A Case of Presumed Ocular Toxocariasis in a 28-year Old Woman

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This is a case of presumed ocular toxocariasis in a 28-year old woman complaining of a sudden onset of nasal side field defect of the right eye. The patient had been suffering from uveitis for ten months. Fundoscopic examination of the right eye showed a rheumatogenous retinal detachment. Furthermore, a retinochoroidal granulomatous lesion was observed nearby the tear site. Scleral buckling, cryotherapy, and gas injection(SF₆, pure gas, 0.7cc) were conducted. Mebendazole was prescribed for one month at 25 mg/kg per body weight daily. Even though the interventions resulted in the recovery of the field defect, anti-Toxocara IgG and IgE titer levels did not decrease when checked three months after the treatment ended. This is the first confirmed serological ocular toxocariasis case in Korea. Uveitis may be a clinical presentation prior to retinal detachment of a person with toxocariasis.

Key words: ocular toxocariasis, Toxocara canis, enzyme-linked immunosorbent assay (ELISA), immunoblotting, mebendazole, retinal detachment

INTRODUCTION

Toxocariasis is a zoonotic disease caused by the infestation of humans by second stage larvae of the dog nematode Toxocara canis or Toxocara cati. Ocular toxocariasis can induce uveitis, chronic diffuse endophthalmitis, posterior retinochoroiditis, peripheral retinochoroiditis, optic papillitis, and other ocular lesions that often lead to a sudden loss of vision in the affected eye.¹-³

In Korea, three cases of suspected toxocariasis had been reported in the literature without serological data: One case showed endophthalmitis in the right eye of four-year-old girl with an exposure to puppies.⁴ Another case showed a dense white elevated inflammatory mass over the macular area in the left eye of a 17-year old woman.⁵ The third case showed ectopic macula with presumed ocular toxocariasis, also with a history of exposure to puppies.⁶ The availability of serologic testing for toxocariasis was therefore greatly needed by Korean ophthalmologists.

We hereby report a case of presumed ocular toxocariasis that was serologically confirmed with a follow-up of serological data after treatment.
CASE REPORT

This patient is a 28-year old woman, a resident of Seoul who visited the Department of Ophthalmology at Kangdong Sacred-Heart Hospital, College of Medicine at Hallym University, in Seoul. She complained of experiencing a nasal side field defect of the right eye for one week on July 29, 1999. She had been suffering from uveitis since September 1997 and had been going to the same department for followed-up care. She had no past history of diabetes, hypertension, or trauma. She did not own any dogs or cats. Her examination showed that her visual acuity was 20/20, while the ocular pressure 16 mmHg in both eyes. The anterior segment of both eyes was within normal limits. However, fundoscopic examination showed a rhegmatogenous retinal detachment of the right fundus. Furthermore, a retinchoroidal granulomatous lesion was noted nearby the tear site. Meanwhile, the left eye was within normal limits (Fig. 1). An emergency operation consisting of scleral buckling (site: 10-11 o/c, 506 sponge), cryotherapy, and intravitreal gas injection (SF₆, pure gas, 0.7 cc) was performed.

Antibody tests for cytomegalovirus, herpes simplex virus, varicella-zoster virus, and human immuno-deficiency virus were negative. Antibody tests for *Toxoplasma*, *Clonorchis sinensis*, *Paragonimus westermani*, sparganum, and *Taenia solium* metacestode were negative. VDRL, non-reactive, RF, ASO, and CRP were within normal limits. Stool examination were negative for helminthic ova and protozoan cyst. CBC and LFTs were within normal limits. There was no eosinophilia. Chest PA and liver sonography were within normal limits. The patient’s serum was tested for toxocariasis. The follow-up results of the serologic tests are shown in Table 1, and the immunoblot results appear on Fig. 2.

At the postoperative first day, visual acuity of the right eye had decreased to 20/200. Intraocular pressure of the right eye decreased to 9 mmHg. Fundoscopic examination showed that the gas took up one third of the right eye, the posterior pole was flat, and a shallow elevation was observed in the
Table 1. The result of serologic test for the sera of the patient including the cross reaction with *Ascaris* and *Strongyloides* in 1998. The cross reaction to *Ascaris* and *Strongyloides* was believed to be due to the high titer of the anti-Toxocara antibody.

<table>
<thead>
<tr>
<th>Antigen and methods</th>
<th>postop. 2nd day</th>
<th>postop. 33rd day</th>
<th>postop. 63rd day</th>
<th>postop. 91st day</th>
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<td><em>Toxocara canis</em> larvae</td>
<td></td>
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<td>Immunoblot Specific IgE ELISA*</td>
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<td>positive</td>
<td>positive</td>
<td>positive</td>
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<tr>
<td><em>Ascaris suum</em> IgG ELISA OD**</td>
<td>7 TU</td>
<td>8 TU</td>
<td>8 TU</td>
<td>9 TU</td>
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<tr>
<td><em>Strongyloides ratti</em> IFA***</td>
<td>1.380</td>
<td>0.800</td>
<td>0.800</td>
<td>0.860</td>
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</tbody>
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ELISA: enzyme-linked immunosorbent assay, OD: optical density, IFA: immunofluorescent assay. *: cut-off value: 5 Toxocara Unit(TU), **: cut-off value: 0.550, ***: cut-off value: 20 unit

inferior retina. Therefore, prednisolone was prescribed at 40 mg/day for one week. At the postoperative sixth day, the visual acuity of the right eye was 20/50. Focal laser therapy was done around the tear site. At the postoperative seventh day, visual acuity was 20/40 and intraocular pressure was 13 mmHg. Fundus examination of the right eye revealed that the retina was flat with good buckle effect. The inferior retinal detachment was relieved. Subsequently, the patient was discharged. At the postoperative 14th day of the follow-up period, visual acuity was 20/40 and intraocular pressure was 10 mmHg. The anterior chamber was with 4(+) cells with flare. Fundus examination revealed that the retina was flat with vitreous reaction. A shallow elevation in the inferior retina remained. Dexamethasone 0.5 cc was injected at the subconjunctival area four times over the following two weeks.

Starting at the postoperative 56th day (September 23), a mebendazole therapy was prescribed at 25 mg/kg per body weight daily for one month. The patient complained of a headache, nausea, and vomiting during the first day of mebendazole therapy. However, the symptoms were relieved afterwards. Visual acuity was 30/50; intraocular pressure was 11 mmHg. Fundus examination revealed that the retina was flat with a good buckle effect. At the postoperative 91st day, visual acuity returned to 20/20 and ocular pressure was 13 mmHg. Fundus examination of the right eye revealed that the retina was flat. A cryo-scar was present, but no visible scatter lesion was observed. Numerous vitreous floaters persisted.

**Parasitological findings**

Serology for nematodes infection (Table 1):

**ELISA:** This test was performed according to methods previously established in France. Result of ELISA for the anti-Toxocara IgE was positive with 7 Toxocara Units(TU). After treatment, the anti-IgE antibody titer did not decrease. The serum of the patient’s daughter was also tested but was found to be negative for the antibodies for any nematodes antigen.

**SDS-PAGE and immunoblotting:** The *T. canis* excretory-secretory antigen preparations (supplied from Toulouse, France) were put into an electrophoresis in 0.1% SDS and 10% polyacrylamide gels. Each well of the gel was loaded with 25 μg protein. The protein bands in the gel were transferred onto a nitrocellulose membrane(Amersham) in a Semi-blotter (Hoffer). It was subsequently divided. The strips were then incubated with sera diluted 1:50. The reaction of serum antibodies to the antigenic protein bands was manifested by an alkaline phosphatase-conjugated anti-human IgG (Jackson, diluted at 1:3,000). The enzyme substrate for color development was NT and BCIP (Sigma...
Co. U.S.A.). Seven bands were observed, then split into two groups (Fig. 2). The first group included four lower molecular weight bands of 24, 28, 30 and 35 kDa; the second consisted of three higher molecular weight bands of 132, 147, and 200 kDa. An examination three months after the treatment ended revealed that the immunoblotting pattern did not exhibit any change. The tests that were simultaneously conducted in Korea and in France displayed the same results.

**DISCUSSION**

Ocular toxocariasis usually occurs in four- to eight-year-old children and is limited to one eye, usually with one larva, in an otherwise healthy child. However, as addressed in our studies, clinical reports of retinal lesions in adults due to toxocarial infection are uncommon. Ocular toxocariasis was indicated by numerous clinical manifestations, including chronic diffuse endophthalmitis, posterior retinochoroiditis, peripheral retinochoroiditis, optic papillitis, motile chorioretinal nematode, diffuse unilateral subacute neuroretinitis (DUSN), keratitis, conjunctivitis, and lens involvement. This case was suspected following ophthalmologic investigations, and then confirmed through serologic testing. For ten months, the patient had been suffering from uveitis, which was also believed to originate from toxocariasis. Therefore, uveitis may be a clinical presentation prior to retinal detachment in a *Toxocara*-infected patient. We hypothesize that any ophthalmologic disturbance due to toxocariasis may result in more severe clinical manifestations, in the absence of intervention. Therefore, a request for an immunodiagnosis for toxocariasis in ophthalmologic problems such as chronic diffuse endophthalmitis, posterior retinochoroiditis, peripheral retinochoroiditis and optic papillitis appears to be necessary in Korea.

Immunoblotting using *Toxocara* excretory-secretory antigen could be applied to corroborate the findings obtained using the ELISA. Immunoblotting seems to be well suited to consistently detect specific anti-*Toxocara* antibodies in positive reference. It is also well correlated with ELISA. By immunoblot, human sera from toxocariasis cases showed a typical pattern in which seven bands were split into two groups. The first group included four low molecular weight bands (35, 30, 28 and 24 kDa), while the other group included three high molecular weight bands (200, 147 and 132 kDa). In the present work, all cases exhibited blotting profiles with a typical seven-band pattern. IgE ELISA only appeared to be insufficient for properly diagnosing the toxocariasis. It might be a complementary method for specific IgG detection. Also, it is useful for the post-treatment follow-up assessment.

Differential diagnosis with other parasitic diseases should be done when a positive ELISA result occurs. By immunoblot, cross reacting sera with other nematode infections are easily identified, since they are negative, or they exhibit only a higher molecular weight banding pattern. In our patient’s case history, no cross-reaction evocative of an infection by any autochthonous (Korea) tissue-dwelling helminth was seen. The positive results in both ascariasis and strongyloidiasis immunodiagnoses [performed in France] were believed to be due to a high titer of the anti-*Toxocara* antibody.

Available drugs for treating human toxocariasis are benzimidazole derivatives (albendazole, mebendazole, thiabendazole) and diethylcarbamazine. In a controlled randomized study, patients from the diethylcarbamazine group reported a significantly higher rate of adverse reactions, most of which could be due to parasite lysis. Therefore, we used mebendazole rather than diethylcarbamazine.

In Korea, there is still no data on the seroprevalence of human toxocariasis. Since a high prevalence of adult *T. canis* 14.4% and *T. catt* 41.5% infection in dogs or cats has been found, numerous cases of toxocariasis in the general population are expected. A field sero-epidemiological survey is therefore necessary. Specialists in ophthalmology clinics must to be informed of the existence of ocular toxocariasis as well.

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**REFERENCES**

the right eye, of two-days duration. Initial examination revealed corrected visual acuity of hand motion OD and 20/30 OS with normal intraocular pressures. Moderate lid edema and conjunctiva injections were noted OD. The pupils were anisometric with a relative afferent pupillary defect existent in the right eye. Extraocular movements revealed moderate motion limitations during lateral, superior, and inferior gaze OD without diplopia. The cornea and the anterior chambers were clear, and fluorescein angiographies of the fundus were benign.

Extraocular movements were further aggravated limiting motion in all directions and coupled with the appearance of upper lid drooping OD. This prompted a computed tomographic (CT) scan, which demonstrated a large lesion involving the right ethmoid and sphenoid sinuses compressing the optic canal (Fig. 1). The clinical and radiographic findings were consistent with an impression of sphenoid ethmoid mucocele and two days later, emergency radical maxilloethmoidectomy and sphenoidectomy were performed. The patient then presented with improved status in terms of upper lid drooping and extraocular movement, which became normal after a postoperative three days. His vision improved to 20/30 OD before he was discharged.

However, upon re-admission in April of this year, ocular examination revealed a relative afferent pupillary defect, pale optic disc, and complete visual field loss sparing the central upper field OD (Fig. 2). His visual acuity was 20/100 OD. A computed tomographic (CT) scan revealed soft tissue density in the maxillary, ethmoid, and sphenoid sinuses, but this was not viewed as a recurrence or a remnant of the previous mucocele and no definite signs of optic nerve compressions were noted (Fig. 3). Follow up fluorescein angiography was not possible due to the severe dye sensitivity of the patient. The patient's incidental complaint of chest tightness and dizziness on walking up stairways prompted a cardiologic evaluation, which resulted in the diagnosis of coronary artery obstructive disease (2-vessel disease). He had no prior history of cardiologic symptoms nor did his routine systemic examinations reveal such problems. On May 12, 1999, he underwent percutaneous trans-coronary angiography with stent insertion of the left anterior descending and obtuse marginalis artery. His ocular symptoms began to immediately improve and 1 week after the procedure this resulted in a recovered visual acuity of corrected vision of 20/30 OD and improved visual fields as determined by the Goldmann visual field examination (Fig. 4). Two and a half months after receiving PTCA, he maintains good visual function.
DISCUSSION

The etiologies of optic neuropathy may be classified as being ischemic, compressive, inflammatory, and idiopathic. The most common type of NAION is idiopathic, which results from a secondary microvascular disease of the anterior optic nerve head. Risk factors include hypertension, ischemic heart disease, diabetes mellitus, and a small cup to disc ratio.\(^5\)

Of the many compressive etiologies, a sphenoid mucocele is a histologically benign, slowly developing lesion of the sinusal cavities, which becomes noticed because of its rather serious functional symptoms induced by the anatomical compression of adjacent tissues and the gradual destruction of their bone walls.\(^6-7\) According to Nugent et
al, headache and visual loss are the most common symptoms associated with visual field defects, ophthalmoplegia, and proptosis. Studies by Moriyama et al. showed that patients with mucocele have generally undergone previous nasal surgery and that the degree of improvement in visual acuity after the operation, depends on preoperative visual acuity, the mode of development of the mucocele, and duration from onset of the disease until the time of operation.

Our patient presented with a rather sudden onset of visual loss and pain of the right eye, which was accompanied by lid drooping and limitations of motion, which corresponded well with what was expected of the compressive effects of a sphenoid mucocele. Removing the compressive lesion produced a prompt improvement in the symptoms and previous ocular abnormalities. The favorable outcome in this case may have been due to the relatively short duration of symptoms and immediate surgery upon diagnosis. However, two years later, the patient returned with symptoms of vision loss and visual field decrease, coupled with findings of the optic disc and pupil, this lead to the diagnosis of recurrent optic neuropathy. The patient did not manifest symptoms suggestive of temporal arteritis, such as headache, scalp tenderness, jaw claudication, or polymyalgia rheumatica, which suggested a new NAION rather than a recurrent compressive optic neuropathy. Amazingly, coincidental PTCA with stent insertion due to cardiologic problems also resulted in a dramatic ocular improvement.

In this case, the presence of the sphenoid mucocele and the occurrence of ischemic optic neuropathy may either be two quite different entities or may be the result of a defective vascular auto regulation in the optic nerve head as proposed by Hayreh et al. In this case, the pre-existing mucocele or its treatment may have provoked a defect in the vascular auto regulatory system, which in turn caused the optic neuropathy. However, the exact etiology is not known. In any case, NAION is presumably a vascular disease associated with systemic disorders. Therefore, existing treatment modalities include the use of anticoagulants, vasodilators, vasopressors, phenytoin, corticosteroids, and optic nerve sheath decompression but overall results are less than satisfactory. The importance of the cardiovascular circulation in the maintenance of optic integrity can be appreciated from articles, which detail visual loss and AION after coronary artery bypass surgery and the postoperative improvement of ocular ischemia and external carotid revascularizations in patients with internal carotid artery occlusions. Such an observation was made in our case, which showed an improvement of vision and visual field after the patient underwent PTCA with stent insertion of the coronary arteries.
No universally effective treatment has been established for NAION. Although most cases are idiopathic, ocular and systemic risk factors have been identified, which lead to an increased incidence of this disease. Whether the progression of the disease is pre-determined or is triggered by an environmental cause, it is without doubt that it is multifactorial. Thus, when it comes to the treatment of NAION, a thorough and systematic vascular investigation is mandatory to achieve good optimal outcomes.

REFERENCES