Unusual ocular presentation of acute toxoplasmosis

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SUMMARY Four patients with toxoplasmosis are reported with unusual presenting ocular lesions. One patient had an active lesion that appeared to involve the optic nerve as well as focal toxoplasmosis chorioretinitis at the macula. A second patient had a pale optic nerve in association with the classical chorioretinal scars of toxoplasmosis. The third patient had toxoplasmosis chorioretinitis of the macula with subretinal neovascularisation. The fourth patient had a branch artery occlusion complicating acute retinitis.

Our report includes 4 patients with unusual manifestations of toxoplasmosis. Optic neuritis and/or optic atrophy was present in 2 patients. A subretinal neovascular frond was present in a third patient. The fourth individual had a branch artery occlusion involving a vessel which passed through an area of acute toxoplasmosis chorioretinitis.

Although retinitis occurring at the macula, the retinal periphery, or even in a juxtapapillary position occurs commonly, optic nerve involvement in toxoplasmosis is rare (Hogan et al., 1964). In addition, we are not aware of a previous report in which either subretinal neovascularisation or a branch artery obstruction has been reported in association with acute toxoplasmosis chorioretinitis. Since these complications can add confusion to the diagnosis of acute toxoplasmosis, we believe they warrant documentation.

Case reports

PATIENT 1
A 15-year-old Caucasian male awoke 3 weeks prior to examination with decreased visual acuity in the right eye (OD). He denied other symptoms and had been in good health. Family pets included 5 new kittens and 1 dog. Ophthalmological examination 5 years previously documented visual acuity of 20/20 in both eyes (OU). On examination at the Medical College of Wisconsin (MCOW) his visual acuity was 10/200 OD and 20/20 in the left eye (OS). A positive Marcus-Gunn pupillary response (i.e., afferent conduction defect) was present OD. There were mutton-fat keratic precipitates (kp) OD, but not OS. The anterior chamber had 2+ cells OD and 1+ flare. The vitreous had 1 to 2+ cells anteriorly and 3 to 4+ posteriorly. An elevated, one disc diameter, intraretinal exudative lesion of the macula was present with overlying vitreous cells (Fig. 1). The disc was oedematous; at the temporal margin there

Fig. 1 Patient 1: Venous phase of fluorescein angiogram OD which demonstrates dye leaking from the active lesion at the optic disc (open arrows). There is obstruction of fluorescence by the acute retinitis at the macula except at the margins of the lesions. There is a suggestion of a subretinal neovascular frond present at 1 o’clock in the perifoveal area (white arrow), but it is beyond the resolution of the photographs.
was intraretinal exudation and sheathing of the retinal vessels, and there were many cells in the vitreous overlying the optic disc. The periphery of the right eye was normal. There were no abnormalities of the left eye. Fluorescein angiogram showed dye actively leaking from three separate foci on the disc and extending beyond the margins (Fig. 1). In the late views the optic nerve head was completely obscured by fluorescein leakage (Fig. 2). The macular lesion blocked fluorescence centrally but leaked progressively at the margins. There was a suggestion of subretinal neovascularisation (Figs. 1 and 2, perifoveal area at 1 o’clock), but a definite frond could not be identified. The Sabin-Feldman dye titre was 1:32 and the indirect immunofluorescence antibody titre for toxoplasmosis was 1:256. Complement fixation titre was 1:8. Skin test for histoplasmosis was negative. At follow-up examinations over a 6-month period his visual acuity remained 20/200 OD, and the Marcus-Gunn pupillary response persisted.

Comment: This patient illustrates acute optic neuritis associated with an active toxoplasmic lesion involving the macula. The optic nerve oedema and fluorescein angiography characteristics appear to be due to intrinsic inflammation within the nerve head, not to the macular lesion, evidenced by the persistent afferent pupillary response defect after quiescence of the inflammation.

**PATIENT 2**

An 18-year-old female had optic neuritis diagnosed in her left eye at age 16, accompanied by visual loss and bitemporal and occipital headaches. Approximately 1 year later blurring of vision recurred OS, with a mild, right temporal headache. Her ophthalmologist noted retinal scars suggestive of ocular toxoplasmosis, and she was given treatment for toxoplasmosis. Vision fluctuated over the next 3 months, at which time she was seen in consultation at MCO and noted to have visual acuity of 20/20 OD and 20/20–2 OS. A definite positive Marcus-Gunn pupillary response was present OS. An atrophic chorioretinal scar with pigment at its margins was present superonasal to the disc OS (Fig. 3). Vitreous condensation extended from the side of the lesion to the disc and into the vitreous body. Inferonasal to the disc was another punched-out area of chorioretinal atrophy, with a large choroidal vessel visible (Fig. 3). Neither of these lesions appeared active. The disc was pale. The macula was normal, and there was no vascular attenuation. The fundus of the right eye appeared normal. Fluorescein angiography showed some dilated capillaries on the disc OS with a peripapillary rim of atrophy, but no dye leaking from the disc (Fig. 4). The peripheral scars blocked fluorescence except at their margins, where staining occurred. At 30 minutes there was diffuse staining of the disc as well as the adjacent sclera. The patient was next
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Fluorescein angiography demonstrated subretinal neovascularisation at the macula (Fig. 6), with dye leaking progressively from the neovascular frond into the subretinal space (Fig. 7). Indirect immuno-fluorescence titre for toxoplasmosis was 1:16. The patient underwent treatment with prednisone, pyrimethamine, and sulphadiazine. One year later the macular lesion was inactive and the disc appeared normal. An afferent conduction defect pupillary response was no longer present.

Fig. 4 Patient 2: Venous phase of fluorescein angiogram OS demonstrates dilated capillaries on the disc with peripapillary hyperfluorescence, but no dye leaking from the disc surface

seen 1½ years later with an active, recurrent satellite lesion. Visual acuity was 20/25 OS. One month later her visual acuity had returned to 20/20 +2 OS, but the afferent nerve conduction defect remained present.

Comment: This patient has typical chorioretinal lesions of toxoplasmosis and a history of optic neuritis evidenced by a Marcus-Gunn pupillary response and pallor of the optic disc.

Patient 3

A healthy 15-year-old male on no medications complained of blurred vision OS for 4 weeks. He had no previous history of ocular disease, and visual acuity had been normal 5 months earlier. Examination showed a visual acuity of 20/20 OD and 10/200 OS. A positive Marcus-Gunn pupillary response OS was present. The anterior chamber was clear OU. The anterior vitreous was clear OD, but had 2+ cells OS. Indirect ophthalmoscopy showed a normal fundus OD. The disc margin OS was oedematous and slightly elevated, with a dusky pigmentation from the 6-12 o'clock position. The macula had a subretinal white, round, elevated lesion (Fig. 5), with retinal striae extending nasally and temporally from the lesion. Vitreous precipitates were present on the back of the retracted vitreous face. Amsler-Grid revealed an absolute central scotoma which extended 10° vertically and 12° horizontally.

Fig. 5 Patient 3: Kodachrome using red-free light OS demonstrates the retinitis at the macula with retinal striae extending from it (white arrow)

Fig. 6 Patient 3: Early venous phase of fluorescein angiogram OS demonstrating the subretinal neovascular frond (white arrow)
which can obscure the inflammatory focus, should alert the ophthalmologist to the possibility of underlying toxoplasmosis chorioretinitis when present in a young patient with cellular infiltrate in the vitreous.

Discussion

Ocular toxoplasmosis is caused by a non-motile obligate intracellular parasite, *Toxoplasma gondii*. It may occur in either a congenital or acquired form. Clinically the ocular lesion in either form usually

![Figure 7 Patient 3: Late venous phase of fluorescein angiogram OS demonstrating dye leaking from subretinal neovascular frond (white arrow)](image1)

*Comment:* The patient had subretinal neovascularisation as shown by fluorescein angiography, associated with toxoplasmosis chorioretinitis. Although the disc was originally oedematous with an afferent conduction defect of the nerve, the inflammation apparently was secondary to the macular lesion, since later examination revealed neither optic atrophy nor persistent conduction defect.

**Patient 4**

A 17-year-old male had no visual difficulties until 10 days prior to consultation at the MCOW, when metamorphopsia OS was noted. On examination visual acuity was 20/15 OD and 20/200 OS. Small, white keratic precipitates were present OS with 1+ cellular reaction and flare in the anterior chamber. The cornea and anterior chamber OD were clear and the fundus examination was normal. Fundus examination OS revealed an intense retinitis in the superior portion of the macula (Fig. 8) with subretinal fluid along the inferior margin. There was localised intraretinal haemorrhage and a branch artery obstruction of an arteriole passing through the area of retinitis. Fluorescein angiogram showed the area of non-perfusion resulting from the branch artery obstruction as well as fluorescein leakage in the area of retinitis (Fig. 9). The Sabin-Feldman dye titre was 1:256. He was treated with sulphadiazine, pyrimethamine, folinic acid, and prednisone, with resolution of the acute chorioretinitis.

*Comment:* This case showed a branch artery occlusion originating at the locus of acute toxoplasmosis chorioretinitis. Branch vascular occlusion,
presents as a focal necrotising chorioretinitis. Recurrences are common as satellite lesions adjacent to an old atrophic scar or in an area of previously normal-appearing retina. The inflammation may be self-limited or in some instances fulminating, resulting in endophthalmitis (Duke-Elder, 1966; Gass, 1970). Juxtapapillary lesions are less common. An active lesion in the optic nerve is rare (Walsh and Hoyt, 1969).

While cranial nerve involvement has been described (Koch, 1943) and papilloedema may be secondary to lesions in the CNS (Koch, 1943), the optic nerve of Patient 1 appears to have been directly affected as well as there being a classical lesion involving the macula (Figs. 1, 2). There were no CNS symptoms or signs to suggest secondary papilloedema. In addition the disturbance of the optic disc was unilateral, the visual acuity was acutely and severely decreased, and a Marcus-Gunn pupillary response was present and persisted.

Patient 2 had a pale optic disc in association with typical chorioretinal scars (Figs. 3, 4). An attack of recurrent acute inflammation occurred as a satellite lesion, which is characteristic of toxoplasmosis. It is possible that the patient had both toxoplasmosis chorioretinitis and a separate cause of the pale disc. Zimmerman, however, noted *Toxoplasma gondii* in the optic nerve in a case of ocular toxoplasmosis (Zimmerman, 1961). Others have suggested that some cases of optic neuritis in young adults may be caused by toxoplasmosis (Hogan et al., 1964; Frenkel and Jacobs, 1958; Frezzotti and Guerra, 1963).

Patient 3 presented acutely with subretinal neovascularisation (Figs. 5, 6, 7). Patient 1 also had the appearance of subretinal neovascularisation in the chorioretinitis which occurred at the macula (Figs. 1, 2), but photographic resolution did not permit absolute identification of the frond. Retinociliary anastomotic vessels have been previously reported in chorioretinal scars due to toxoplasmosis (Gass, 1970; Saari et al., 1975; Kennedy and Wise, 1971). In addition, a racemose angioma of the retina has been described in association with toxoplasmosis (Stucchi et al., 1972) as well as preretal fibrovascular proliferans extending from the disc to a chorioretinal lesion (Saari et al., 1975; Maumenee, 1961). We are unaware of a previous case in which a neovascular frond was present like that in Patient 3. The patient had no history of trauma, was not myopic, and had no peripheral scars such as are seen in presumed ocular histoplasmosis. He did not have angioid streaks. Although the possibility of *Toxocara canis* was considered, the clinical appearance and reactive immunofluorescence antibody titre seemed to confirm the diagnosis of toxoplasmosis.

Retinal vascular lesions previously reported in toxoplasmosis include periphlebitis with or without venous insufficiency, concomitant periphlebitis and periarteritis, and rarely segmental periarteritis alone (Schwartz, 1977; Wise et al., 1971). Patient 4 presented with a branch artery obstruction as the vessel passed through a localised area of acute retinitis (Figs. 8, 9).

Serological tests for toxoplasmosis include the Sabin-Feldman dye test, indirect fluorescent antibody test, complement fixation test, precipitin test, and haemagglutination test. A skin test has also been used but may not become positive until as long as 6 months after infection (Hogan et al., 1964; O'Connor, 1957; Hultd, 1958; Jacobs and Lunde, 1957; Scott, 1974). A Sabin-Feldman dye titre of 1:16 or greater has been considered positive (Hogan et al., 1964; Scott, 1974). Hogan et al. reported an unusual patient with a positive dye titre only in undiluted serum but who had toxoplasma organisms in his eye at necropsy (Hogan et al., 1964). Others have found equally low Sabin-Feldman dye titres in histologically proved cases, including 1 case which was seronegative (Zscheile, 1964; Francescetti and Engelbrecht, 1964). There has been good agreement (95%) between the Sabin-Feldman dye test and the indirect fluorescent antibody test regarding their specificity and sensitivity (Scott, 1974; Walton et al., 1966). Positive titres in either test can exist for years, and it has been suggested that variations in serum titres tend to reflect proliferative activities of the parasite in the reticuloendothelial organs more than the activity of eye lesions (Scott, 1974; O'Connor, 1973). Patient 1 had a dye titre of 1:16 and an indirect fluorescent antibody titre of 1:64. Patient 2 did not have serological testing but had classical peripheral chorioretinal scars associated with toxoplasmosis. Patient 3 had an indirect fluorescent antibody titre of 1:16. Patient 4 had a Sabin-Feldman dye titre of 1:256. None of our patients had evidence of systemic lupus erythematosus, which may cause a false positive immunofluorescent test for toxoplasmosis.

The 2 cases in this report with optic nerve involvement emphasise the need to include toxoplasmosis in the differential diagnosis of any patients presenting with optic neuritis. In addition they suggest the importance of carefully testing patients with peripheral toxoplasmosis chorioretinitis for a Marcus-Gunn pupillary response to rule out concomitant occult optic nerve involvement. The third patient indicates that toxoplasmosis should be included in the differential diagnosis of subretinal neovascularisation, particularly in the young. Finally, the fourth patient demonstrates that branch artery occlusion may complicate toxoplasmosis chorioretinitis.
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References


