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Ocular toxoplasmosis; common and rare symptoms and signs

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Abstract

The common and rare symptoms and signs of congenital, childhood and adult ocular toxoplasmosis are discussed together with the differential diagnosis of the retinal lesions. A choroidal coloboma in connection with congenital toxoplasmosis is described. The occurrence of an optic pit with congenital macular toxoplasmosis, growth of subretinal new vessels as well as disappearance of arteriolar and venular sheathing is demonstrated.

Introduction

Toxoplasma gondii is endemic all over the world. In the Netherlands 60% of the population in the fourth decade has a positive antibody titre, usually after a subclinical infection [1]. Most chorioretinal scars due to toxoplasmosis have a typical appearance but there exist uncommon and even quite rare manifestations of toxoplasmosis. Since serology is inconclusive in cases of ocular toxoplasmosis, diagnosis is made mostly on clinical grounds. Therefore, it is important for ophthalmologists to be aware of the less common signs of this disorder. The purpose of this paper is to describe all known signs of ocular toxoplasmosis infection and to introduce two new ones hitherto not encountered in the literature.

Ocular manifestations of toxoplasma infection

It is assumed that ocular toxoplasmosis is usually acquired by intrauterine infection [2] and its manifestations are protean. An overview of these mani-

festations is given in Table 1 in which the signs present at or around birth are marked with an asterisk. The later in pregnancy the mother becomes infected the greater the chance for the offspring to be infected [3] but the smaller the risk of serious ocular malformations. Perinatal ocular abnormalities will be separated in this article from signs of toxoplasma infections manifesting themselves later in life.

Perinatal signs of ocular toxoplasmosis

Microphthalmia is a regular mentioned sign [4]. It is probably the result from infection around the fifth week of gestation. Concomitant signs may be enophthalmos and ptosis. Nystagmus is also frequently encountered and may be due to cerebral infection or to visual deprivation. Eso- or exotropia with resulting amblyopia are frequently present in congenital toxoplasmosis and once the Stilling-Türk-Duane syndrome has been described in a 15 year old patient with toxoplasmosis scars in the macula [5]. Myopia and astigmatism of more than 5

Fig. 1. Optic pit (arrow) in 52 year old black patient with congenital macular toxoplasmosis scar.

dioptries in connection with toxoplasmosis [4] could also be the result of visual deprivation. Iris hyperaemia [4] and persistent tunica vasculosa lentis have been recorded in the newborn together with corneal haze as sequelae of uveokeratitis [6]. Iritis will be discussed later.

There is a well-known association between Fuchs' heterochromic cyclitis and ocular toxoplasmosis but the reason for this is unknown [7]. Iris translucency can be considered to be part of this heterochromia. Cataract is often seen and may be due to the intrauterine infection or secondary to the ensuing uveitis.

Encysted toxoplasma colonies in the optic nerve have been described [8] and this might one lead to the assumption that an optic coloboma or pit also could originate from intrauterine toxoplasmosis infections. Indeed recently a black man with a typical congenital macular toxoplasmosis scar and a small pit in the optic disc was seen (Fig. 1). He had on high magnification biomicroscopy an excavation or extreme thinning of the retina in the area of the macular scar. The internal limiting membrane, when examined with a 60 dioptre lens and a slit lamp, was seen to be stretched across the macular coloboma with a tiny round hole in it. Also a non-pigmented congenital choroidal coloboma has personally been observed in a 25 year old male with congenital toxoplasmosis (Fig. 2).

In the newborn, retinal folds and traction detachments have been described as well as an anastomosis between the upper and lower temporal retinal venules [4]. Granulomata in the posterior pole may look like a white mushroom in the active stage but also can have an elevated red-brown appearance. These granulomata can become so large that they may reach the crystalline lens [9] and sometimes they are accompanied by perivasculitis.

Fig. 2. Congenital choroidal coloboma at the six o'clock position below the disk and toxoplasmosis scars in left macula. The same eye had a scar with much glial tissue in the upper nasal periphery.

Fig. 3a. Chorioretinal toxoplasma scars.

Fig. 3b. Same eye with active satellite lesion in fovea.

Ocular toxoplasmosis in older children and adults

Loss of visual acuity due to retinal inflammation is the most common symptom of a toxoplasma infection in children and adults. Less frequently encountered symptoms and signs will be described systematically.

Conjunctivitis due to toxoplasmosis has been mentioned in laboratory staff handling contaminated materials but also after generalized infection [10]. It seems reasonable to expect that this might regularly happen among people handling contaminated meat. There has been one report on ocular toxoplasmosis acquired after an autopsy [11].

For a long time it has been denied that iritis or anterior uveitis could be part of a toxoplasma infection [2]. Nevertheless determination of antibodies in the aqueous has proven otherwise. Pain, photophobia and scleral tenderness thus may be resulting from toxoplasmic anterior uveitis. Keratic precipitates may have a mutton fat or as in Fuchs' heterochromia a stellate appearance. In cases with Fuchs' iritis translucency is sometimes visible. Granulomata in the iris and on the pupillary margin as well as posterior synechiae, secondary glaucoma and cataract may be present [11]. Rubeosis and iris bombé have personally been observed in the divergent right eye of the case described in Fig. 2. Toxoplasmosis can cause intermediate uveitis (pars planitis) [13] but the main cause

of vitreous cells and opacities will be the cellular reaction overlying a retinal inflammatory focus. As the toxoplasma parasite is an obligatory intracellular one, free parasites have never been found in the vitreous or the aqueous [14]. The inflammatory reaction in the vitreous may result in vitreous strands and fibrous membranes that may completely obscure the fundus and adhere to the lens [15].

Optic pallor, especially on the temporal side, is quite common in toxoplasmosis as a result of nerve fibre loss. Optic atrophy may occur as a result of isolated papillitis due to toxoplasmosis; in the absence of chorioretinitis scars this aetiology has regularly been overlooked [16]. This is not the case with the juxtapapillary chorioretinitis of Jensen with its nerve fibre bundle defects that most ophthalmologists will attribute to toxoplasmosis. Organization of inflammatory exudates in cases of papillitis may lead to a glial tissue veil that gradually can merge with the temporal retina [15].

The hallmark of ocular toxoplasmosis is the focal necrotizing retinitis with the resulting characteristic chorioretinal scars. They may be round or irregularly shaped (Fig. 3). The scar usually has a light-yellow colour with white spots where the bare sclera is visible and with uneven pigmented areas. The location in the macula is more or less typical for congenital toxoplasmosis (Fig. 1) but toxoplasma scars may be seen up till the equator. In blacks 26% of the lesions are in the periphery of the retina

Fig. 4a. Anterior and venular sheathing peripheral to toxoplasma chorioretinitis scar with active satellite lesion outside picture.

Fig. 4b Same vessels 18 months after the inflammation settled down. Arrows indicate identical sites.

whereas in whites only 4% [17]. Scars may be as large as 5 disk diameters or can consist of tiny specks. The presence of active satellite inflammatory foci next to the scar (Fig. 3) is pathognomonic for toxoplasmosis. These satellites crop up when cysts containing slowly growing bradyzoites burst either due to stretching of the cyst wall [14] or to lowered host resistance. After bursting of the cyst, bradyzoites are transformed into tachyzoites that invade neighbouring cells. When host resistance builds up, tachyzoites gradually transform into bra-

dyzoites again. Sometimes such an exudative reaction is seen in the retina that the underlying inflammation may be overlooked.

Around the retinal arterioles and venules peripheral to an active inflammation, sheathing may be present. It is remarkable that these sheaths may completely disappear without vascular occlusion later on [12] as personally observed (Fig. 4) in a 37 year old woman who was on immuran therapy for chronic rheumatoid arthritis. However, retinal branch artery and vein occlusions have been de-

Fig. 5. Fluorescein angiogram of subretinal neovascular membrane (arrow) adjacent to toxoplasmosis scar.

Table 1. Ocular manifestations of toxoplasmosis infection.

	Congenital	Congenital or acquired		Congenital	Congenital or acquired
Amblyopia		+	intermediate uveitis		
Anterior uveitis with or without			(pars planitis)		+
Iris hyperaemia	★		juxtapapillary chorioretinitis		+
Iris granulomata		+	macular fibrosis		+
Keratitic precipitates			oedema		+
(sometimes mutton fat)		+	punctate outer retinal		
Pain, photophobia,			infiltrates		+
scleral tenderness		+	retinitis (focal necrotizing)		+
Posterior synechiae		+	satellite inflammatory		
Secondary cataract		+	lesions		+
Secondary glaucoma		+	Squint		+
Choroidal coloboma	★		Stilling-Turk-Duane syndrome	★	
Conjunctivitis		+	Subretinal neovascularization		+
Iris bombé		+	Uveokeratitis with		
Iris heterochromia		+	hazy cornea	★	
Iris rubeosis		+	Vascular retinal changes		
Iris translucency		+	anastomosis		
Microphthalmus	★		veno-venous between		
Myopia and high astigmatism		+	superior and inferior		
Nystagmus	★		retinal temporal venules		+
Optic atrophy		+	chorioretinal		+
Optic pit	★		capillary non-perfusion		+
Optic disc glial tissue veil			Coats-like hard exudates		+
towards temporal retina		+	neovascularization		+
Optic disc neovascularization		+	occlusion branch artery		
Papillitis		+	and vein		+
Persistent tunica			petechiae or larger		
vasculosa lentis	★		haemorrhages		+
Ptosis		+	sheathing branch artery		
Retinal manifestations:			and vein		+
detachment exudative		+	Vitreous cells, floaters		
detachment rhegmatogenous		+	and haemorrhages		+
folds	★		Vitreous membranes		
foveal chorioretinitis	★		and strands		+
granulomata, sometimes					
reaching the crystalline lens	★				

★ Congenital; + Congenital or acquired.

scribed peripheral to old toxoplasmosis scars resulting in capillary non-perfusion, neovascularization and vitreous haemorrhages [18]. New vessels on the disc may wax and wane with the activity of the inflammation [19]. Retinal arterial or venous petechiae and larger haemorrhages may occur independently of active inflammatory foci but these foci can be surrounded by marginal haemorrhages [11]. Chorioretinal vascular anastomoses in the scars can be seen on fluorescein angiograms [20].

Adjacent to the scars it is not uncommon to see subretinal new vessels originating from the choroid leading to a disciform reaction (Fig. 5) [21, 22]. A rare vascular complication of toxoplasmosis is the occurrence of Coats-like exudates [23–25]. Sometimes only very small exudates are visible in the retina, resulting in punctate infiltrates in the outer retina and fine granular white dots at the level of the retinal pigment epithelium in the quiet stage [14].

Organization of vitreous infiltrates may lead to traction detachment. A rhegmatogenous detachment can start from a retinal hole at the site of a former toxoplasmosis scar where the adhesion to the pigment epithelium and sclera was strongest.

Toxoplasmosis in the immune compromised host

This has been described in cases following chemotherapy, radiotherapy and human immunodeficiency virus infection. Absence of retinal or choroidal inflammation was noted [26], and this is probably a direct consequence of the immune suppression. This may be the reason why toxoplasmosis in these patients can run such a fulminant course.

Differential diagnosis of ocular toxoplasmosis

The symptoms and signs of ocular toxoplasmosis (Table 1) may occur in many ophthalmological disorders and it would be impossible in the scope of this article to give a complete differential diagnosis. For the retinochoroidal inflammation, however,

Table 2. Differential diagnosis of toxoplasmic retinitis.

Acute retinal necrosis (herpes simplex?)
Age related macular degeneration or other disciform lesions
Blood dyscrasias
Candida endophthalmitis
Coccidioidomycosis
Collagen disorders (eg SLE, polyarteritis nodosa)
Cytomegalovirus retinitis
Fat embolism (acute pancreatitis)
Malignant hypertension
Medullated nerve fibres
Metastatic endophthalmitis
Non-Hodgkin lymphoma (reticulum cell sarcoma)
Presumed ocular histoplasmosis
Purtscher's disease
Retinoblastoma
Rift Valley fever
Rubella
Sarcoidosis
Subacute sclerosing panencephalitis (SSPE)
Syphilitic retinitis
Toxocara canis granuloma
Torulosis (Cryptococcosis)

only a restricted number of disorders have to be considered in the differential diagnosis and these are given in Table 2.

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