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Ocular tuberculosis: A challenging diagnosis – A case report and review

Dr. Rajendra Tatu Nanavare[1], Dr. Rajendran R[2], Dr Dipak Vinayak Chaudhari[2]
[1] Department of Medical, Group of TB Hospital, Sewri Mumbai, Faculty for Post Graduate Diploma in Chest and Tuberculosis, Tropical Medicine, College of Physician and Surgeon CPS Mumbai, Maharashtra, India
[2] Department of Medical, Group of TB Hospital, Sewri Mumbai, Maharashtra, India

Abstract
Background: Ocular tuberculosis (TB) is a rare manifestation of extrapulmonary tuberculosis that can involve any ocular structure, leading to significant morbidity if not diagnosed and treated early.
Case Presentation: We report a case of a 42-year-old woman presenting with granulomatous anterior uveitis and choroidal tubercles without systemic TB evidence. Diagnosis was supported by positive Mantoux test, interferon-gamma release assay, ocular imaging findings, and clinical response to anti-tubercular therapy. The patient was successfully treated with a standard six-month anti-TB regimen and adjunctive corticosteroids, leading to complete resolution of ocular lesions and restoration of vision.
Conclusion: Ocular TB remains a diagnostic challenge and demands a high index of suspicion, especially in TB-endemic areas. Early recognition, appropriate anti-tubercular therapy, and multidisciplinary care are critical to prevent irreversible vision loss.

Keywords: Ocular tuberculosis, anterior uveitis, choroidal tubercles, mycobacterium tuberculosis, diagnosis, multidisciplinary management

Introduction

Tuberculosis (TB), caused by Mycobacterium tuberculosis, continues to be a significant global health challenge, affecting millions annually. While pulmonary involvement is its most common and recognized manifestation, extrapulmonary TB accounts for approximately 15–20% of cases, with ocular tuberculosis (ocular TB) representing a small yet clinically important subset. Ocular TB is a rare but serious presentation that can affect virtually any part of the eye, including the conjunctiva, sclera, cornea, uvea, retina, optic nerve, and the adnexal structures such as the eyelids and lacrimal glands.

Ocular TB may result from hematogenous dissemination from a distant focus, direct extension from adjacent structures, or, rarely, a primary infection of ocular tissues. The clinical spectrum of ocular TB is broad, ranging from granulomatous anterior uveitis and choroidal tubercles to scleritis, retinal vasculitis, and optic neuropathy. Importantly, ocular TB can occur even in the absence of active pulmonary disease, making diagnosis particularly challenging.

Timely diagnosis is often hampered by the paucibacillary nature of ocular tissues, the difficulty in obtaining ocular samples for microbiological confirmation, and the protean clinical manifestations that often mimic other infectious and non-infectious inflammatory conditions such as sarcoidosis, syphilis, and idiopathic uveitis. In TB-endemic countries like India, where latent TB infection rates are high, establishing the etiological link between ocular inflammation and M. tuberculosis demands a high degree of clinical suspicion and a multidisciplinary approach.

Untreated or inadequately treated ocular TB can lead to devastating visual outcomes, including permanent vision loss. Fortunately, with early recognition and the institution of appropriate anti-tubercular therapy, most patients achieve resolution of inflammation and restoration of visual function. This case report highlights a classic presentation of ocular TB, discusses the diagnostic challenges encountered, and underscores the importance of a systematic, collaborative approach to management.

Case Presentation

Patient Profile

A 42-year-old female from a TB-endemic region presented with a 3-month history of blurred vision, mild eye pain, and photophobia in her right eye. There was no previous history of systemic TB, diabetes, or other immunocompromising conditions.

Clinical Findings

Visual acuity: 6/12 in the right eye, 6/6 in the left.

Slit-lamp examination: Granulomatous anterior uveitis with iris nodules (Koeppe and Busacca nodules).

Fundoscopy: Multiple choroidal tubercles at the posterior pole.
No vitritis or retinal detachment was noted.
No lymphadenopathy or pulmonary symptoms.

Investigations

Mantoux Test: 20 mm induration (positive).

Interferon Gamma Release Assay (IGRA): Positive.

Chest X-ray: Normal.

Ocular B-scan ultrasound: Choroidal thickening without retinal involvement.

Sputum for AFB and GeneXpert: Negative.

Serum angiotensin-converting enzyme (ACE) levels: Normal (to rule out sarcoidosis).

Management

Initiated on standard anti-TB therapy (2HRZE/4HR regimen)

Intensive phase: 2 months of isoniazid, rifampicin, pyrazinamide, and ethambutol. Continuation phase: 4 months of isoniazid and rifampicin.

Oral corticosteroids (prednisolone 1 mg/kg/day) tapered over 6 weeks under ophthalmologist supervision.

Monthly ophthalmic evaluation for drug toxicity, especially ethambutol-induced optic neuropathy.

Outcome

At the end of 6 months, the patient showed complete resolution of choroidal lesions and significant visual improvement (6/6). No drug-induced ocular toxicity was observed.

Discussion

Ocular tuberculosis presents a formidable diagnostic challenge due to its diverse clinical manifestations and the difficulty in obtaining microbiological confirmation. It can affect almost every ocular tissue, with posterior uveitis and choroidal tubercles being among the most common manifestations, as seen in our patient. However, its presentation can vary widely, including anterior uveitis, retinal vasculitis, scleritis, orbital inflammation, and optic neuropathy, often leading to misdiagnosis or delayed diagnosis.

The pathogenesis primarily involves hematogenous dissemination from a latent or active systemic focus, although direct extension or primary ocular infection remains possible but rare. The absence of systemic features of TB, as observed in this case, is not unusual. Studies indicate that up to 60% of patients with ocular TB may not exhibit any pulmonary or systemic signs at the time of diagnosis.

Diagnosis typically relies on a combination of clinical suspicion, supportive laboratory and imaging findings, and therapeutic response to anti-tubercular therapy (ATT). The use of tuberculin skin testing, interferon-gamma release assays (IGRA), chest imaging, and ocular imaging (fundus photography, optical coherence tomography, fluorescein angiography) supports the diagnosis but is not definitive. In most cases, the low yield of ocular tissue biopsy and the paucibacillary nature of the disease preclude direct identification of Mycobacterium tuberculosis from ocular samples. Hence, the diagnosis remains largely presumptive and is often categorized under "presumed ocular tuberculosis."

Treatment mirrors the standard approach for pulmonary TB, typically involving a 6-month regimen of first-line anti-tubercular drugs (HRZE for 2 months followed by HR for 4 months). The addition of systemic corticosteroids is critical to control inflammatory damage and preserve visual function, particularly in cases with posterior segment involvement or significant intraocular inflammation. Corticosteroids must always be used in conjunction with ATT to avoid exacerbating the underlying infection.

Monitoring for drug-induced ocular toxicity, particularly ethambutol- and isoniazid-associated optic neuropathy, is essential. Regular ophthalmic evaluations, including color vision testing and visual field analysis, should be incorporated into the follow-up regimen. In our case, careful monitoring ensured a favorable visual outcome without complications.

Multidisciplinary management involving ophthalmologists, pulmonologists, infectious disease specialists, and internists is pivotal in achieving optimal outcomes. Early recognition, aggressive management, and close follow-up significantly reduce the risk of permanent visual impairment.

Given the ongoing global burden of tuberculosis, especially in endemic areas, ocular TB must remain a differential diagnosis in patients presenting with chronic or atypical ocular inflammation. Greater awareness among healthcare professionals, improved diagnostic modalities, and integrated care approaches are key to improving prognosis and preserving sight in affected individuals.

Conclusion

Ocular tuberculosis, though considered an uncommon manifestation of extrapulmonary TB, must be included in the differential diagnosis of persistent, atypical, or granulomatous uveitis, particularly in TB-endemic regions. Given its ability to mimic a wide spectrum of ocular inflammatory diseases, a high index of clinical suspicion is essential. Early and accurate diagnosis, supported by appropriate laboratory tests and imaging, enables prompt initiation of anti-tubercular therapy along with adjunctive anti-inflammatory treatment. This comprehensive approach is crucial to controlling ocular inflammation, preserving visual function, and preventing irreversible structural damage and permanent visual disability. Multidisciplinary collaboration between ophthalmologists, pulmonologists, and infectious disease specialists plays a vital role in optimizing patient outcomes and minimizing complications associated with both the disease and its treatment.

Message to the Community

Tuberculosis can silently affect not just the lungs but also the eyes, threatening vision. Regular health checkups and early consultation for any eye symptoms like blurred vision, redness, or floaters are essential. TB is treatable and preventable with timely intervention.

Message to Healthcare Workers

Healthcare professionals, particularly ophthalmologists and physicians practicing in TB-endemic regions, must maintain a heightened awareness of ocular tuberculosis as a potential cause of unexplained, chronic, or atypical uveitis and other ocular inflammations. Recognizing the protean manifestations of ocular TB and initiating timely investigations are critical steps toward diagnosis. Early collaboration across specialties — ophthalmology, respiratory medicine, infectious diseases — ensures comprehensive evaluation and management. Moreover, diligent monitoring for treatment-related complications, particularly ocular toxicity from anti-TB medications, is essential. By promoting early diagnosis, patient education, strict adherence to therapy, and multidisciplinary care, healthcare workers can significantly reduce the risk of irreversible vision loss and improve the overall quality of life for affected individuals.

Way Forward

Increase awareness among ophthalmologists and primary care physicians regarding ocular TB.

Promote research into better diagnostic methods for ocular TB.

Develop guidelines for screening and managing latent TB in patients with ocular involvement.

Strengthen TB control programs to include extrapulmonary forms such as ocular TB in training modules.

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