



## CANINE OCULAR THELAZIOSIS IN SLOVAKIA A CASE REPORT

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### ABSTRACT

**Thelaziosis is a parasitic disease of the eye that has become more common in Europe over the last twenty years. It is caused by a nematode, order *Spirurida*, family *Thelaziidae*. The transmission of this parasite occurs by the dipteran flies. *Thelazia callipaeda* occurs in the conjunctival sac, under the third eyelid or in the lacrimal ducts, causing blepharospasm, conjunctivitis, keratitis and sometimes corneal ulceration. Thelaziosis is a zoonotic disease. It occurs in humans, domestic animals and wildlife. Between 2016 and 2018 three cases of canine ocular thelaziosis occurred in dogs admitted to the Small Animals Clinic in Kosice, Slovakia. In all cases, the systemic and local treatments were administered. The parasites were removed from the conjunctival sac. The identification of *Thelazia callipaeda* was performed by microscopic examinations.**

**Key words:** dog; eye parasite; *Thelazia callipaeda*

### INTRODUCTION

The nematode *Thelazia callipaeda* Raillet and Henry, 1910 (*Spiruvida*, *Thelaziidae*) is an agent of ocular thelaziosis that can occur in large and small animals including cattle, horses, cats, dogs, wolves, red foxes and rabbits [8, 16, 19, 22]. *Thelazia callipaeda* has a zoonotic character. The occurrence of *Thelazia* sp. in dogs used to be typical in North America and Asia [28] which explains its so-called name of “oriental eye worm” [25]. The disease was first reported in northern Italy in 1989 [24]. Recently the number of infections are rapidly increasing and the occurrence of thelaziosis has been reported in Belgium, Germany [7], Portugal, Serbia, France [2], Spain [14], Switzerland [13], Hungary [27] and Slovakia [3]. Thelaziosis in Europe is a consequence of international trade and travel of people, animals and potential disease vectors [7].

*Thelazia callipaeda* is a nematode parasite with an indirect life cycle. The females are viviparous. Muscid flies or fruit flies are the intermediate hosts and they ingest the L1 stage with conjunctival fluids. The larva develops through

two moults to a third-stage larva, which is infective to vertebrate hosts and transmitted to the new host [10, 11, 29, 30]. *Phortica variegata* (Diptera: *Drosophilidae*), a fruit fly, is the intermediate host of *T. callipaeda* in Europe [17, 26]. The development of the larval stage occurs in the fly's ovarian follicles during the summer time. Late-stage larvae migrate to the fly's mouthparts and transfers to the final host through fly ingestion [28]. The prepatency lasts 3–6 weeks and the adult worms persist for a year and longer [6]. Although there are more ocular parasitic helminths, *Thelazia* sp. is the only one that needs direct inoculation of the larval stage into the proper host eye [20]. Adult parasite can be found in the conjunctival sac, under the eyelids, third eyelid or in the nasolacrimal ducts.

The typical signs of canine ocular thelaziosis are: blepharospasm, intensive epiphora, sometimes purulent discharge, conjunctivitis, hyperaemia and chemosis of the conjunctiva, and keratitis [7, 25]. In some cases, corneal ul-

ceration may occur due to the mechanical damage of the corneal surface by the moving parasite [20]. The presence of *T. callipaeda* in the conjunctival sac can be considered as a presence of a foreign body that secondarily causes infection or conjunctivitis. The presence of the parasite in the nasolacrimal duct can directly cause its obstruction which may be presented as either a severe epiphora or a discharge from the infected eye. The case of *T. callipaeda* nasolacrimal duct infection was presented in Europe for the first time in 2006 in Belgium [9]. The diagnosis of thelaziosis is based on the presence of eye worms in the animal's conjunctival sac and a broad spectrum of clinical signs [14]. The identification of *Thelazia callipaeda* can be performed by: microscopic and molecular examination, by genomic DNA isolation and identification. The microscopic identification of *T. callipaeda* is according to: their size, the presence of a buccal capsule, the transversely striated cuticle, the position of the vulva located anterior to the oesophagus-intestinal junction and the presence of numerous rounded first-stage larvae in the distal uterus in the female worms and the presence of two dissimilar spicules in the caudal bursa of the male worm [21] (Figs. 1, 2, 3).

This study describes three cases of canine ocular thelaziosis that occurred in patients of the Small Animals Clinic in Kosice, Slovakia, between 2016 and 2018.

## CASE PRESENTATIONS

### Case No. 1

In October 2017, a 3-year old female Rough Collie was brought to the clinic with a unilateral problem with one eye. According to the owner, for three weeks, intermittent



Fig. 1. Head of female *Thelazia callipaeda* isolated from patient



Fig. 2. Tail of male *Thelazia callipaeda* with visible spiculum

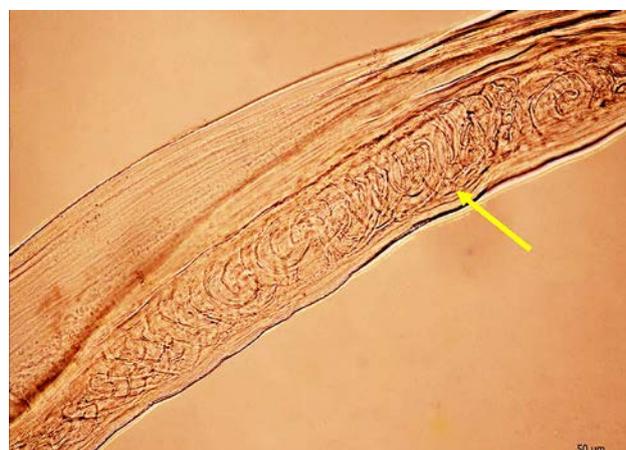


Fig. 3. The middle part of the female body with the larvae inside

epiphora had been observed from the right eye that had become purulent and severe for the last few days. The clinical findings revealed: a purulent discharge, conjunctival hyperaemia and chemosis. The Schirmer tear test (STT) was 23 mm.min<sup>-1</sup> and 21, 23 mm.min<sup>-1</sup> in the left and right eye, respectively. Slit-lamp biomicroscopy revealed a normal anterior segment of the eye. The measurement of the intraocular pressure using a handheld rebound tonometer (TonoVet®, iCare) revealed 15 mmHg on the right and 17 mmHg on the left eye. No fundoscopic changes were observed by ophthalmoscopic examination using a direct and indirect ophthalmoscope. The examination of the conjunctival sac after local anaesthesia and Oxybuprokainium chlorid drops (Benoxi 0.4 %, Unimed Pharma, Slovakia) revealed the presence of moving white eye worms under the third eyelid and on the corneal surface. A mild hyperplasia of lymphoid follicles was also evident on the bulbar conjunctiva of the nictitating membrane. The parasites were removed from the eye using fine serrated forceps and a cotton tip applicator. An application of 10 % imidacloprid and 2.5 % moxidectin (Advocate Spot-On; Bayer Animal Health, Slovakia) was administered. Tobramycin 3 mg.ml<sup>-1</sup> and Dexamethasone 1 mg.ml<sup>-1</sup>, (Tobradex, Novartis, Slovakia) eye drops were administered 4 times a day for a week. After a one week recheck, no parasites were present under the third eyelid. After a one month consultation, no parasites were observed with no visible signs of any conjunctivitis. The parasites were collected in 70 % ethanol for parasite identification. During the microscopic examination, *Thelazia callipaeda* was identified. Ten individuals (3 females, 7 males) were collected (Fig. 4).



Fig. 4. Ten adult worms of *Thelazia callipaeda* found in dog's (case No. 1) eye. Size of worms from 16 to 21 mm.

#### Case No. 2

A four year old, female, Border Collie was brought to the clinic with a unilateral problem in the right eye in September, 2016. The owner has observed a long lasting discharge and redness of the right eye. Clinical findings revealed purulent discharge. There was severe conjunctival hyperaemia and chemosis. Schirmer tear test (STT) was 18 mm.min<sup>-1</sup> on the left and 23 mm.min<sup>-1</sup> on the right eye. Slit-lamp biomicroscopy revealed a normal anterior segment of the eye. The intraocular pressure was acquired using a handheld rebound tonometer (TonoVet®, iCare) which revealed 15 mmHg and 17 mmHg at the left and right eye, respectively. There were no fundoscopic changes observed using the direct and indirect ophthalmoscope. During the examination of the conjunctival sac after local anaesthesia and Oxybuprokainium chlorid drops (Benoxi 0.4 %, Unimed Pharma, Slovakia), the white eye worms under the third eyelid were observed. The parasites were removed from the eye using fine serrated forceps. Spot on application of 10 % imidacloprid and 2.5 % moxidectin (Advocate Spot-On; Bayer Animal Health, Slovak Republic) and local application of 0.33 mg.ml<sup>-1</sup> Tobramycin, (Tobrex, Novartis, Slovakia) eye drops 4 times a day for a week were recommended. No parasites were present after a one week recheck. The owner was informed about the regular prevention of parasitic diseases and asked to come back to the clinic if any worsening of the status of the dog occurred. The parasites were collected in 70 % ethanol for parasitic microscopic identification during which *Thelazia callipaeda* was identified. Three individuals (2 females and 1 male) were collected.

#### Case No. 3

In September 2018, the owner of a 7.5-year old, female Dogo Argentino signed up for an appointment at the clinic due to chronic ulceration of the right eye. Ophthalmic examination revealed unilateral seropurulent discharge, hyperaemia and chemosis. The Schirmer tear test (STT) was 19 mm.min<sup>-1</sup> and 20 mm.min<sup>-1</sup> in left and right eyes respectively. On the right cornea in the medial quadrant, chronic ulceration with corneal neovascularization was diagnosed, with surface 0.4 × 0.5 mm fluorescein positive test. Slit-lamp biomicroscopy revealed no changes in the anterior chamber of the eye. The measurement of the intraocular pressure using TonoVet®, iCare revealed 17 mmHg on right and 17 mmHg on the left eye. During ophthalmo-



Fig. 5. *Thelazia callipaeda* eye infection in a dog (case No. 3)

scopic examination using direct and indirect ophthalmoscope, no fundoscopic changes were observed. After the examination of the third eyelid and conjunctival sac under local anaesthesia and Oxybuprokainium chlorid drops (Benoxi 0.4 %, Unimed Pharma, Slovakia), one white eye worm under the third eyelid was observed (Fig. 5). The worm was removed from the eye using a cotton tip applicator. The application of 10 % imidacloprid and 2.5 % moxidectin (Advocate Spot-On; Bayer Animal Health, Slovakia) was administered. Eye drops of 0.33 mg.ml<sup>-1</sup> Tobramycin, (Tobrex, Novartis, Slovakia) were prescribed 4 times a day for a week. The administration of glycosaminoglycan in the form of hydrogel was recommended (Sentrx-Aptus gel, Orion Corporation, Finland) to support corneal healing 3 times a day. The parasites were collected in 70 % ethanol for parasite identification. During the microscopic examination one *Thelazia callipaeda* female was identified.

There were no signs either of inflammation or the presence of the *Thelazia* sp. parasite in the other eye in all of the three patients. All patients were informed about the necessity of regular parasitological prevention.

## DISCUSSION

The occurrence of *Thelazia* sp. in dogs was typical in North America and Asia but the number of infections is rapidly increasing since first reported in Europe in late 1980's [24]. A recent zoonotic outbreak of thelaziosis has been described in France and Italy although it is a major problem in Asia. All of the dogs presented in these cases were living in Slovakia. Two of them, Case No. 1 and No. 2, were travelling with their owners around Europe. In 2017,

4 cases of canine ocular thelaziosis were described for the first time [3]. The potential increase in the number of these cases depends on the presence of vectors; the flies in these cases [15]. It has been reported that 74 % of the cases occurred during summer and autumn, when the number of flies is the biggest and they are most active [5]. All of the cases were diagnosed by authors during the autumn in Slovakia; two times in September and once in October.

The typical signs of canine ocular infection of *Thelazia* sp. are: blepharospasm, intensive epiphora, sometimes purulent discharge, conjunctivitis, hyperaemia and chemosis of conjunctiva, keratitis and sometimes corneal ulceration [7]. All of the patients revealed severe symptoms of eye problems but only one of the three had corneal ulceration. Thelaziosis can be symptomatic or subclinical. According to various studies, 15.4 to 81.4 % of infected dogs shows clinical signs [13, 14]. In the subclinical stage of the disease, dogs and cats are considered to be reservoirs of *Thelazia callipaeda* [19]. Although the number of parasites in the conjunctival sac can vary, there is no relationship between the severity of the clinical signs and the degree of invasion. Although all cases described by the authors were home pets, the prevalence of large breeds of dogs living outdoors has been reported [13, 14]. In a differential diagnosis, bacterial, viral, rickettsial, parasitic, allergic and hypersensitivity conjunctivitis should be taken into consideration [23]. Eye worm diagnosis can be difficult when most parasites are in the larval stage [21]. Thelaziosis should be always taken into consideration in the differential diagnosis of chronic keratoconjunctivitis, in "red eyes" cases [7].

The treatment of thelaziosis always consists of systemic and local drug applications. Removal of the worms from the conjunctival sac is necessary. *Thelazia callipaeda* can be easily removed using fine serrated forceps and cotton tip applicator under local anaesthesia. The detection of parasites can be made easier by increasing the light intensity of the biomicroscope (for example the slit lamp) because that promotes the movement of the parasite [23]. A single spot-on dermal application of 10 % imidacloprid and 2.5 % moxidectin (Advocate Spot-On®; Bayer) has previously been reported as a successful treatment. The comparison study of spot on imidacloprid 10 % and moxidectin 2.5 % and milbemycin oxime/praziquantel tablets (Milbemax, Novartis, France) revealed 100 % efficacy up to 35 days post treatment by spot on applied combination. The *per os* tablet treatment was also successful, but parasites were still de-

tected up to the 14th day of the treatment during rechecks [18]. The local treatment using antibiotics and corticoids is also recommended to treat the local symptoms including conjunctivitis and eventual bacterial contamination [1, 9]. The administration of eye drops of 1 % moxidectin injectable solution demonstrated good tolerance and efficiency. According to a paper published in 2004, a few minutes after drug administration into the conjunctival sac, the parasites died. That was explained as more effective, as local treatment in drops was approximately 6 µg of moxidectin to compare with 200 µg.kg<sup>-1</sup> ivermectin systemic treatment as subcutaneous injection that may cause pain and injuries due to propylene-glycolin formulation [12]. Generally, the described and recommended treatment of ocular thelaziosis include a single subcutaneous injection of ivermectin [7, 12] or 200 µg.kg<sup>-1</sup> ivermectin in combination with oral 0.5 mg.kg<sup>-1</sup> milbemycin oxime [23] or single spot on administration of 10 % imidacloprid and 2.5 % and moxidectin [4]. The systemic treatment can be successfully combined with local administration of chloramphenicol [4, 7] fusidic acid [23], and dexamethasone if necessary [4]. The prevention against vectors is important. It is possible to use preparations with repellent effects. They are used with the active substance deltamethrin, permethrin or the combination of imidacloprid + permethrin in various application forms (collar, spot on).

## CONCLUSIONS

The prevention and treatment of *Thelazia callipaeda* is very important as an increasing number of infected humans and animals makes it another potential zoonotic disease. It appears relevant to conduct further studies to investigate *Phortica* sp. as a vector of *Thelazia callipaeda* in Europe due to climate changes, particularly global warming that may cause the spread of parasites on our continent.

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