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UNLOCKING DIAGNOSTIC INSIGHTS: OCULAR MANIFESTATIONS AS KEY INDICATORS FOR DETECTION OF EXTRA-PULMONARY TUBERCULOSIS

Ophthalomology

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ABSTRACT

Tubercular uveitis is a rare but important manifestation of extrapulmonary TB, often presenting without systemic signs and posing diagnostic challenges. We report two cases where ocular inflammation was the initial manifestation, leading to the diagnosis of extrapulmonary TB. A middle-aged man in his late 40s presented with right-eye panuveitis and reduced vision. Investigations revealed a strongly positive Mantoux reaction, elevated C-reactive protein, normal chest radiograph, and B-scan evidence of vitritis. A female in her late 20s, in her first trimester of pregnancy, presented with bilateral intermediate uveitis. She had positive tuberculin reactivity, computed tomography evidence of hilar lymphadenopathy, and negative TB PCR. Both patients were initiated on ATT (anti-TB therapy)-standard regimen for the first patient and pregnancy-safe modification for the second-resulting in complete resolution of inflammation within three months and visual improvement or stabilization. These cases highlight that in TB-endemic regions, unexplained uveitis may be the first and only sign of systemic TB. Prompt systemic evaluation and timely initiation of anti-TB therapy, even in special populations such as pregnant women, are essential for preserving vision and preventing complications.

KEYWORDS

Uveitis, Extrapulmonary Tuberculosis, Mantoux, ATT

INTRODUCTION

Tuberculosis (TB) continues to be one of the leading causes of infectious morbidity and mortality worldwide, with the World Health Organization estimating 10.6 million new cases in 2022, of which approximately 15% involve extrapulmonary sites [1]. India accounts for nearly a quarter of the global TB burden [1]. While pulmonary TB is the most common form, ocular TB is an important but under-recognized manifestation of extrapulmonary TB.

TB uveitis may result from direct infection of ocular tissues by *Mycobacterium tuberculosis* or from a hypersensitivity reaction to mycobacterial antigens [2]. The clinical spectrum is broad and includes anterior uveitis, intermediate uveitis, posterior uveitis, panuveitis, retinal vasculitis, and optic neuropathy [2–4]. In endemic areas, ocular TB should be considered in any patient with unexplained uveitis, especially if the presentation is chronic, granulomatous, or recalcitrant to conventional therapy [3,5].

Diagnosis is challenging because ocular TB is often paucibacillary and laboratory confirmation from ocular specimens is rare [5,6]. In most cases, the diagnosis is presumptive-based on compatible ocular features, positive immunological tests such as tuberculin skin test or interferon-gamma release assays, supportive radiological findings, exclusion of other causes, and a favourable response to anti-tubercular therapy (ATT) [7–9].

Importantly, TB uveitis can occur in the absence of pulmonary involvement; studies suggest that up to 50% of presumed ocular TB cases have normal chest radiographs [8]. This makes ophthalmologists pivotal in early TB detection. The stakes are high—delayed treatment can result in irreversible ocular damage, while prompt ATT can be vision-saving.

Special considerations arise in pregnancy. Immune modulation during pregnancy can alter uveitis activity, with possible flares in early gestation and remission later [10]. Drug choice must account for foetal safety: isoniazid, rifampicin, and ethambutol are considered safe; pyrazinamide use varies by national guidelines; streptomycin is contraindicated [11].

In this report, we present two patients in whom ocular inflammation was the first and only clinical manifestation of TB-one in a healthy middle-aged man and the other in a first-trimester pregnant woman. Both were diagnosed and treated based on ocular findings and supportive systemic work-up, illustrating the critical role of ophthalmology in detecting extrapulmonary TB.

Case Reports

Case 1

A 48-year-old male presented to our uveitis clinic with a 3-week history of painless, progressive diminution of vision in the right eye. He denied any history of ocular trauma, surgery, chronic illness, cough, fever, night sweats, weight loss, or contact with a patient with tuberculosis.

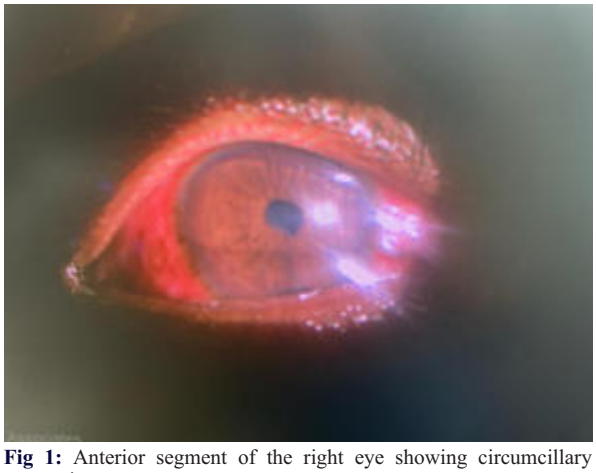

Fig 1: Anterior segment of the right eye showing circumcillary congestion.

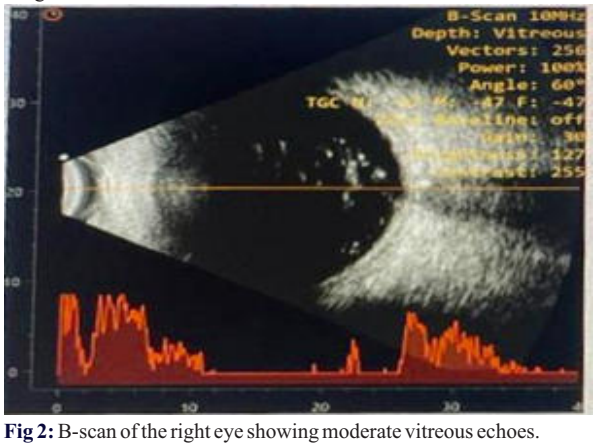

Fig 2: B-scan of the right eye showing moderate vitreous echoes.

On examination, the best-corrected visual acuity (BCVA) was 6/60 in the right eye (OD) and 6/24 in the left eye (OS). Slit-lamp biomicroscopy [Fig. 1] of OD revealed circumcorneal congestion, fine keratic precipitates, 2+ anterior chamber cells, 1+ flare, and posterior synechiae at the 6 o'clock position. The lens showed early posterior subcapsular cataract changes. Fundus evaluation of OD revealed a hazy view due to vitreous haze grade 2+, with perivascular sheathing along the superior temporal arcade and no retinal haemorrhages. The left eye was within normal limits. Intraocular pressures were 14 mmHg in both eyes. B-scan ultrasonography [Fig. 2] of OD demonstrated moderate vitreous echoes, attached retina, normal optic nerve head, and no subretinal mass.

Systemic evaluation [Table.1] revealed a random blood sugar level of 240 mg/dL, erythrocyte sedimentation rate of 20 mm/h, and C-reactive protein of 78.5 mg/L. Mantoux test showed a 40 mm induration at 48 hours. Chest X-ray was unremarkable. Laboratory screening for syphilis, sarcoidosis, and toxoplasmosis was negative.

Table 1 : Reports Of Case 1

REPORTS	
CRP	785
ESR	20mm
Mantoux	40mm induration (highly positive)
Right eye B-scan	moderate vitreous echoes suggestive of vitirits.
chest X-ray	normal

A presumptive diagnosis of panuveitis secondary to ocular tuberculosis was made. The patient was referred to pulmonology and was initiated on a standard four-drug anti-tubercular regimen (isoniazid, rifampicin, pyrazinamide, and ethambutol) for two months, followed by isoniazid and rifampicin for seven months. Oral prednisolone (1 mg/kg) was commenced one week after starting ATT and tapered over eight weeks. Topical prednisolone acetate 1% was prescribed every two hours and tapered gradually.

At four weeks, there was marked improvement with resolution of anterior chamber activity and a reduction of vitreous haze to grade 0.5+, with BCVA improving to 6/24. At three months, inflammation had resolved completely, and BCVA was maintained at 6/12 at nine months with no recurrence.

Case 2

A 29-year-old female, gravida 2 para 1 living 1, at 6 weeks and 4 days gestation, presented with a one-month history of bilateral floaters and blurred vision. She denied fever, cough, night sweats, weight loss, or other systemic complaints.

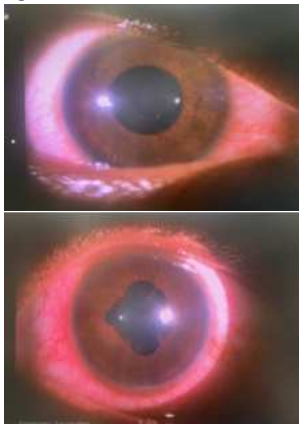

Fig 3: Anterior segment of the right eye (A) showing circumcillary congestion and left eye (B) showing a festooned pupil.

On ocular examination, her best-corrected visual acuity (BCVA) was 6/18 in the right eye (OD) and 6/9 in the left eye (OS). Slit-lamp evaluation of right eye revealed Koppe nodules, mutton-fat keratic precipitates, 2+ anterior chamber cells, a round pupil reacting briskly to light, and a clear lens. Left eye showed posterior synechiae, hypopyon, iris pigment dispersion, and a festooned pupil on dilation[Fig. 3]. Fundus examination in both eyes demonstrated 1+ vitreous cells, vitreous haze grade 1+, a healthy optic disc, normal macula, and absence of vasculitis. Intraocular pressures were 15 mmHg bilaterally.

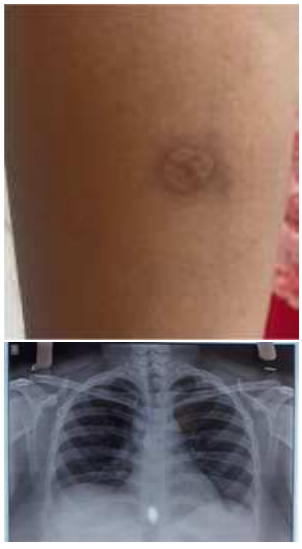

Fig 4: Mantoux test and Chest x-ray (PA view)

Systemic evaluation [Table. 2] revealed an ESR of 28 mm/h, a strongly positive Mantoux reaction [Fig. 4] with 26 mm induration, and negative TB PCR. Chest X-ray was normal [Fig.4]. Low-dose CT chest (obstetric protocol) revealed right hilar lymphadenopathy. Screening for HIV, syphilis, antinuclear antibodies, and serum ACE levels was negative.

Table 2 : Reports of case 2

REPORTS	
ESR	28mm
Mantoux	26mm induration (positive)
chest X-ray	Normal
CT Chest	Mediastinal lymph node enlargement
HIV, HbsAg, VDRL RT-PCR (TB)	Negative

A diagnosis of bilateral intermediate uveitis secondary to presumed ocular tuberculosis was made. In consultation with obstetrics and pulmonary department, the patient was initiated on a pregnancy-safe anti-tubercular regimen consisting of isoniazid, rifampicin, ethambutol, and pyridoxine supplementation. Systemic corticosteroids were deferred initially in view of early pregnancy. Topical medications in both eyes included prednisolone acetate 1% six times daily, moxifloxacin-dexamethasone combination six times daily, homatropine twice daily, and nepafenac three times daily.

Over 12 weeks of follow-up, there was complete resolution of vitreous inflammation, with BCVA improving to 6/9 in both eyes. No recurrence was noted during six months of follow-up. The pregnancy progressed without complications, and the patient delivered a healthy term infant. These findings support the role of early recognition and prompt treatment of ocular TB, even in pregnancy, to preserve vision and prevent systemic spread.

DISCUSSION

Ocular TB remains a diagnostic challenge because of its protean manifestations and low microbiological yield from ocular specimens [5,6]. Our two cases illustrate several important points relevant to clinical practice.

First, both patients had no systemic symptoms or radiographic evidence of pulmonary TB, reinforcing earlier studies showing that ocular TB can occur in isolation [8,9]. In Lee et al.'s multicentric series of 200 presumed ocular TB cases, 50% had normal chest X-rays [8]. Thus, ophthalmologists may be the first to suspect TB, prompting systemic work-up.

Second, both diagnoses were presumptive, based on ocular features, strong Mantoux reactivity, and supportive radiology, consistent with British Thoracic Society and RNTCP guidelines allowing ATT initiation on clinical grounds [7]. This approach is supported by Sharma et al., who reported good visual outcomes in latent/manifest ocular TB treated with ATT despite negative microbiology [9].

Third, the anatomical pattern differed-panuveitis in Case 1 and intermediate uveitis in Case 2-yet both responded well to ATT. Tubercular intermediate uveitis is less common but well-described, often showing snowballs and snow banking similar to idiopathic pars planitis [3,4]. Differentiation from sarcoidosis and idiopathic uveitis is essential, using systemic and laboratory evaluation [2,5].

Pregnancy presents unique therapeutic dilemmas. Immune modulation can affect uveitis activity [10], and teratogenic risks restrict drug choices [11]. In Case 2, a pregnancy-safe regimen achieved inflammation control without systemic steroids. Similar favourable outcomes have been reported in other series using isoniazid, rifampicin, and ethambutol in pregnant TB patients [11].

CONCLUSION

Our cases underscore three key clinical lessons. First, clinicians in TB-endemic regions should maintain a high index of suspicion for tuberculosis in any patient presenting with chronic, granulomatous, or recurrent uveitis, even in the absence of systemic symptoms. Second, a combination of clinical findings, immunological tests such as the Mantoux reaction, and supportive radiological evidence can be instrumental in establishing a presumptive diagnosis when microbiological confirmation is lacking. Finally, early initiation of anti-tubercular therapy is crucial to halt inflammation, prevent irreversible structural damage to ocular tissues, and preserve long-term visual function Interdisciplinary management with pulmonologists ensures accurate systemic assessment and optimal anti-tubercular regimens, while obstetric input is vital for safe therapy in pregnancy. This coordinated approach allows for individualized care.

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