CASE REPORT

PEDIATRIC OCULAR TOXOCARIASIS IN JIANGSU PROVINCE, EASTERN CHINA

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Abstract. Ocular toxocariasis is caused by migration of a *Toxocara* larva through the posterior eye. We report the first case of pediatric ocular toxocariasis caused by *T. canis* in Jiangsu Province, eastern China. A 6-year-old girl presented to Suzhou Municipal Children's Hospital with a complaint of right eye redness, minimal white discharge, no photophobia, eye pain, visual impairment, fever or arthralgia. She was initially diagnosed as having conjunctivitis; however, a 2-month treatment with lomefloxacin 0.3% eye drops gave no improvements. The diagnosis was made based on medical history (contact with dogs), clinical features and detection of *T. canis* IgG antibodies with an enzyme-linked immunosorbent assay (ELISA). Anthelmintic therapy with albendazole in combination with prednisolone resulted in improvement of the ocular symptoms. Ocular toxocariasis is rarely reported in China. However, the rapid economic development in China, could mean an increase in pet dogs with the potential increased risk of contracting toxocariasis if no control measures are taken. Disposal of pet litter, deworming of infected pets, complete cooking of meats, thorough rinsing of fruits and vegetables, and good hand-washing may help prevent human infections. Ocular toxocariasis should be considered in the differential diagnosis of patients with conjunctivitis that does not resolve with treatment.

Keywords: ocular toxocariasis, *Toxocara canis*, case report, Jiangsu Province

INTRODUCTION

Toxocariasis is caused by infection with the larvae of the roundworm genus *Toxocara*, *T. canis* from dogs, and *T. cati* from cats and is found among humans and animals worldwide (Macpherson, 2013). *T. canis* is one of the most widespread endoparasites humans share with dogs, cats and a variety of other hosts (Chen *et al*, 2012a,b). Human infection occurs by the accidental ingestion of embryonated eggs or larvae from a range of wild and domestic paratenic hosts, and manifests clinically in a number of ways: visceral larva migrans (VLMs), ocular larva migrans (OLMs), eosinophilic meningoencephalitis (EME), covert toxocariasis (CT)

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Table 1
Reported cases of human *Toxocara* infections in China.

Year	Location	No. of infections	Population	Reference
1994	Chengdu	1	Child	Liu and Wang, 1994
1996	Chengdu	3	Children	Yang *et al*, 1996
1999	Chengdu	1	Child	Xiao, 1999
1999	Chengdu	64	Children	Luo *et al*, 1999
2008	Changsha	1	Child	Lei *et al*, 2008
2009	Eryuan	1	Adult	Li *et al*, 2009
2010	Shanghai	18	Children	Zhou *et al*, 2010
2012	Shanghai	35	28 children and 7 adults	Zhou *et al*, 2012

and neurotoxocariasis (Rubinsky-Elefant *et al*, 2010). Epidemiological studies have shown this parasite to be prevalent among children from socio-economically disadvantaged populations in the tropics, sub-tropics and industrialized countries (Hotez and Wilkins, 2009; Smith *et al*, 2009; Torgerson and Macpherson, 2011; Turrientes *et al*, 2011). In China, *T. canis* has been widely detected in dogs (Wang *et al*, 2006; Dai *et al*, 2009; Chen *et al*, 2012a,b); however, few human infections are reported (Table 1). We report a case of pediatric ocular toxocariasis due to *T. canis* infection in Jiangsu Province, eastern China.

CASE REPORT

A 6-year-old girl presented to Suzhou Municipal Children's Hospital with a complaint of right eye redness and a small amount of white discharge for 2 months. She had no history of photophobia, eye pain, visual impairment, fever or arthralgia. She was diagnosed as having bacterial conjunctivitis and treated with lomefloxacin 0.3% eye drops without improvement. Re-examination 2 months later showed the girl had a visual acuity of 20/2000 in the right eye, which could not be corrected. The further examination in the Eye, Ear, Nose & Throat Hospital Affiliated to Fudan University (Shanghai, China) on October 13, 2012 revealed a visual acuity of finger counting in the right eye, which could not be corrected. She had a visual acuity of 20/20 in the left eye, mild conjunctival hyperemia in the right eye, clear cornea of the right eye and a positive Tyndall phenomenon indicating the presence of inflammation in the right eye.

Direct ophthalmoscopy and fundus photography revealed a flocculent vitreous opacity, and organized vitreous bands surrounding the paranasal region joining optic papilla suggesting the development of vitreous inflammation. There was no papilledema seen, and no apparent edema was observed in the macular area (Fig 1). The intraocular pressure was 17.1 mmHg in the right eye and 19.9 mmHg in the left eye.

Optical coherence tomography (OCT) of the right eye revealed a papillary bulge with the presence of traction, indicating the development of vitreous inflammation (Fig 2). B-mode ultrasonography of the right eye showed an opacity in the anterior and middle segment of the vitreum of the right eye, organized vitreous bands in the posterior segment adjoining the optic papilla and the retina surrounding the sub-nasal region, and a mild papil-

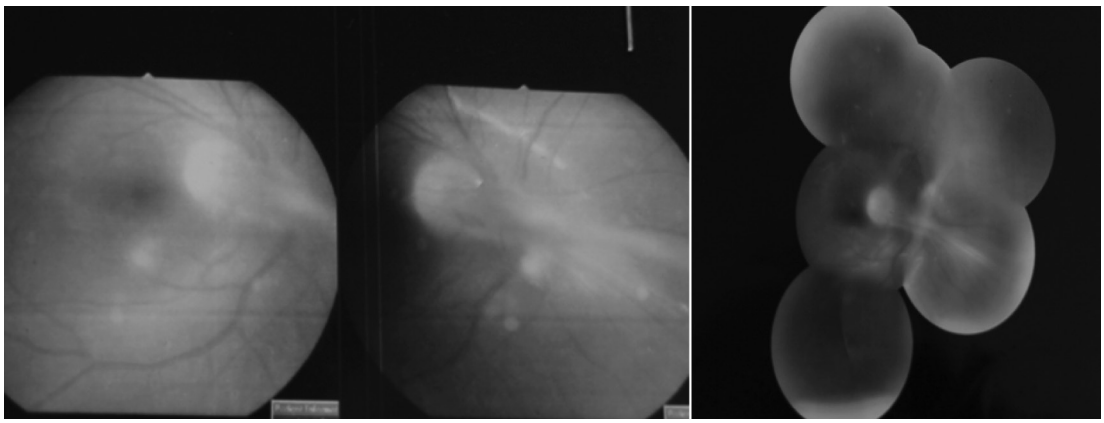

Fig 1–Photograph of right eye fundus.

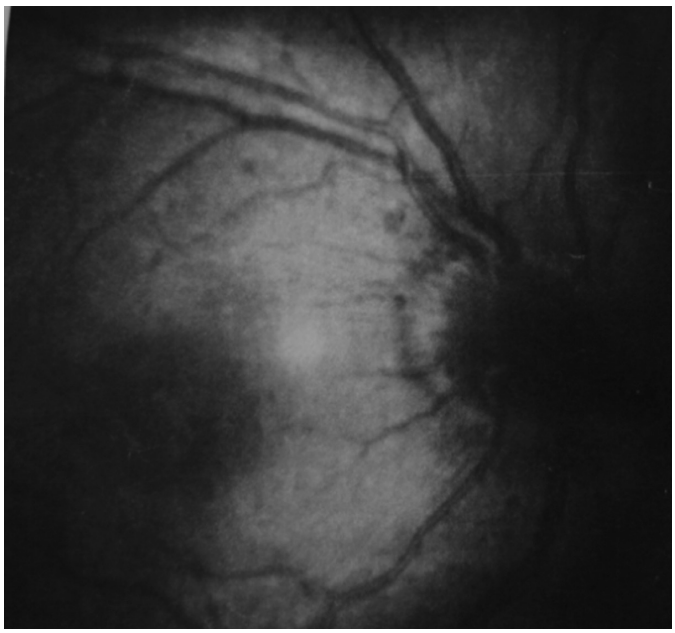

Fig 2–Optical coherence tomography (OCT) of the right eye displaying a papillary bulge and the presence of traction.

lary bulge indicating the emergence of vitreous inflammation (Fig 3). Ultrasound biomicroscopy of the right eye revealed dot-like opacities in the vitreum, notably in the paranasal and subnasal regions, a moderate to high echoic mass measuring 3.98 × 1.22 × 5.49 mm^3 on the flat subnasal area, local tractional ciliary body detachment, and a large amount of discharge from the surface of the flat paranasal area (Fig 4). These findings were suggestive of the presence of a granuloma in the peripheral right eye, similar to the findings in the anterior segment that were consistant with ocular toxocariasis.

The results of routine blood, urine and stool testing were all normal, including liver function, renal function, erythrocyte sedimentation rate (ESR), high-sensitivity C-reactive protein (hs-CRP), rapid plasma reagin (RPR) and IgG and IgM antibodies to *Toxoplasma gondii*. The patient gave a history of close contact with dogs so an enzyme-linked immunosorbent assay (ELISA) for *T. canis* IgG antibody was performed and was positive. The patient was diagnosed as having ocular toxoca-

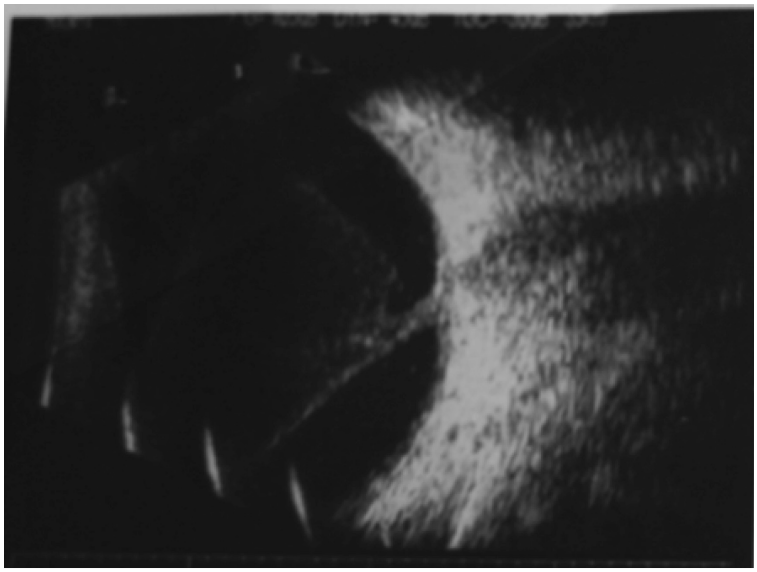

Fig 3–B-mode ultrasonography of the right eye.

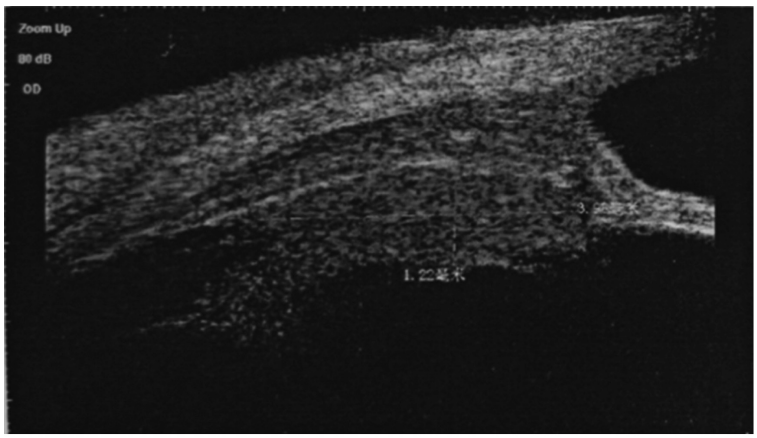

Fig 4–Ultrasound biomicroscopy of the right eye.

riasis based on the epidemiology, ocular findings and antibody test results. She was treated with oral prednisolone 1 mg/kg (total dose of 20 mg for 43 days) once a day (QD) since October 14, 2012, along with prednisolone eye drops. On November 26, 2012, the visual acuity of her right eye rose to 20/100, and the inflammation had improved. The dose of prednisolone was then reduced to 15 mg QD, which she took for 28 days. On December 24, 2012 the child had a visual acuity of 20/100, the prednisolone was reduced to 10 mg QD for 30 consecutive days. On January 24, 2013 examination showed a flocculent vitreous opacity, extension of the bands surrounding the paranasal region from optic papilla to the neighboring regions, and inflammatory reactivation. She was then given albendazole 400 mg BID for 7 days, and the prednisolone dose was reduced to 15 mg QD and continued at that dose until July 16, 2013 when prednisolone was reduced to 10 mg QD. On August 21, 2013 the examination revealed no inflammation in the right eye, the visual acuity was 20/100, and there was a negative Tyndall phenomenon. Fundus photography at that time revealed remarkable improvement in the flocculent vitreous opacity and the organized vitreous bands surrounding the paranasal region joining with optic papilla. There was no papill-edema seen nor edema in the macular area. Currently, the patient is still being treated with prednisolone 10 mg QD and examined regularly.

Permission to report this case was approved by the Ethics Review Committee of Jiangsu Institute of Parasitic Diseases

(2012-078), and the Key Laboratory on Technology for Parasitic Disease Prevention and Control, Ministry of Health (ERC2012-112). Informed consent was obtained from the girl's parents, with a detailed description of the purpose and content of the report.

DISCUSSION

Toxocariasis is a parasitic infection with the roundworm *T. canis* or *T. cati*. Humans become infected by ingestion of infectious eggs, which may be found in soil contaminated with dog or cat feces (Smith *et al*, 2009). The signs and symptoms of *Toxocara* infection in humans dependends on the parasite load, immune response to the parasite, and migration patterns of the *Toxocara* larva (Fan *et al*, 2013). Toxocariasis can manifest as ocular toxocariasis, visceral toxocariasis or covert toxocariasis (Macpherson, 2013). The prevalence of *Toxocara* infection varies greatly by region. A significantly higher *Toxocara* infection rate is found in developing tropical countries than in Western developed countries, and a higher prevalence is found in rural areas than urban regions (Rubinsky-Elefant *et al*, 2010). Ocular disease is caused by migration of *Toxocara* larvae into the posterior eye. Once the larva enters the eye, an immune reaction can occur, resulting in inflammation and permanent scarring. Ocular toxocariasis is typically found in children, is unilateral in more than 90% of cases and is a rare but important cause of monocular vision loss (Woodhall *et al*, 2012). In China, there have been few reported cases of ocular toxocariasis.

Most cases of ocular toxocariasis are asymptomatic but some may simulate a viral infection. Three different manifestations of ocular involvement have been reported: chronic endophthalmitis, development of a posterior granuloma and development of a peripheral granuloma (Rubinsky-Elefant *et al*, 2010). The diagnosis of ocular toxocariasis may be challenging, because it is relatively uncommon and the presentations vary from patient to patient (Pivetti-Pezzi, 2009; Schneier and Durand, 2011). Diagnosis is based on clinical features and should be confirmed by finding IgG antibodies to *T. canis* in the serum (ELISA test) (Fillaux and Magnaval, 2013). The absence of antibodies in the serum does not exclude the diagnosis of ocular toxocariasis (Singh *et al*, 2007). The detection of specific antibodies in intraocular fluid can improve the sensitivity of the diagnosis of ocular toxocariasis (Benitez del Castillo *et al*, 1995; de Visser *et al*, 2008). Imaging techniques may be useful for diagnosing ocular toxocariasis (Rodman and Pizzimenti, 2009; Campbell and Wilkinson, 2012). OCT, computerized tomography (CT) or B-mode ultrasonography are helpful to clarify the lesions and rule out some other ocular diseases (Cella *et al*, 2004; Arevalo *et al*, 2013). In the presented case the diagnosis was based on the history of contact with dogs, clinical features and the ELISA test results.

The treatment of ocular toxocariasis depends mainly on corticosteroids to reduce the inflammatory response (Macpherson, 2013). Anthelmintic therapy with a benzimidazole derivative (albendazole, thiabendazole and mebendazole) is controversial because of the concern the dead larva might increase the inflammatory reaction in the eye (Schneier and Durand, 2011). If cortisone therapy alone does not give a satisfactory response, anthelmintic therapy combined with corticosteroids may be given. Vitreoretinal surgery may be useful to remove vitreous opacities and epiretinal membranes, to

prevent or treat retinal detachment (Despommier, 2003). In this case, the patients was initially given prednisolone without improvement, so albendazole was added, which resulted in the disappearance of inflammation and improvement in symptoms.

Although ocular toxocariasis is rarely reported in China the rapid increase in pet dogs may increase the risk of toxocariasis if no control activities are initiated. Appropriate preventive measures should be taken, including disposal of pet litter, periodic deworming of pets, completely cooking of meats, rinsing fruits and vegetables well and good hand-washing. Clinicians need to better understand this disease and include it in the differential diagnosis of unilateral uveitis. Treatment should be given based on visual acuity, severity of inflammation and presence of ocular damage to reduce the risk of vision loss.

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