease that, if not treated adequately, can have severe consequences, including death.

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Prikaz bolesnika

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NEUROTOKSOKARIAZA: PRIKAZ BOLESNIKA U KORELACIJI SA KLINIČKIM SIMPTOMIMA I RADIOLOŠKIM IMIDŽINGOM

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Ljudska toksokariaza je parazitska infekcija, koju izazivaju okrugli crvi *Toxocara canis* ili *Toxocara cati*. Larve toksokare mogu preći krvno-moždanu barijeru i izazvati neurotoksokariazu. Zahvaćenost centralnog nervnog sistema je izuzetno retka. Klinička prezentacija sastoji se od širokog spektra neuroloških manifestacija. Ovde predstavljamo slučaj šezdesettrogodišnje žene sa brzo progresivnim oblikom neurotoksokariaze. Početno snimanje kompjuterizovanom tomografijom endokranijuma, pokazalo je više hipervaskularnih lezija u mozgu, a kontrastno snimanje magnetnom rezonancom pokazalo je više lezija sa pojačanjem signala T1W i T2W u bazalnim ganglijima i molom mozgu. Nakon toga, u daljoj obradi, serološki testovi pokazali su prisutnost povišenog titra antitoksokara antitela u serumu, prisutnost eozinofilije u serumu i eozinofilne pleocitoze u cerebrospinalnoj tečnosti. Ovo je neobičan slučaj neurotoksokariaze u neendemskom području, kod bolesnika koji nije imunokompromitovan, gde je dijagnoza postavljena serološkim testom, koji pregledava relevantne radiološke nalaze.

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Ključne reči: *toksokariaza, centralni nervni sistem, neurotoksokariaza*