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Case Report

Toxocara Optic Disc Granuloma: Deep Range Imaging Optical Coherence Tomography Findings

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Deep range imaging optical coherence tomography · Ocular toxocariasis · Uveitis

Abstract
We aimed to present a unique case of a child with an optic disc granuloma with exudative retinal detachment as a manifestation of ocular toxocariasis. The response to systemic therapy was assessed using deep range imaging optical coherence tomography. This imaging technique was the most accurate for identification of retinal, macular and vitreous changes associated with this intraocular pathology.

Introduction

Toxocariasis is a globally prevalent illness caused by infestation of larvae of the parasite *Toxocara canis* or *Toxocara cati*, which is the most ubiquitous gastrointestinal helminth in dogs and cats, respectively [1]. Human infection is due to accidental ingestion of infective eggs and tissue invasion of migrating parasitic larvae. Symptoms of the infection depend on the involved organs [2, 3]. Larvae that migrate to the eye cause ocular toxocariasis (OT). The

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average age at diagnosis of OT is 7.5 years (ranging from 2 to 31 years) and 80% of the patients are younger than 16 years [4]. The most common symptoms and signs of OT are decreased vision, strabismus, leukocoria, peripheral or posterior pole retinal granuloma, and chronic endophthalmitis [1, 4].

Case Report

We present the case of an optic disc granuloma with exudative retinal detachment as a manifestation of OT. The response to systemic therapy was assessed using deep range imaging optical coherence tomography (DRI-OCT). To our knowledge there are few reports of DRI-OCT findings in OT and only two presenting this parasitic disease as a granuloma overlying the optic disc [5–9].

A generally healthy 5-year-old boy with no known ophthalmological history was evaluated for leukocoria and decreased visual acuity in the right eye (RE). Ophthalmic examination revealed a best corrected visual acuity in the left eye of 6/6, and only light perception with projection in the RE. The slit lamp examination showed no abnormalities. Indirect ophthalmoscopy of the RE revealed exudative retinal detachment and a large, white, and well-circumscribed mass overlying the optic disc (Fig. 1a). Sporadic inflammatory cells in the vitreous body were present. No abnormalities were found in the left eye.

The patient was imaged with DRI-OCT (Atlantis; Topcon, Japan), ultrasonography, and magnetic resonance imaging of the orbits (Fig. 1b, c). The complete blood count and C-reactive protein levels were normal. *Toxoplasma* and viral serology findings were negative (CMV, HSV, VZV, EBV, HCV, and HBV). *Toxocara* IgG antibodies detected in serum with the ELISA method were positive (IgG 35.77 NTU). The chest X-ray image and computed tomography scan of the brain were normal. Stool ovum and parasite tests were negative. The patient's mother did not provide written consent for a diagnostic biopsy of the vitreous body. The patient was diagnosed with OT and treated with albendazole 400 mg twice a day for 4 weeks and systemic corticosteroids with a loading dose of 1 mg/kg/day and then tapering.

After 1 year of follow-up, the fundus examination, DRI-OCT, and ultrasonography scans showed significant lesion regression with optic disc granuloma scarring and no serous retinal detachment (Fig. 1d–f). The vision of the RE improved up to 6/20.

At the baseline examination, DRI-OCT showed inflammatory cells in the vitreous body and vitreoretinal tractions at the granuloma-vitreous interface. Within the lesion, the internal layers presented a homogeneous high-reflectivity mass with many hyperreflectivity spots, which may have been related to eosinophil infiltration. The presence of this lesion did not allow for any exact visualization of the external retinal layers surrounding the optic disc (shadow effect). Retinal detachment was detected around the granuloma (Fig. 1c).

One year after the diagnosis and treatment, DRI-OCT of the RE showed posterior vitreous detachment with localized condensed vitreous opacities and only few inflammatory cells on the surface of the lesion. The reduction of the granuloma size made the choroid and retinal pigment epithelium visible. No subretinal fluid was observed. The retina near to the lesion showed edema as well as alterations of the epiretinal membrane and retinal pigment epithelium (Fig. 1f).

Discussion

In most cases, it is difficult to establish the diagnosis of OT based on clinical manifestations only, because ocular symptoms may be various and inflammatory signs are not always present [1–4] and this clinical entity may be confused with retinoblastoma in children. Due to the potentially profound significance of misdiagnosis, very careful examination should be performed. The presumptive diagnosis of OT is generally based on a history of geophagia, contact with dogs, and laboratory findings; however, serological tests may be negative [10]. Due to the fact that the clinical signs of OT are not specific, a differential diagnosis should consider other parasitic diseases, other causes of posterior uveitis, and the possible occurrence of retinoblastoma in childhood. Laboratory tests include the detection of specific IgG in the serum (ELISA, 90% specificity, 91% sensitivity) or intraocular fluids [1, 2, 10]. However, approximately 10% of patients with clinical signs of OT present negative results with the ELISA method from ocular fluid samples [10].

In the present case, we would like to underline the value of a noninvasive imaging method (DRI-OCT) in the diagnosis and evaluation of toxocara optic disc granuloma in children. Our findings are in accordance with other publications. Several authors have shown that *Toxocara* granuloma is associated with vitreous opacities as a sign of inflammation and may induce vitreous traction, macular edema, and epiretinal membrane formation [5–9].

In our opinion, the use of DRI-OCT was the most adequate noninvasive imaging method for assessment of the evolution of retinal changes, vitreous traction, and signs of vitritis during the follow-up period and for analyzing the response of the optic disc granuloma to therapy. DRI-OCT imaging may offer a simple and practical diagnostic tool for the evaluation of posterior pole lesions due to OT.

Statement of Ethics

The authors have no ethical conflicts to disclose. Written informed consent was obtained from the patient for publication of this case report and any accompanying images.

Disclosure Statement

The authors have no conflicts of interest to disclose. None of the authors has any financial disclosure to make relevant to this manuscript.

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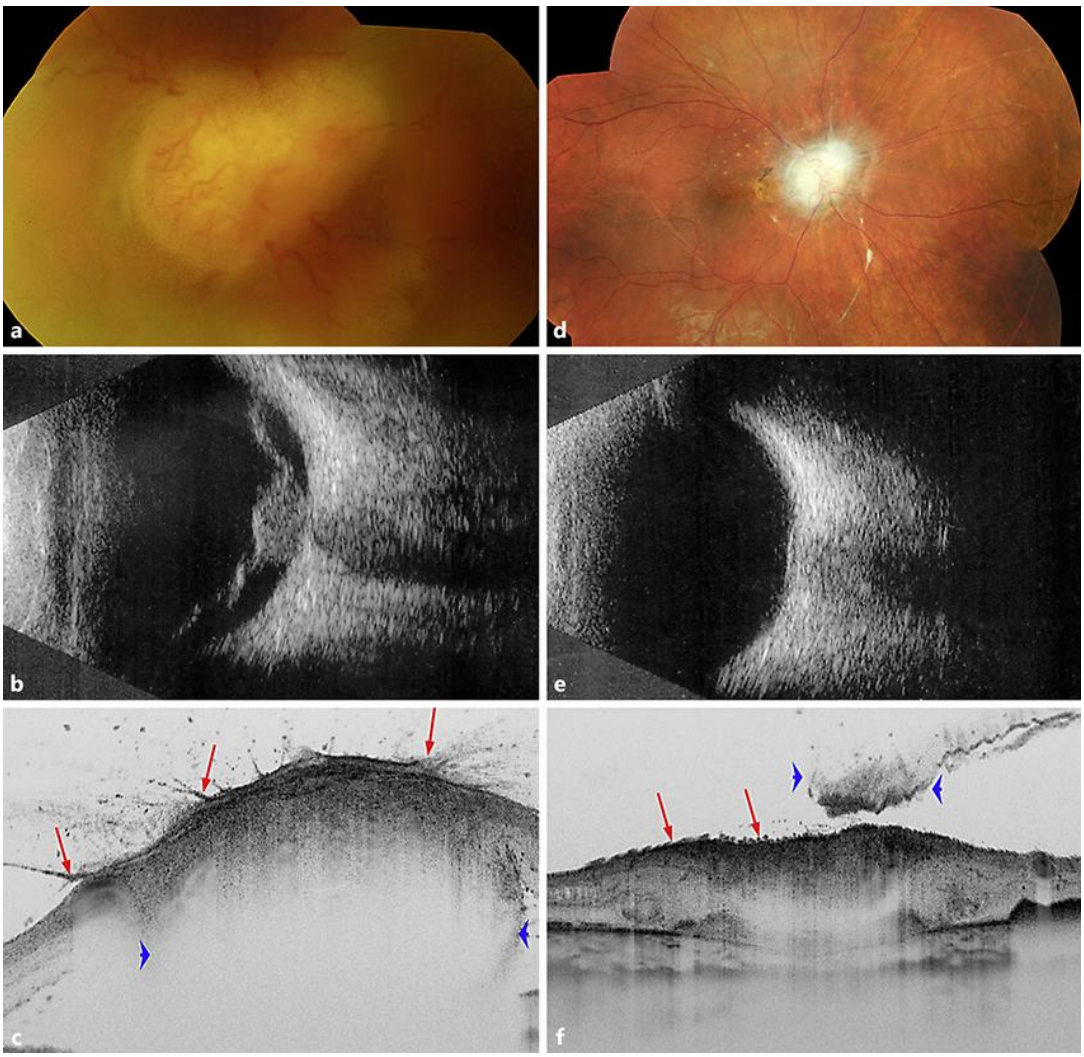

Fig. 1. **a** Fundus image (mosaic) of the right eye showing a well-defined, creamy, and well-circumscribed mass overlying the optic disc with a net of superficial vessels and surrounding serous retinal detachment. **b** B-scan ultrasound image of the right eye demonstrating an oval-shaped, medium-reflectivity mass overlying the optic disc with adjacent retinal detachment. Mild vitritis is present. **c** Deep range imaging optical coherence tomography (DRI-OCT) image of the right eye showing an oval-shaped lesion/cyst (450 × 250 μm) with low reflectivity and well-demarcated borders (blue arrowheads), surrounded by subretinal fluid. Within the lesion, the internal layers present high reflectivity, with an area of low reflectivity beneath, which did not allow any exact visualization of the external retinal layers surrounding the optic disc. Inflammatory cells (vitritis) and inflammatory membranes adhesive to the surface of the lesion with vitreoretinal traction are present (red arrows). **d** Fundus image (mosaic) of the right eye at the 12-month follow-up showing complete resolution of the lesion; the pale optic disc is now visible, surrounded by hard exudates and remnants of fibrous tissue. Single fibrous subretinal proliferations around the optic disc are also present. The macula presents retinal pigment epithelium alterations (hypo- and hyperpigmentation changes). **e** B-scan ultrasound image of the right eye demonstrating significant lesion regression with no serous retinal detachment. **f** DRI-OCT image of the right eye showing posterior vitreous detachment with localized condensed vitreous opacities (blue arrowheads) and only few inflammatory cells on the surface of the lesion. The reduction of the granuloma size makes the choroid and retinal pigment epithelium visible. No subretinal fluid is observed. The retina near the lesion shows edema and alterations of the epiretinal membrane and retinal pigment epithelium (red arrows).