Toxoplasma Retinochoroiditis

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Introduction

Toxoplasmosis is a common infectious cause of posterior uveitis. The causative organism is a parasite, *Toxoplasma gondii*, a single-cell intracellular protozoan. While cats serve as the definite host for the organism, mammals including humans can act as intermediate host. The active infectious form is the tachyzoite. It is estimated that more than one billion individuals worldwide are infected with this organism.

The hallmark of ocular toxoplasmosis is necrotizing retinochoroiditis that is often associated with dense vitreous inflammation (*headlight-in-fog* appearance). Lesions are typically located in the posterior pole and adjacent to previous pigmented scars/atrophic areas suggestive of congenital toxoplasma infection. Primary acquired toxoplasmosis is associated less frequently with ocular disease. More than 85% cases can have bilateral involvement. Classic findings of ocular toxoplasmosis include whitish focal area of retinochoroiditis with accompanying anterior chamber inflammation (non-granulomatous or associated with stellate keratic precipitates). Atypical disease can present with peripheral tongue-shaped lesions mimicking viral retinitis, optic neuritis, retinal vasculitis, retrobulbar neuritis, or occlusive vasculitis.

Due to the widespread prevalence of the disease, qualitative serology has certain limitations in establishing the diagnosis. Quantitative serology and polymerase chain reaction of aqueous/vitreous fluid are considered to be superior with higher sensitivity and specificity. The mainstay of therapy includes anti-toxoplasma antibiotics such as clindamycin (administered orally and/or intravitreally), azithromycin, and sulfamethoxazole + trimethoprim. Intravitreal therapy with clindamycin

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V. Gupta et al. (eds.), *The Uveitis Atlas*,
https://doi.org/10.1007/978-81-322-2410-5_44

may avoid systemic side effects such as pseudomembranous colitis due to oral administration of the drug.

In the index chapter, various cases of ocular toxoplasmosis along with their imaging characteristics have been illustrated.

Case 1: Toxoplasma Retinochoroiditis in a Young Male

A 29-year-old male presented to the ophthalmology clinic with complaints of decreased vision in the left eye for the past 10 days. There was no history of prior ocular or systemic complaints. The best-corrected visual acuity (BCVA) was counting fingers at 1 m in the left eye and 20/20 in the right eye. Intraocular pressure was recorded as 44 mmHg in the left eye. Anterior segment examinations revealed 3+ cells and 2+ flare in the left eye. There was presence of corneal edema in the left eye. Fundus examination of the left eye showed 3+ vitreous haze, dense vitritis (headlight-in-fog appearance), and a yellowish-white lesion in the superior macula (Fig. 1). Fluorescein angiography revealed early hypofluorescence followed by late hyperfluorescence and leakage (Fig. 2). Optical coherence tomography (OCT) revealed the presence of intraretinal fluid. Since the clinical presentation was suspicious for toxoplasma retinochoroiditis, serology was performed and other infectious etiologies were ruled out. Toxoplasma serology (IgM and IgG) was strongly positive. The patient received intravitreal clindamycin (1 mg/0.1 ml) and dexamethasone (4 mg/0.1 ml) along with oral sulfamethoxazole + trimethoprim and topical corticosteroids. Antiglaucoma therapy (oral acetazolamide and topical brimonidine) was initiated along with topical corticosteroids and atropine. After 3 weekly intravitreal injections of clindamycin + dexamethasone, there were clinical improvement and reduction in the retinal thickness on OCT (Figs. 3 and 4).

Case 2: Observation Can Be the Proper Choice for Peripheral Lesions in an Immunocompetent Host

A 14-year-old boy was referred for decreased vision in his left eye since 5 days. At presentation his BCVA was 20/20 in the right eye and 20/40 in the left eye. At slit-lamp examination the right eye did not show any relevant finding. In the anterior chamber of the left eye, a mild inflammatory reaction (1+ cells) was detected. Intraocular pressure measured 14 mmHg in both eyes. Funduscopic examination was normal in the right eye. There were 2+ vitreous cells in the left eye mostly localized in the superior quadrants of the posterior

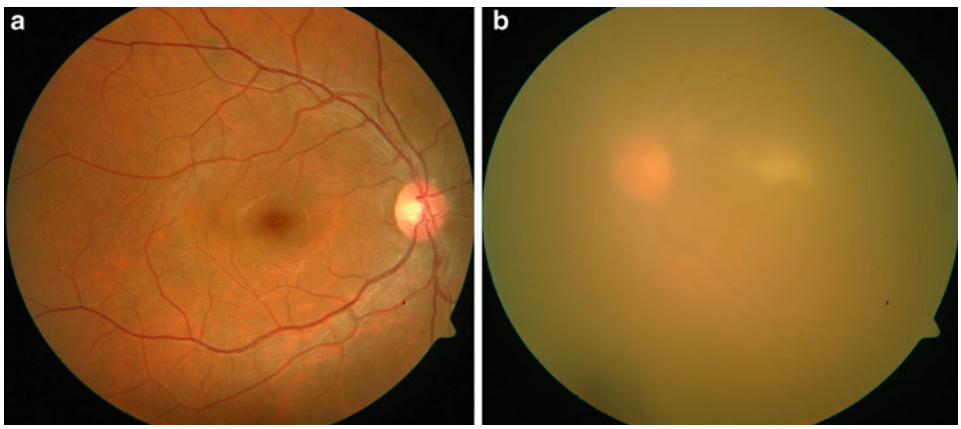

Fig. 1 Color fundus photographs of a patient with toxoplasma retinochoroiditis. Examination of the right eye was unremarkable (**a**). In the left eye, there is dense vitritis ("headlight-in-fog" appearance) along with a retinochoroiditis lesion in the superior macula and superotemporal to the optic disk (**b**)

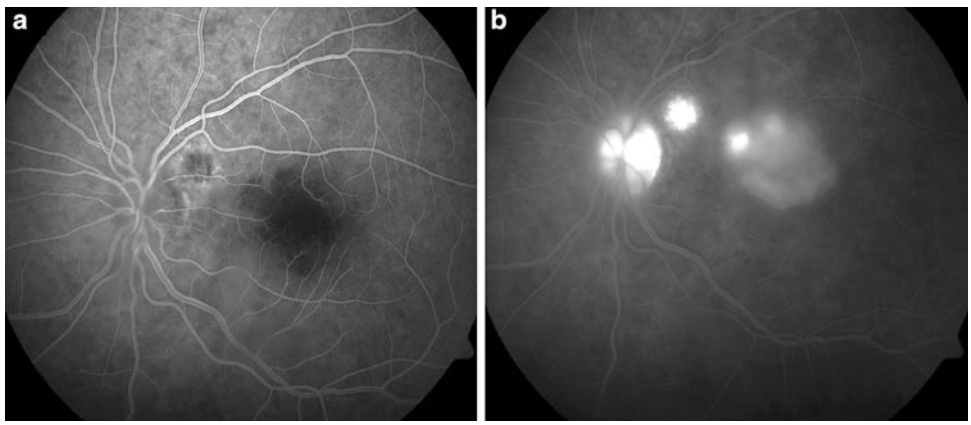

Fig. 2 Fluorescein angiography of the left eye shows early hypofluorescence (**a**) and late hyperfluorescence with leakage (**b**) in the region of toxoplasma retinochoroiditis lesion

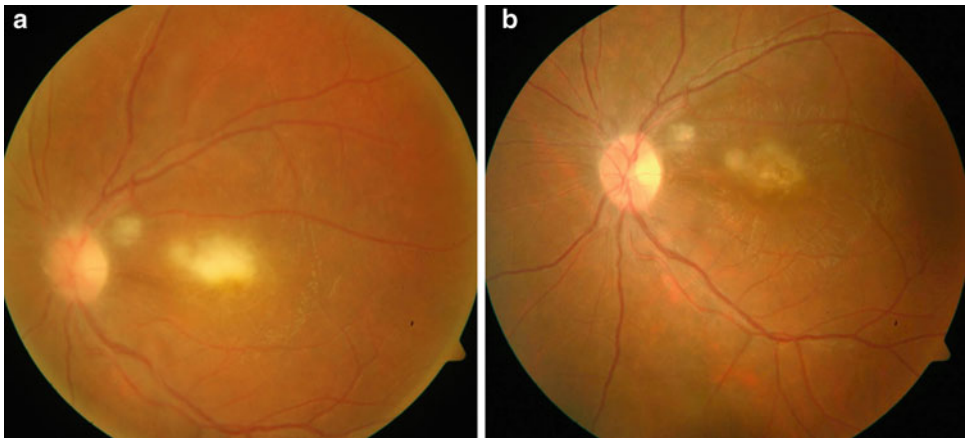

Fig. 3 Follow-up color fundus photography of the left eye at 2 weeks (**a**) and 4 weeks (**b**) after intravitreal clindamycin + dexamethasone and oral sulfamethoxazole + trimethoprim therapy. There are resolution of vitritis and decrease in the size of the retinochoroiditis lesion

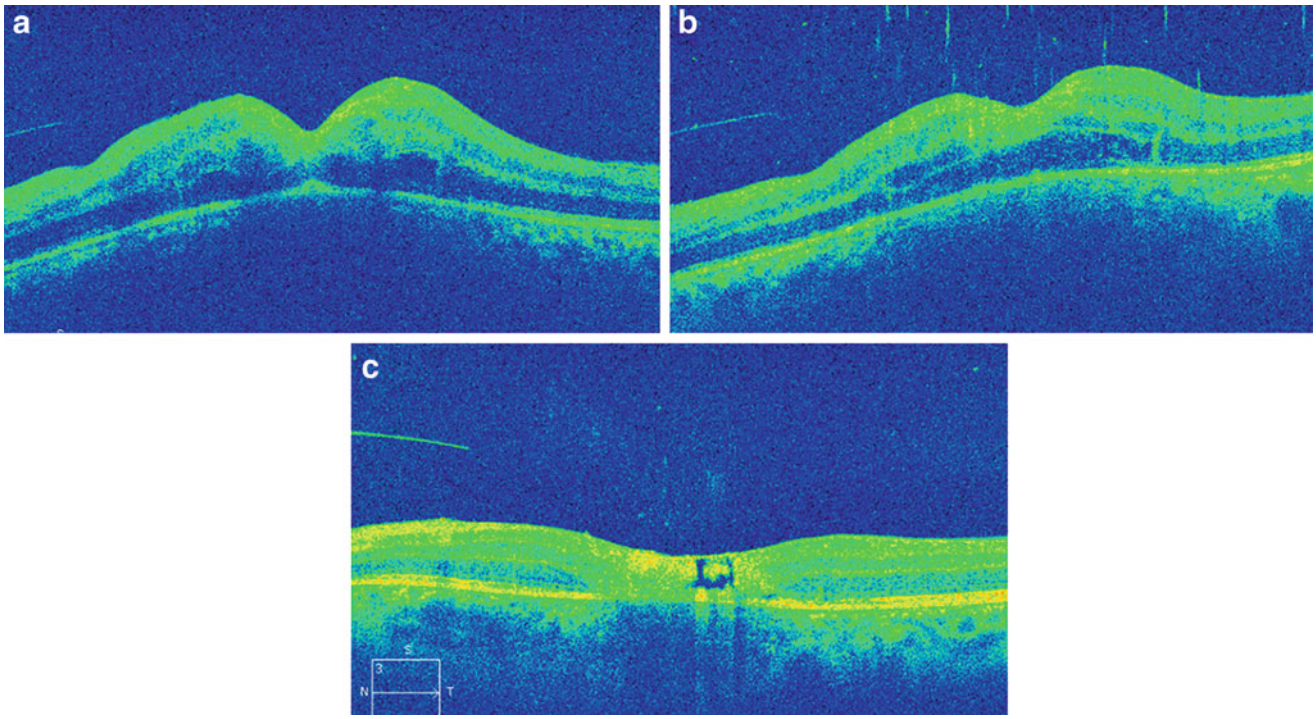

Fig. 4 Optical coherence tomography (*OCT*) at baseline (**a**), 2 weeks (**b**), and 4 weeks (**c**) of the left eye in the region of the toxoplasma retinochoroiditis lesion. At baseline, there is retinal thickening, intraretinal fluid, and disruption of the retinal layers. At 2 weeks, there is an interval decrease in the retinal edema. At 4 weeks, there are disruption and atrophy of the retinal layers and scar formation

chamber. In the same region, a one papillary diameter large active chorioretinal lesion was visible. Margins of the focus appeared ill defined and multiple signs of vasculitis were detected (Figs. 5, 6, and 7).

Toxoplasma serology was positive for disease reactivation (IgG+, IgM−), and other laboratory evaluation revealed that the subject was not immunocompromised. Since the infectious focus was not considered to be sight threatening, no specific antibiotic treatment was initiated. Mydriatic drops and mild topical steroids were started to control anterior chamber inflammation and prevent formation of synechiae. A strict follow-up consisting of two visits/week was scheduled in order to shift the approach from observational to interventional in case of worsening. After a couple of weeks, the vision was restored to 20/20 and the anterior chamber was quiet.

One month after the initial presentation, the vitreous haze was resolved and the active focus appeared to be completely healed. The lesion appeared as a small pigmented scar along a vessel aside the recently healed lesion (Fig. 8). This older focus likely represented the first localization of the parasite during the primary infection and the origin of the reactivation process.

Careful observation and a strict follow-up can allow the physician to monitor the disease activity. In case of small peripheral lesions not threatening the vision in immunocompetent hosts, observation can be done to allow spontaneous resolution of inflammation.

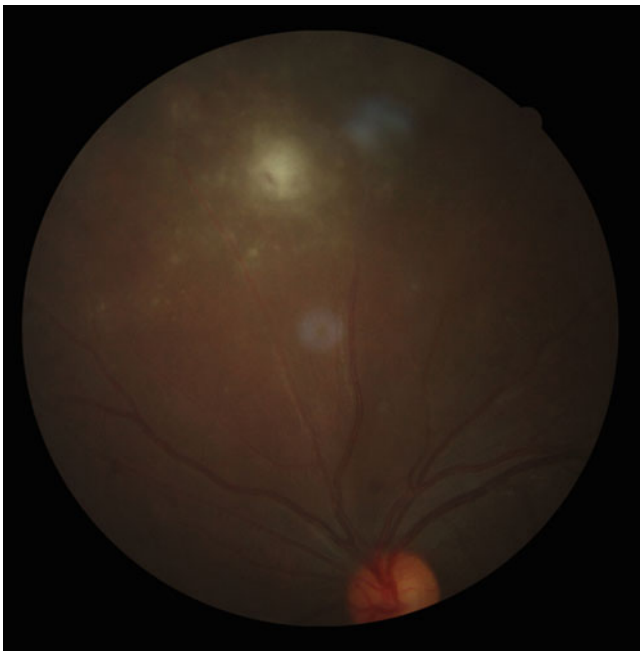

Fig. 5 Peripheral fundus photograph of the left eye showing an active chorioretinal lesion and vasculitis

Case 3: Toxoplasma Chorioretinitis Mimicking Viral Necrotizing Retinitis

A patient was referred for a second opinion after uveitis worsening in response to local steroid injection in his right eye. At presentation, BCVA was hand movements in the right eye and 20/20 in the left eye. The right eye showed conjunctival injection, corneal edema, 3+ cells in the anterior chamber, and intraocular pressure of 26 mmHg. Examination of the left eye was within normal limits. Funduscopic examination revealed a large area of necrotizing chorioretinitis involving the whole posterior pole (Fig. 9).

The patient had received a local injection of steroids for an ocular inflammation about 1 week earlier. Due to the absence of pigmented scars that suggest the toxoplasma etiology, clinical picture was highly suggestive for a viral retinitis in the form of progressive outer retinal necrosis. Nevertheless, immunocompromised hosts often develop unusual disease forms, thus a diagnostic vitrectomy was immediately performed in order to initiate the proper therapy. To our surprise, PCR performed on the vitreous tap was negative

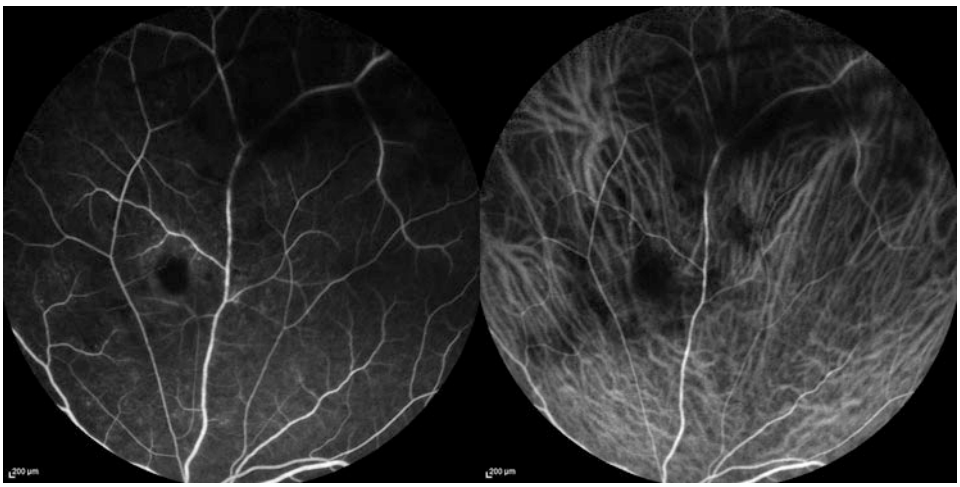

Fig. 6 A combined imaging (OCT + fluorescein angiography + indocyanine green angiography) confirmed the presence of a chorioretinitis accompanied by multiple breakdowns of the blood retinal barrier along the inflamed vessels

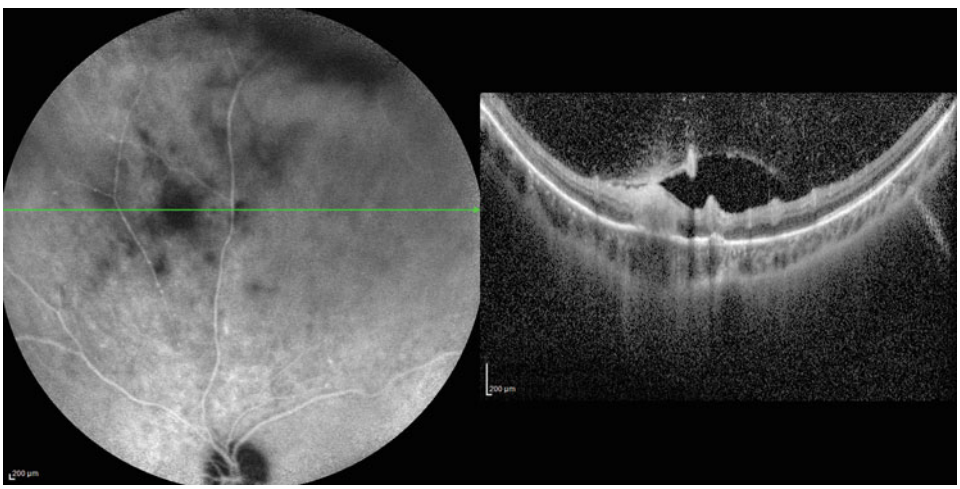

Fig. 7 A combined imaging (OCT + fluorescein angiography + indocyanine green angiography) confirmed the presence of a chorioretinitis accompanied by multiple breakdowns of the blood retinal barrier along the inflamed vessels

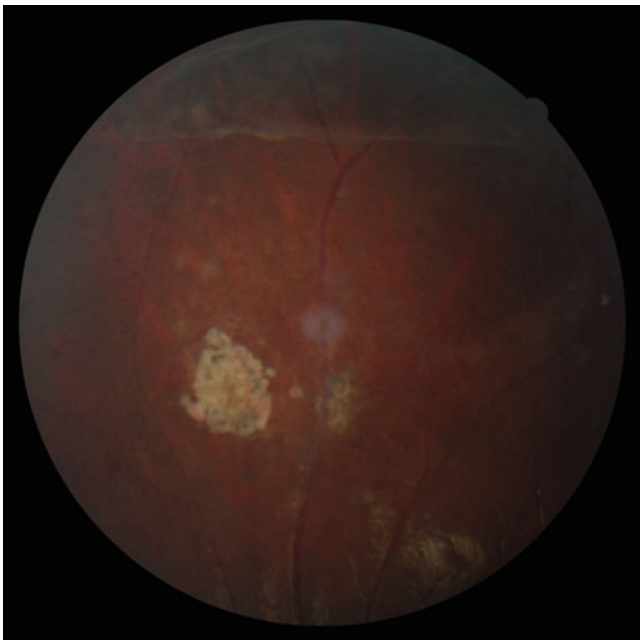

Fig. 8 Fundus photograph of the periphery shows the presence of healed chorioretinal lesion

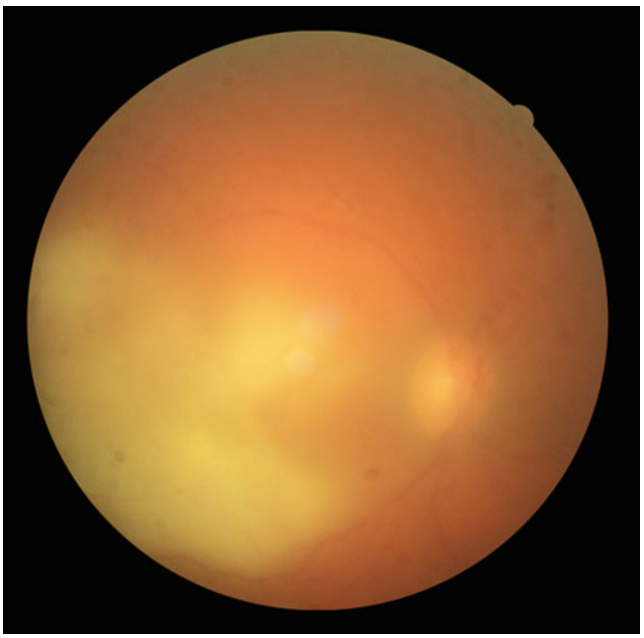

Fig. 9 Fundus photograph of the right eye shows the presence of a large necrotizing retinochoroiditis lesion involving the posterior pole

for viruses and strongly positive for *Toxoplasma gondii*. Serology for toxoplasma was positive (IgG+ and IgM+).

Considering the severity of the clinical picture and previous local steroid administration, a combined approach was used that included systemic therapy with pyrimethamine and sulfadiazine boosted by a single intravitreal injection of clindamycin. After 2 weeks, the lesion was completely

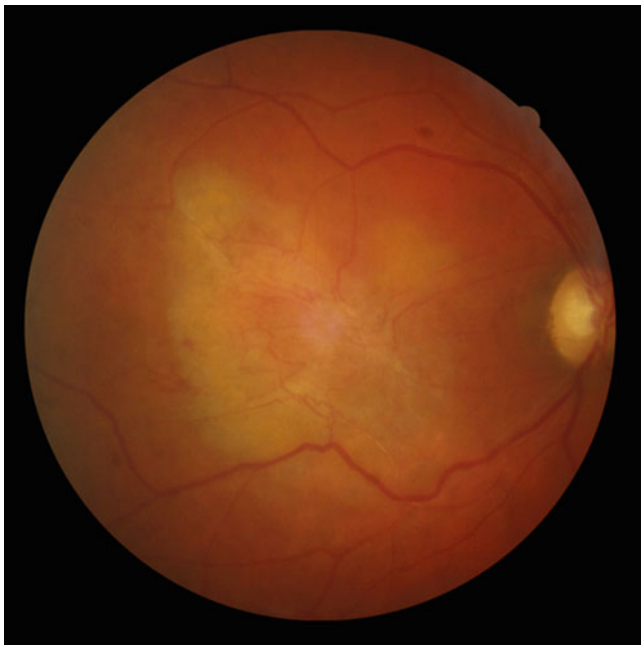

Fig. 10 Fundus photograph of the right eye shows healing of the toxoplasma lesion

healed although the vision did not improve due to extensive central retinal pathology (Fig. 10).

Toxoplasma retinochoroiditis can have protean manifestations especially in immunocompromised hosts, or in case of local administration of steroids, it can resemble a viral retinitis. Extensive laboratory analysis in such challenging cases is essential in order to find the correct diagnosis and start proper therapy.

Case 4: Macular Lesions in Toxoplasmosis

A 44-year-old female presented with complaints of decreased vision and floaters in the right eye for the past 2 months. There was no history of previous ocular complaints or trauma. Systemic evaluation was within normal limits. The BCVA in the right eye was counting fingers at 2 m and 20/20 in the left eye. Intraocular pressure measured 18 mmHg in both eyes. Slit-lamp biomicroscopy revealed the presence of 0.5+ cells in the anterior chamber of the right eye. Posterior segment examination of the right eye showed the presence of 1+ vitritis and a hypopigmented ill-defined area around the fovea. There were two noncontiguous lesions in the upper temporal retina. One of the lesions appeared as a chorioretinal scar with hyperpigmentation. The other lesion showed discrete edges and barring of choroidal vessels (Fig. 11). Fluorescein angiography showed the presence of hyperfluorescence in the macula (late phase) corresponding to the retinal opacification (Fig. 12). Laboratory

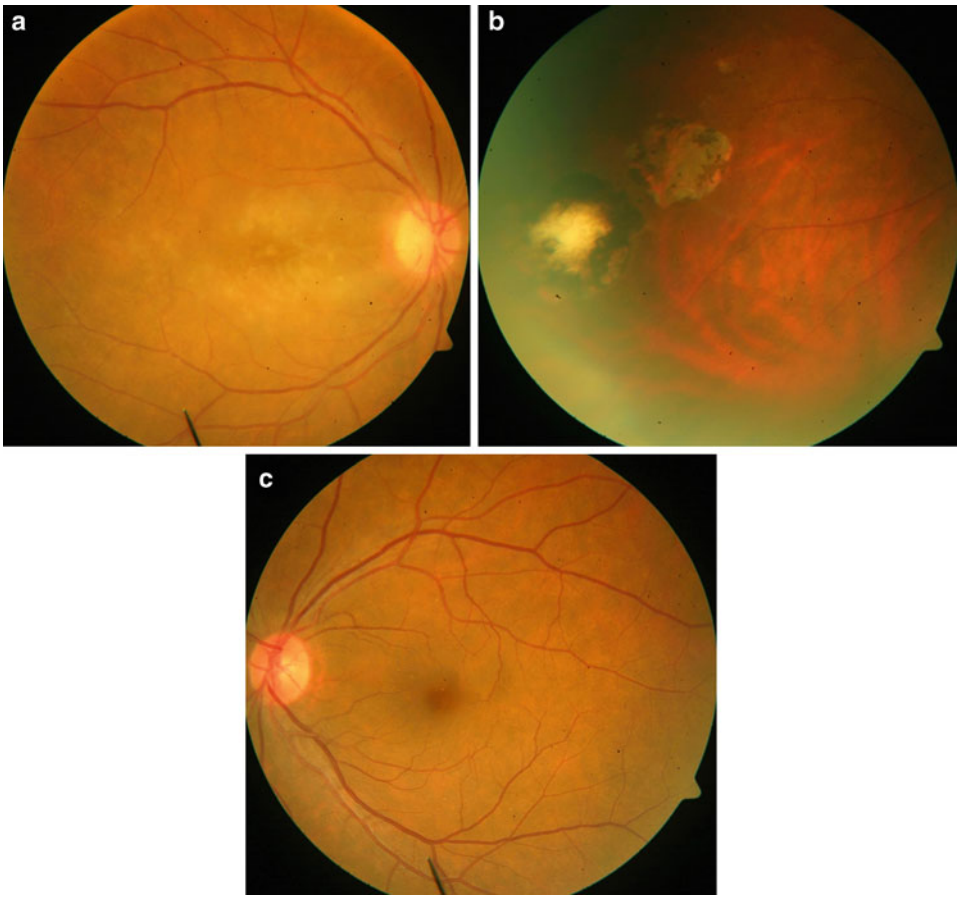

Fig. 11 Color fundus photographs of a patient with toxoplasma retinochoroiditis. At initial presentation, examination of the right eye revealed the presence of opacification and whitening of the macula in the right eye (**a**). Examination of the periphery revealed the presence of a pigmented scar and a noncontiguous inactive retinochoroiditis lesion (**b**). Examination of the left eye was unremarkable (**c**)

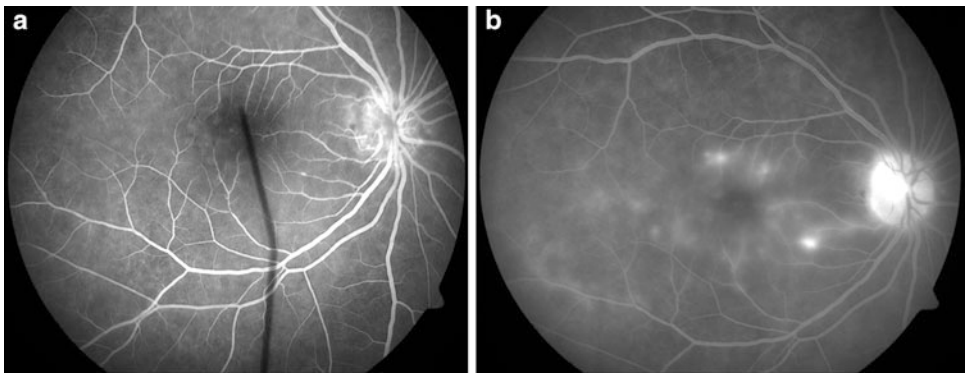

Fig. 12 Fundus fluorescein angiography of the right eye in early phase (**a**) shows subtle pinpoint leakage at the macula in the right eye. In the late phase, there is evidence of multifocal areas of hyperfluorescence in the macula along with retinal periphlebitis (**b**)

investigations revealed negative tuberculin test, syphilis, and HIV. Serum toxoplasma serology was equivocal. Due to the high clinical suspicion of toxoplasmosis, vitreous paracentesis was performed which was positive for toxoplasma polymerase chain reaction (Fig. 13). The patient received intravitreal clindamycin (1 mg/0.1 ml) and dexamethasone (4 mg/0.1 ml) along with oral sulfamethoxazole + trimethoprim and topical corticosteroids. After 2 weeks, there were resolution of anterior segment inflammation and healing of the macular lesions (Fig. 14). The BCVA improved to 20/60.

Key Points

- Ocular toxoplasmosis is an emerging disease in endemic as well as non-endemic areas as an important cause of infectious retinochoroiditis.
- Toxoplasma retinochoroiditis presents with necrotizing retinochoroiditis adjacent to a retinochoroidal scar along with vitritis, vasculitis, and optic neuritis.
- The diagnosis of ocular toxoplasmosis is mainly clinical. However, serology and intraocular fluid analysis using polymerase chain reaction may be very helpful in atypical cases.

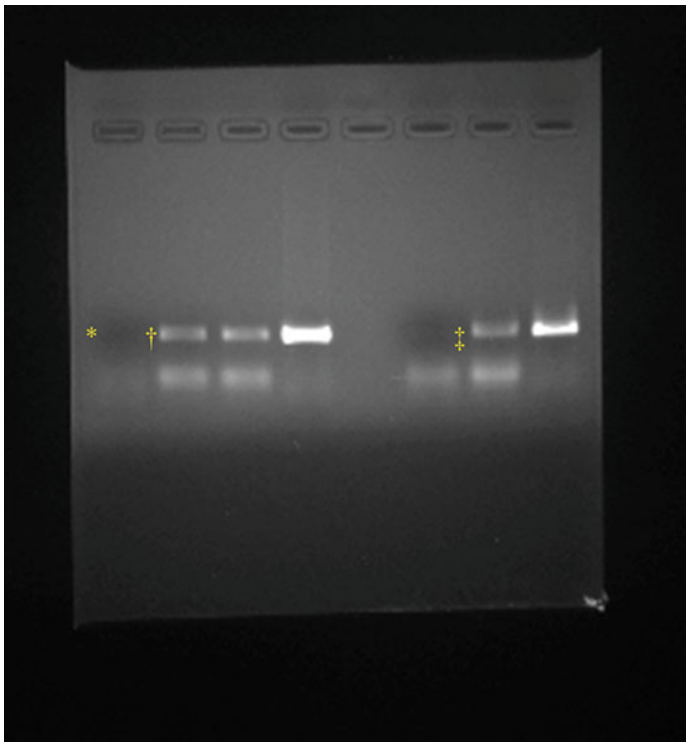

Fig. 13 Polymerase chain reaction showing positive toxoplasmosis from the vitreous sample of the patient. Asterisk indicates negative control. Dagger (†) indicates positive control. The result of the index case is indicated by a double dagger (‡)

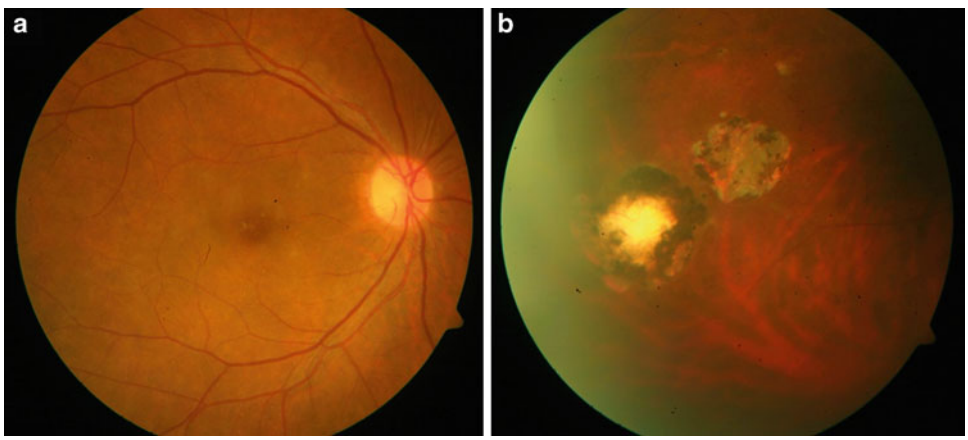

Fig. 14 Follow-up color fundus photographs of the right eye after intravitreal clindamycin + dexamethasone therapy at 2 weeks. (**a**) There is resolution of macular whitening (**b**)

- Treatment of ocular toxoplasmosis consists of specific antibiotic therapy given either systemically or intravitreally. Commonly used antibiotics include sulfamethoxazole/trimethoprim, clindamycin, and sulfadiazine/pyrimethamine (along with folinic acid).

Suggested Reading

Bonfioli AA, Orefice F. Toxoplasmosis. Semin Ophthalmol. 2005;20 (3):129–41.

Furtado JM, Winthrop KL, Butler NJ, Smith JR. Ocular toxoplasmosis I: parasitology, epidemiology and public health. Clin Experiment Ophthalmol. 2013;41(1):82–94.

Kim SJ, Scott IU, Brown GC, Brown MM, Ho AC, Ip MS, Recchia FM. Interventions for toxoplasma retinochoroiditis: a report by the American Academy of Ophthalmology. Ophthalmology. 2013;120(2):371–8.

Maenz M, Schlüter D, Liesenfeld O, Schares G, Gross U, Pleyer U. Ocular toxoplasmosis past, present and new aspects of an old disease. Prog Retin Eye Res. 2014;39:77–106.

Vasconcelos-Santos DV. Ocular manifestations of systemic disease: toxoplasmosis. Curr Opin Ophthalmol. 2012;23(6):543–50.