

CLINICAL FOLLOW-UP OF DOGS WITH NEUROLOGICAL DISORDERS AND POSITIVE FOR ANTIBODIES AGAINST *TOXOPLASMA GONDII*

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Abstract

Toxoplasmosis is an important parasitic zoonosis caused by the protozoan Toxoplasma gondii, which is widespread in humans and animals worldwide, including dogs. Infection with T. gondii in dogs is usually asymptomatic but cases of severe clinical toxoplasmosis have been reported worldwide. Toxoplasmosis is recognized as an opportunistic disease in dogs and is characterized by neuromuscular, respiratory, and gastrointestinal signs or by generalized infection. The most common neurological signs are characterized by ataxia, circling, behavioural changes, seizures, paralysis, paraplegia, twitching and tremors. In this study we present a clinical follow-up of twenty-seven dogs admitted to the Veterinary Clinic of Faculty of Veterinary Medicine of Bucharest in 2014, presenting with neurological disorders, mainly epilepsy-like seizures. All of them were serological positive for antibodies against T. gondii, as follows: 63.00% (17/27) were positive for both IgG and IgM, 25.9% (7/27) were positive only for IgG, while 11.1% (3/27) were positive only for IgM. The clinical presentation and the outcome of different therapeutic regimes are discussed. The study demonstrates the importance of toxoplasmosis in dogs and represents a basis for further in-depth studies to investigate the risks for clinical canine toxoplasmosis and to confirm, including by PCR, the implication of T. gondii in the neurological pathology in dogs in Romania. In addition to its veterinary importance, toxoplasmosis is also of major zoonotic concern and dogs can serve as epidemiological indicators for local infections.

Key words: neurological disorders, clinical investigation, Ig G, Ig M antibodies, *Toxoplasma gondii*, dogs

INTRODUCTION

Toxoplasmosis is an important parasitic zoonosis caused by the protozoan *Toxoplasma gondii*, which is widespread in humans and animals worldwide, including dogs (Dubey, 2010; Dubey and Beattie, 1988). Toxoplasmosis is recognized as an opportunistic disease in dogs, which is characterized by neuromuscular, respiratory and gastrointestinal signs, or by generalized infection (Greene, 2006).

Infection with *T. gondii* in dogs is usually asymptomatic but cases of severe clinical toxoplasmosis in dogs have been reported worldwide (Dubey et al., 2003).

The most common neurological signs are characterized by ataxia, circling, behavioral

changes, seizures, paralysis, paraplegia, twitching and tremors (Greene, 1998; Da Silva et al., 2005).

Although, there are numerous serological reports of *T. gondii* infection in dogs, clinical canine toxoplasmosis is considered a rare disease (Dubey et al., 2003). Furthermore, *T. gondii* infections are epidemiologically important because the dog may be considered as a sentinel in the epidemiology of toxoplasmosis (Dubey, 2010).

In this study we present a clinical follow-up of dogs admitted to the Veterinary Clinic of Faculty of Veterinary Medicine of Bucharest in 2014, presenting with neurological disorders. The clinical presentation, serological investigations and the outcome of different therapeutic regimes have been followed.

MATERIALS AND METHODS

Twenty-seven dogs admitted in 2014 to the Veterinary Clinic of Faculty of Veterinary Medicine of Bucharest (South-eastern Romania), presenting with nervous symptoms were included in this study. The dogs, of age between two and 12 years, of different breed. Every dog, for which a detailed medical history was recorded, was subjected for a complete clinical and neurological examination. Additional, most of them (21/27), were subjected also for an ophthalmological exam.

For every dog, biochemical and hematological exams were performed. Serological tests for IgM and IgG anti-*T. gondii* antibodies were carried out in the Diagnostic Laboratory. For this, serum samples were examined by an indirect fluorescent antibody test (IFAT) using a commercially available test.

RESULTS

Twenty-seven dogs admitted to the Veterinary Clinic of Faculty of Veterinary Medicine of Bucharest presented with neurological symptoms. Their owners reported about history of epilepsy - like seizures for a period of time of a few weeks to a few years. The seizures were manifested at a variable period of time (a few per day or a few per year), not presenting a cyclical typology; in a few dogs (6/27; 22.2%), salivation during the seizures appeared but no defecation / urination was observed.

The duration of a seizure was from 1-2 minutes to 30-40 minutes.

No changes in appetite (hydric or of food) were observed.

Unlike the epilepsy seizure, only some dogs (1/27; 3.7%) have lost their conscience, and the tonic-clonic contraction was manifested in two dogs (7.4%).

The clinical examination did not reveal significant changes, but the neurological changes were as follows:

- Status: depressed, in most patients;
- Cranial nerves:
 - o Anisocoria (15/27; 55.6%);
 - o No changes in face sensibility;

- o Delayed pupilar/palpebral reflex (17/27; 62.9%);
- o Delayed “menace” and “cotton ball” test results in right eye/left eye or both eyes in those presenting seizures for over 3 months;
- Posture – no changes or prefers lateral recumbence;
- Proprioception – no changes;
- Spinal reflexes – no changes;
- Panniculus – no changes;
- Perianal reflex – no changes;
- Gait: Tendency to fall on the side of the affected cerebral area;
 - o tendency for dromomania after the seizure (9/27; 33.3%);
 - o tendency to hold the head below the body line (13/27; 48.1%);
 - o tendency to lean the head against objects.

The neurologic exam lead to the conclusion that the neuroanatomical localisation was in the area of the cerebral hemispheres.

For none of the examined dogs, ocular lesions compatible with toxoplasmosis were recorded.

Serological tests for IgM and IgG anti-*T. gondii* antibodies revealed positive results, for all dogs as follows: 63.00% (17/27) were positive for both, IgG and IgM, respectively, 25.9% (7/27) were positive only for IgG, while 11.1% (3/27) were positive only for IgM.

The chosen regime of treatment was:

- Clindamycine 10 mg x 2 times a day, for 30 days;
- Omega-3 1 g/40 kg/day, for 30 days;
- Antioxydant Wamark 1 cpr/40 kg/day, for 30 days;
- Liver support (Silimarina, Hepatiale, Essentiale) according to body weight, for 30 days;
- Probiotics- according to body weight, for 30 days;
- When seizures occurred (in two dogs; 7.4%), Fenobarbital (4 mg/kg/day) was administered;
- When the seizure was only partial/fake (especially after loud noises) we chose to administer GABA 15-20 mg/kg/day, in the evening (for one dog; 3.7%).

Fourteen days post-treatment, the dogs underwent for a check-up, including: clinical,

neurological examinations and serological tests for toxoplasmosis (IgG and IgM *T. gondii* antibodies). In a high percentage (81.5%; 21/27), the neurological exam was significantly improved had no seizures at all, but some still went through one seizure/30 days (7.4%; 2/27) or a few partial seizures (14.8%; 4/27).

For one dog, the Magnetic Resonance Imaging revealed asymmetry at the IV ventricular level, possibly due to a congenital reason, and multiple vascular alterations - possibly an ischemic vascular attack. In the dog presenting seizures localised on some muscle groups, it was decided to change the diet to gluten free type, which lead to a normal general state.

Overall, the post-treatment serological test results were also encouraging, all dogs being negative for Ig M. However, the serological test revealed still high titers of IgG in eleven dogs (40.7%).

For these reagents dogs, we proceeded to a new 30 day treatment with Doxycycline 10 mg/kg/day or Clindamycine 10 mg x two times/day, and we recommended to continue the previous treatment with Omega-3, Antioxydant Walmark, liver support, probiotics +/- Fenobarbital, +/- GABA).

Overall, all the dogs made a gradual recovery, with complete return of locomotor function and muscle mass within two and three months for 59.3% and 40.7%, respectively. The serological test revealed 2 positive only for IgG, low titers and they were advised for monitoring.

Toxoplasmosis is recognized as one of the most common diseases in dogs with neurological signs (Da Silva et al., 2005), and has been related to combined infections with distemper (Brito et al., 2002). Moreover, neurological signs of toxoplasmosis, distemper, and neosporosis are similar, emphasizing the importance of the differential diagnosis of these diseases (Langoni et al., 2012). *N. caninum* infections have been described in animals affected with toxoplasmosis and it should be also considered in the differential diagnosis or with concurrent infection (Mineo et al., 2001).

In our study, the most common neurological disorders were alterations movement, mainly epilepsy-like seizures, and, for some, in consciousness. The percentage of reagents with specific IgM antibodies was higher (63.0%), indicating active infections. This was also supported by the fact that all dogs were vaccinated for distemper virus, and the age category, over 2 years, it is not known as common for neosporosis (Dubey et al., 2003). *Toxoplasma* infection in animals has been previously studied in Romania, especially in the west, north, centre, and southeast of the country. Hotea et al. (2012) has reported high prevalence rates of *Toxoplasma* infection in cats (77.42%) and sheep (61.33%) in western Romania. For dogs, recent studies have reported sero-prevalence rates of IgG *T. gondii* antibodies from 25.46% to 50.00% in northwestern and southeastern Romania, respectively (Cozma et al., 2007; Enachescu et al., 2013). Moreover, Enachescu et al. (2013) has reported that of the dogs positives for IgG antibodies against *T. gondii*, one dog, for which a high antibody titer (S/P=291.91%) was registered but negative for *Neospora* infection, has presented neurological disorders: the dog, 14 month old, presented myoclonus and ataxia at the clinical examination, and a history of distemper - like symptoms with one month before (fever, purulent nasal and ocular discharge, dyspnea), but the rapid antigen test for canine distemper virus was negative (Enachescu et al., 2013). In a similar study, Brito et al. (2002) reported that IgM titers are more prevalent in dogs with altered consciousness.

Overall, a high seroprevalence of *T. gondii* in dogs may indicate a high pressure of environmental contamination, emphasizing the need for extended epidemiological studies (Langoni et al., 2014; Lopes et al., 2011; Schares et al., 2005; Meireles et al., 2004). Furthermore, it could emphasize potential risks to public health, pointing out potential common sources of infection for both humans and dogs (Salb et al., 2008).

CONCLUSIONS

In the present study, the clinical follow-up of dogs with neurological disorders and positive

for antibodies against *T. gondii* emphasized a high percentage of animals seropositive for Ig M *T. gondii* antibodies, which might indicate an active infection.

Although it was not possible to be certain that every case is one of clinical toxoplasmosis, given the possibility of neurological symptomatology of other infections, these results demonstrate the importance of toxoplasmosis in dogs.

In addition to its veterinary importance, toxoplasmosis is also of major zoonotic concern and dogs can serve as epidemiological indicators for local infections.

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