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Brief Original Article

Causes of visual impairment in patients with ocular toxoplasmosis

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Abstract

Introduction: The aim of this study was to report the causes of visual impairment in patients with the classic clinical presentation of ocular toxoplasmosis (OT).

Methodology: Eight patients with OT underwent standardized ophthalmologic examination and fundus imaging. Macula and the lesions that could be visualized were evaluated by spectral domain optical coherence tomography (SOCT) at presentation. The scan acquisition protocols for SOCT included a radial line scan through the retinochoroiditis lesion, radial line macular scan, and horizontal volume scans at the macula.

Results: The mean age of the five (62.5%) women and three (37.5%) men was 25.7±7.6 years. The mean logMAR ETDRS best-corrected visual acuity was 0.45 (Snellen equivalent, 20/50). SOCT findings of macula were normal in seven patients, and one patient had decreased retinal thickness from a healed chorioretinitis at the fovea. Of eight patients, two had 3+ vitreous haze, four had 2+ vitreous haze, and two had 1+ vitreous haze at presentation. OCT scans revealed vitreous hyperreflective dots in all patients with different densities in different radial scans. Hyperreflective dots were denser in macular scans of eyes in which the active lesion was closer to the fovea.

Conclusions: In this study, visual impairment in majority of the patients was found to be related to vitreous cells and flare. Dense vitritis on macula scans and visual impairment were seen in the patients who had an active lesion closer to the fovea. SOCT may provide objective data of the cellular load of the eyes with posterior segment inflammation.

Key words: Chorioretinitis; macula; ocular toxoplasmosis; optical coherence tomography; vitritis.

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Introduction

Toxoplasmosis is the most common cause of posterior uveitis in immunocompetent subjects and the most frequent cause of infectious uveitis in many countries. Ocular toxoplasmosis (OT) affects most commonly the retina with secondary involvement of the choroid, vitreous, and the anterior chamber [1]. The hallmark of OT is focal necrotizing retinochoroiditis, resulting in characteristic atrophic scars [2]. The classic toxoplasmic chorioretinitis occurs as a small-to-moderate focus of necrotizing chorioretinitis near an old pigmented chorioretinal scar ("satellite" lesion) [3]. OT is associated with complications including rhegmatogenous serous and tractional retinal detachment, vitreous hemorrhage, epiretinal membrane, choroidal neovascular membranes, and vitreous opacities [4,5], all of which can potentially cause visual loss. The aim of this study was to address the causes of visual impairment in ocular toxoplasmosis and demonstrate spectral-domain optical coherence tomography (SOCT) findings of macula and the active lesion with toxoplasma chorioretinitis on first admission to the clinic.

Methodology

A total of eight eyes from eight patients diagnosed with toxoplasmic retinochoroiditis were enrolled in this cross-sectional study. The study protocol was approved by the local institutional review board. Written informed consent was obtained from all patients before their inclusion in the study. All patients underwent fundus imaging studies by an experienced certified ophthalmic technician under the supervision of one of the authors (NSK, FU).

All patients diagnosed with active toxoplasma chorioretinitis between January 2012 and June 2013 at the Department of Ophthalmology, Adana Numune Training and Research Hospital, were invited to participate in the study. The diagnosis was based on the presence of an active white focal retinal lesion, with an associated hyperpigmented chorioretinal scar and confirmed by anti-*Toxoplasma* antibody (Ab) analysis (immunoglobulin G/IgG and immunoglobulin M/IgM).

Abs related to toxoplasma were studied serologically using the enzyme-linked immunosorbent assay (ELISA) method by scanning Ab IgM and IgG.

Each patient received a detailed ophthalmologic examination including best-corrected visual acuity (BCVA) with Snellen chart, slit lamp biomicroscopy, dilated biomicroscopic and fundus examinations, and color fundus photography. All patients underwent SOCT imaging (Spectral OCT/SLO, Opko/OTI Inc, Miami, USA). The scan acquisition protocols for SOCT included a radial line scan through the retinochoroiditis lesion, radial line macular scan, and horizontal volume scans at the macula. After completing the baseline evaluation, all patients with active lesion were treated according to the standard protocol of the hospital, with trimethoprim-sulfamethoxazole (160–800 mg twice daily orally), clindamycin (300 mg four times daily orally), prednisone (0.5 mg⁄ kg) orally once daily beginning on the third day of the treatment, for at least four weeks. Prednisone was tapered over four weeks.

OCT scans were graded by two physicians independently and interpreted as normal or abnormal. The scans with increased or decreased retinal thickness, cystoids changes, subretinal fluid, vitreous traction, or epiretinal membrane were considered to be abnormal.

Results

Eight patients with a diagnosis of toxoplasma chorioretinitis having satellite lesions were included in this report. Patients' baseline characteristics are summarized in Table 1. The mean (±SD) age of the five (62.5%) women and three (37.5%) men was 25.7 (±7.6) years (range, 17–37 years).

Anti-*Toxoplasma* Ab analysis revealed positive IgG and IgG titers in all patients. The mean (± SD) logarithm of the minimum angle of resolution BCVA was 0.45 (±0.58) on presentation. Six patients (75%) had visual loss. Of eight patients, two had 3+ vitreous haze, four had 2+ vitreous haze, and two had 1+ vitreous haze at presentation. The size of the lesion was 1–2 disk diameters or less in all patients and was located in zone 1 in four patients and zone 2 in four patients. On clinical examination, all active lesions were located adjacent to a pigmented chorioretinal scar. The SOCT findings of the macula are summarized in Table 2. The macular scans of seven patients were identified as normal using SOCT. Decreased retinal thickness was observed in one patient due to the toxoplasmosis chorioretinitis scar at the fovea. None of the scans showed ERM (epiretinal membrane). Vitreous hyperreflective dots were observed in all patients with different densities in different radial scans. Hyperreflective dots were denser in the macular scans of eyes in which the active lesion was in zone 1 and

Table 1. Baseline characteristics of patients with ocular toxoplasmosis.

	Age	Gender	Study eye	Lesion location (zone)	Lesion size (DD)	BCVA (Snellen)	BCVA (logMAR)	Clinical findings
1	30	F	R	1	1	20/60	0.5	ACC2+, VC3+
2	35	F	L	1	1	20/1250	1.8	ACC3+, VC2+, KP
3	24	F	L	1	1	20/80	0.6	ACC2+, VC3+, KP
4	22	M	R	2	< 1	20/20	0.0	ACC1+, VC1+
5	23	M	R	2	1	20/32	0.2	ACC1+, VC2+
6	37	F	R	2	< 1	20/32	0.2	ACC1+, VC2+
7	17	M	R	2	1	20/40	0.3	ACC2+, VC2+
8	17	F	R	1	2	20/20	0.0	ACC1+, VC1+

ACC: anterior chamber cells; EM: exudative maculopathy; KP: keratic precipitates; VC: vitreous cells; BCVA: best-corrected visual acuity.

Table 2. Spectral domain optical coherence tomography (SOCT) findings of the macula.

	Age	Thickness (µm)	Fluid	ME	ERM
1	30	197	N	N	N
2	35	142	N	N	N
3	24	207	N	N	N
4	22	226	N	N	N
5	23	229	N	N	N
6	37	220	N	N	N
7	17	232	N	N	N
8	17	200	N	N	N

ERM: epiretinal membrane; ME: macular eudema; fluid: subretinal fluid; N: no.

close to the fovea. In the vitreous cavity, hyperreflective dots were observed following SOCT imaging on radial scan of macula of patients with toxoplasmic chorioretinitis. In three patients, punctuate spots as hyperreflective dots were seen at different densities. Three active retinochoroidal lesions that could be visualized by SOCT showed increased reflectivity from the inner retinal layer, retinal thickening, and choroidal shadowing. Retinal pigment epithelial and choriocapillaris band shadowing was noticed by SOCT due to the inner retinal layers hyperreflective at the lesion site. Increased reflectivity of the posterior hyaloid was noticed in all patients. The thickened posterior hyaloid was attached to the active lesion in all the visualized lesions.

Discussion

This study was designed to report the causes of visual impairment in patients with ocular toxoplasmosis at first presentation to the hospital. Normal macular findings were seen in seven patients, and one patient had a chorioretinitis scar at the fovea. There was no macular edema, subretinal fluid, macular detachment, or epiretinal membrane at the first examination of the patients. The visual impairment was due to vitreous cells and healed chorioretinitis scars in six patients.

Three of the patients who had the active lesion on zone 1 (patients 1, 2, 3) had marked vitritis seen on OCT as hyperreflective dots. The other patient with active lesion on zone 1 (patient 8) did not have vitritis seen on macular area and visual impairment. This result was thought to be due to the location of the active lesion. The active chorioretinitis was at the border of zones 1 and 2. The patients who had satellite lesions on zone 2 showed mild vitritis in OCT scans of macula. In the current study, the distance of the active lesion to the fovea was inversely correlated with the intensity of vitritis on the visual axis and visual impairment. The severity of inflammation depends on many other variables in inflammatory diseases. In ocular toxoplasmosis, the depth of the vitritis also may be related to many other factors, such as size of active retinitis, immune status of the patient, and number of attacks.

Diniz *et al*. reported macular serous retinal detachment as the most common macular abnormality, with a ratio of 50% in patients with active toxoplasma chorioretinitis, and reported that one of their patients showed presence of residual fluid at follow-up visits [6]. The investigators stated that this could be related to the proximity of the lesion to the macula. They found an indirect correlation with the presence of fluid and the distance of the retinochoroidal lesion to the fovea, even though this correlation was not statistically significant. In our study, we did not measure the lesion-foveal distance but found the same association for vitritis and the location of the active lesion. The visual impairment and dense vitritis on macula scans were seen in the patients who had an active lesion close to the fovea.

SOCT provides valuable information on the morphological features of the vitreal, retinal, and choroidal changes in ocular toxoplasmosis. It has been reported that the retina was thickened at the lesion site, with an increased reflectivity of inner retinal layers and posterior shadowing [7]. In addition, thickening of the posterior hyaloid, hyperreflective signals, and spherical hyperreflective depositions in vitreous have been reported [8]. One-fifth of the patients were reported to have subretinal fluids at the lesion site [6,8]. We could demonstrate the active lesion in three of eight patients and see thickening of the retina at the lesion site, increased reflectivity of inner retinal layers, and posterior shadowing in all. Thickening of the posterior hyaloid and attachment to the lesion was seen in all three lesions. Hyperreflective signals and spherical hyperreflective depositions in vitreous were seen in all the OT patients in different radial scans with different densities. None of the patients showed subretinal fluid. The findings of our study support that toxoplasmosis infection involves the entire retina as well as the choroid and vitreous. Morphological features of OT reported in our study and in the literature aid diagnosis of ocular toxoplasmosis.

The current study demonstrated punctate spots in the vitreous in eyes with ocular toxoplasmosis. The density of the vitreous cells graded by ophthalmoscopy and punctuate spots on SOCT scans were consistent. In the literature, there are reports that show punctuate spots within the retina [9,10]. In our cases, we did not find any deposit within the retina. Our hypothesis is that vitritis is dense in the eyes that have active lesions closer to the macula.

SOCT has its peak sensitivity in the vitreous above the retina and can be used to image cells in the posterior vitreous. This may aid in eventual strategies in using OCT for *in vivo* cellular classification by grading the number of cells per scan section. OCT findings are helpful to clarify the cause of visual impairment and follow-up of patients with OT.

The main weakness of the current study is its very small sample size. The interesting outcome and hypothesis about association between visual acuity and vitritis at macula scans raise interesting research possibilities.

Conclusions

SOCT is an important adjunctive imaging modality in the diagnosis and follow-up of patients with OT, and it offers the potential to be able to grade the actual number of cells present in the vitreous.

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References

1. Rathinam SR, Ashak KA (2010) Ocular manifestations of systemic disease: ocular parasitosis. Curr Opin Ophthalmol 21: 478-484.
2. Rothova A (1993) Ocular involvement in toxoplasmosis. Br J Ophthalmol 77: 683.
3. Pavesio CE, Lightman S (1996) *Toxoplasma gondii* and ocular toxoplasmosis: pathogenesis. Br J Ophthalmol 80: 1099-1107.
4. Khairallah M, Yahia SB, Zaouali S, Jenzeri S, Attia S, Messaoud R (2007) Acute choroidal ischemia associated with toxoplasmic retinochoroiditis. Retina 27: 947-951.
5. Rothova A (2003) Ocular manifestations of toxoplasmosis. Curr Opin Ophthalmol 14: 384-388.
6. Diniz B, Regatieri C, Andrade R, Maia A (2011) Evaluation of spectral domain and time domain optical coherence tomography findings in toxoplasmic retinochoroiditis. Clin Ophthalmol 5: 645- 650.
7. Oréfice JL, Costa RA, Oréfice F, Campos W, da Costa-Lima D Jr, Scott IU (2007) Vitreoretinal morphology in active ocular toxoplasmosis: a prospective study by optical coherence tomography. Br J Ophthalmol 91: 773-780.
8. Oréfice JL, Costa RA, Scott IU, Calucci D, Oréfice F, Grupo Mineiro de Pesquisa em Doenças Oculares Inflamatórias (2013) Spectral optical coherence tomography findings in patients with ocular toxoplasmosis and active satellite lesions (MINAS Report 1). Acta Ophthalmol 91: 41-47.
9. Goldenberg D, Goldstein M, Loewenstein A, Habot-Wilner Z (2013) Vitreal, retinal, and choroidal findings in active and scarred toxoplasmosis lesions: a prospective study by spectral-domain optical coherence tomography. Graefes Arch Clin Exp Ophthalmol 251: 2037-2045.
10. Saito M, Barbazetto IA, Spaide RF (2013) Intravitreal cellular infiltrate imaged as punctate spots by spectral-domain optical coherence tomography in eyes with posterior segment inflammatory disease. Retina 33: 559-565.

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