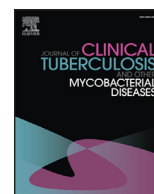




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Intraocular manifestations of mycobacterium tuberculosis: A review of the literature[☆]



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ABSTRACT

Mycobacterium tuberculosis: is most commonly associated with pulmonary infection. However, tuberculosis (TB) can also affect the eye. TB can affect nearly any tissue in the eye, and a high index of suspicion is required for accurate diagnosis, as many of the intraocular manifestations of TB can mimic other, more common diseases. Correct diagnosis is critical because systemic anti-tuberculosis treatment may be required, and vision loss or even loss of the affected eye can occur without proper treatment. Thus, it is important for ophthalmologists and infectious disease specialists to work together to accurately diagnose and treat intraocular TB. This article reports the various known presentations of intraocular TB and reviews important elements of diagnosis and treatment.

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Review of the literature

Background

Tuberculosis (TB) is an airborne infectious disease that most commonly affects the lungs. The causative organism is the obligate aerobic, acid-fast bacillus *Mycobacterium tuberculosis* [1–3]. There are numerous manifestations of extrapulmonary tuberculosis, many involving the eye [4]. This review will focus primarily on the intraocular forms of TB. A previous review summarized orbital TB [5].

Literature search strategy

The literature was reviewed using a PubMed search with both Medical Subject Headings (MeSH) and keywords. MeSH terms included tuberculosis, ocular tuberculosis, eye infections and visual acuity. Keywords included eye, intraocular, periocular, ocular, uveitis, sclerouveitis, panuveitis, choroiditis, retina, retinal, tuberculosis, and “ocular tuberculosis.” Results were limited to available peer-reviewed, English-language journals published between 1930

and 2015. All papers were reviewed, (including single case reports), to determine if they should be referenced in this review.

Epidemiology

The Centers for Disease Control and Prevention (CDC) estimates that one third of the world's population is infected with TB, but only ten percent of infected persons develop clinical manifestations of the disease [6]. Of the ten percent with detectable disease, sixteen to twenty-seven percent have extrapulmonary TB involvement, which includes those with intraocular findings [7]. The incidence of intraocular TB has been reported to range from 1.4 to 18 percent [4, 8–13]. Age over forty, female gender, and HIV infection increase the risk of extrapulmonary TB, and individuals with HIV also have an increased risk of ocular TB [4].

Intraocular involvement

Hematogenous spread is the primary mechanism by which TB affects the eye [14–16]. However, direct local extension and hypersensitivity responses from infection elsewhere in the body can also result in intraocular findings [14]. Intraocular TB often affects the ciliary body and choroid due to the high regional oxygen tension of these tissues, and uveitis, especially posterior uveitis, is the most common form of intraocular TB [6,14,16]. Regardless of the clinical presentation, multiple recurrences of inflammation despite treatment should increase the level of suspicion for intraocular TB in a patient with TB risk factors. The wide variety of ways in which TB

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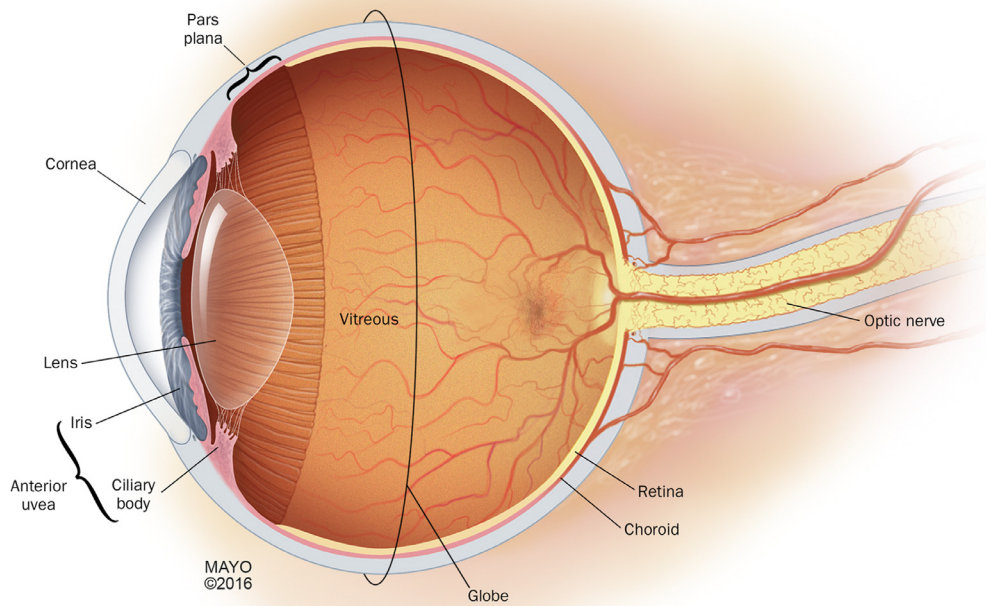


Fig. 1. Anatomical diagram of the eye. The various anatomical structures of the eye that can be affected by tuberculosis are labeled. Labels correspond to the structures listed in [Table 1](#)

Table 1
Clinical presentations of intraocular tuberculosis.

Tissue	Possible presentations
Anterior uvea/ Pars plana	Granulomatous anterior uveitis Iris nodules Iris atrophy Intermediate uveitis
Lens	Cataract
Choroid	Tubercles Tuberculomas Abscesses Choroiditis
Retina	Macular edema Intra- or preretinal hemorrhage Retinitis Vasculitis Neovascularization Neuroretinitis Eales disease
Optic nerve	Optic neuritis Retrolbulbar neuritis Papillitis Papilledema Tubercles
Globe	Panuveitis Endophthalmitis Panophthalmitis Globe rupture

can affect the intraocular tissues are described below and summarized in [Table 1](#) with a corresponding diagram outlining the relevant structures of the eye in [Fig. 1](#).

Anterior uveitis

TB can cause a granulomatous uveitis with iris and angle granulomas, mutton-fat keratic precipitates, posterior synechiae, and oc-

asionally hypopyon [17–20]. A pigmented hypopyon, iris nodules, and iris atrophy have also been reported [14,21,22]. Cataract can develop as a result of ongoing inflammation and steroid treatment, and extensive synechiae can lead to angle closure glaucoma [14]. Of patients with TB-related uveitis, anterior uveitis has been reported in 12 to 36 percent of the cases; these patients are more likely to have broad-based posterior synechiae and less likely to have filiform synechiae than patients with uveitis unrelated to TB [6,23,24].

Posterior and panuveitis

Panuveitis has been reported in 11 to 20 percent of patients with TB uveitis ([Fig. 2](#)), whereas posterior uveitis accounts for 35 to 42 percent of intraocular TB [6,23]. Multifocal choroiditis is the most common manifestation of posterior segment involvement ([Fig. 3](#)) [6,14,15,23]. Retinitis usually occurs in the setting of concomitant choroiditis rather than as an isolated syndrome [6]. TB-associated posterior uveitis can also take the form of serpiginous-like choroiditis ([Figs. 4 and 5](#)), which is hypothesized to be a hypersensitivity reaction that progresses relentlessly despite steroid treatment. [6,25]. Serpiginous-like choroiditis may be an important marker for TB even in patients residing in non-endemic regions [26,27]. In contrast to classic serpiginous choroiditis, the lesions in TB-associated serpiginous-like choroiditis are more pigmented, more likely to be multifocal, and often arise outside the peripapillary region [28]. However, both TB-associated choroiditis and true serpiginous choroiditis can be difficult to treat. Patients with serpiginous-like choroiditis are typically from TB-endemic regions and/or of Asian Indian ethnicity [29]. In one report, serpiginous-like choroiditis was found in 21.5 percent of patients with TB uveitis in Tunisia, North Africa, and another report found that patients with TB-associated uveitis are more likely to have serpiginous choroiditis than patients with uveitis unrelated to TB [23,24]. Since chorioretinal inflammation may breach Bruchs

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