



Case report

Nodular posterior scleritis associated with presumed ocular tuberculosis: A multimodal imaging case report

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ABSTRACT

Purpose: To describe a patient with nodular posterior scleritis associated with presumed ocular tuberculosis (TB).

Observations: A 25-year-old Caucasian man reported metamorphopsia in the right eye (OD). He had lost the vision in his left eye when he was 15 years old. The visual acuity (VA) levels were 20/20 and light perception in the right and left eyes, respectively. Wide-field color fundus photography, fluorescein and indocyanine green angiography, optical coherence tomography, and ultrasound suggested an inflammatory condition associated with an elevated lesion in the choroid/sclera. The purified protein derivative (PPD) skin test and all other screening tests were negative. A diagnosis of presumed nodular posterior scleritis was made and after oral corticosteroid therapy, the VA decreased to 20/100 OD associated with a red and painful eye. Subsequently a QuantiFERON-TB test was positive, tuberculosis (TB) treatment was started and the corticosteroid dose was increased. Three months after treatment, the pain resolved and the vision OD recovered to 20/20.

Conclusions and Importance: Nodular posterior scleritis can be associated with ocular TB that did not have a pulmonary manifestation. Rigorous testing is required in order to prevent visual loss in this disease that is not easily diagnosed.

1. Introduction

Posterior scleritis, a rare disease that is often misdiagnosed due to its wide range of clinical presentations and low incidence, can be classified as diffuse or nodular based on the ultrasonographic characteristics. The latter can mimic choroidal tumors or inflammatory diseases and can be associated with systemic diseases.¹

Three forms of ocular tuberculosis (TB) have been described. Direct ocular infection from an exogenous source can involve the ocular adnexa, conjunctiva, sclera, or cornea. The second form results from a hypersensitivity reaction from distant infectious foci. The third form is related to the hematogenous spread of *Mycobacterium tuberculosis* from pulmonary or extrapulmonary sites. The manifestations of the last form of ocular TB are numerous, including episcleritis and scleritis, necrotizing scleritis, posterior scleritis, subretinal abscess, optic disc granuloma, chorioretinitis, and choroidal granuloma.²

We describe the case of a patient with nodular posterior scleritis associated with presumed ocular TB.

2. Case report

A 25-year-old Caucasian man reported a 10-day history of metamorphopsia in his right eye (OD). He received a diagnosis of ocular toxocariasis in his left eye (OS), which evolved to complete visual loss 10 years previously.

The visual acuity (VA) levels were 20/20 OD and light perception OS. Slit-lamp examination showed no cells in the anterior chamber. Light pupillary reactivity was normal OD and diminished OS. A fundus examination showed redness of the optic disc associated with subretinal hypopigmented spots OD (Fig. 1). The posterior pole appeared elevated. No vitreous cells were seen. The optic disc OS was atrophic (Fig. 1). No retinal scars were seen.

Fluorescein angiography (FA) and wide-field indocyanine angiography (ICGA) (Fig. 1) showed hypofluorescent spots in the posterior pole and midperiphery. Optical coherence tomography (OCT) (Fig. 1) showed a choroidal elevation and subfoveal fluid. Ultrasound showed a hyperechogenic choroidal lesion with low reflectivity (height, 3.75 mm) (Fig. 1).

The results of complete blood count, angiotensin-converting

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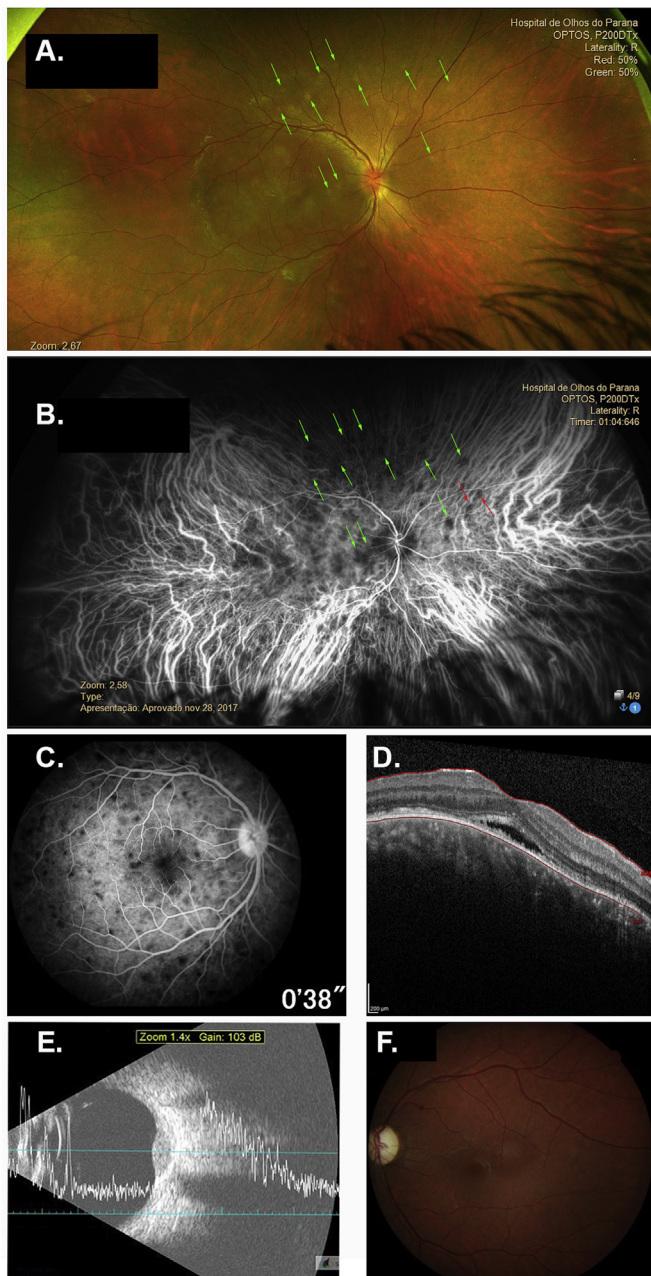


Fig. 1. Ancillary tests done during the patient's first visit. (A) Wide-field fundus photograph of the right eye (OD) shows a red optic disc and multiple white-yellow subretinal spots (green arrows). (B) Wide-field indocyanine green angiography (ICGA) shows that the same spots seen in (A) are hypofluorescent OD. ICGA allows identification of other spots (red arrows) not seen in (A). (C) The spots are also hypofluorescent on fluorescein angiography. (D) B-scan optical coherence tomography of OD shows a choroidal elevation associated with subretinal fluid. (E) Ultrasound of OD shows a hyperechogenic choroidal/scleral lesion with low reflectivity (height, 3.75 mm). (F) Color fundus photograph of the left eye shows a pale optic disc. (For interpretation of the references to color in this figure legend, the reader is referred to the Web version of this article.)

enzyme, chest and abdomen computed tomography (CT), and brain magnetic resonance imaging (MRI) were within normal limits. The purified protein derivative (PPD), venereal disease research laboratory test, fluorescent treponemal antibody absorption, toxoplasmosis IgM, and human immunodeficiency virus tests were negative. The erythrocyte sedimentation rate was 19 mm. Rheumatoid factor, LE cell, antinuclear factor were normal. Oral corticosteroids were prescribed for

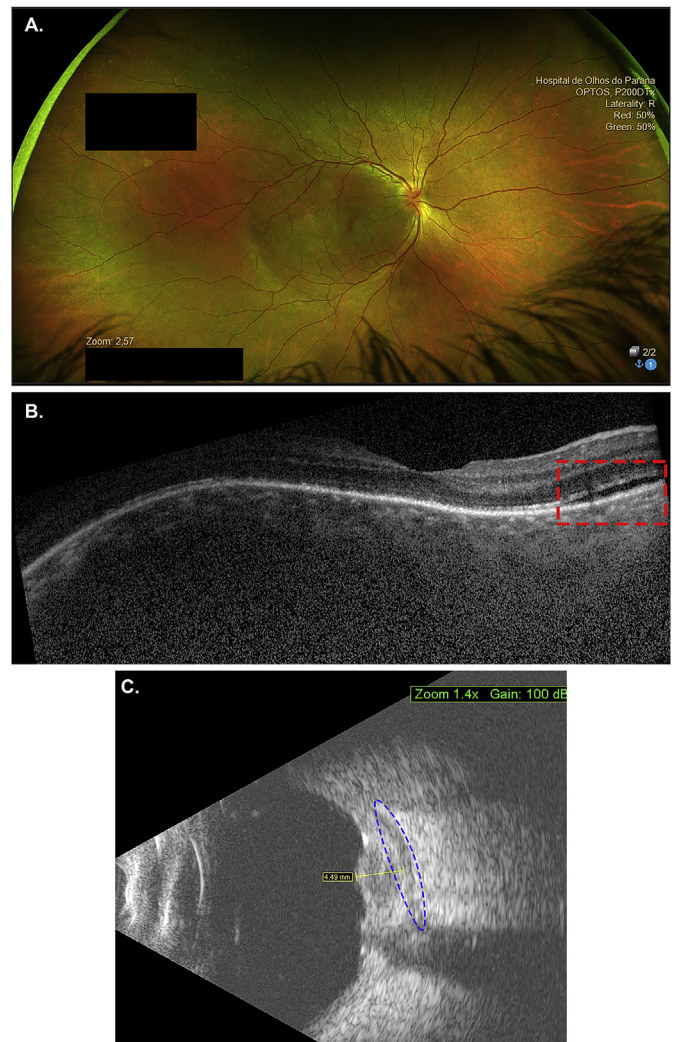


Fig. 2. Ancillary tests done on day 9. (A) Wide-field fundus photograph of the right eye (OD) shows a red optic disc and resolution of the white-yellow subretinal spots seen in Fig. 1A. (B) Enhanced-depth-imaging optical coherence tomography shows a stable choroidal elevation, but the location of the subretinal fluid has changed (red rectangle). (C) Ultrasound shows that the lesion has increased in size to 4.49 mm, and the presence of fluid in sub-Tenon, known as T-sign (blue ellipse). (For interpretation of the references to color in this figure legend, the reader is referred to the Web version of this article.)

presumed nodular scleritis (1 mg/kg).

Nine days later, the patient reported decreased vision to 20/25 and mild pain OD during ocular movements. Wide-field fundus photographs showed the same degree of erythema of the optic disc. However, the hypopigmented lesions had resolved (Fig. 2). Enhanced-depth-imaging OCT showed that the choroidal elevation was stable, but the location of the subretinal fluid changed (Fig. 2). Ultrasound B-scans showed that the lesion increased in height (4.49 mm) and there was a T-sign (Fig. 2). At this point, a QuantiFERON-TB test (IGRA) was performed and the corticosteroid prescription was continued.

Five days later, the vision decreased to 20/100 and the patient reported increased pain. Fig. 3 shows the red right eye and worsening optic disc edema. OCT clearly showed the worsening subretinal fluid (Fig. 3). The QuantiFERON-TB test was positive and TB treatment comprised of rifampin, isoniazid, pyrazinamide, and ethambutol began. The corticosteroid dosage was increased to 120 mg/day.

Three months after treatment for TB began, the VA was 20/20. The optic disc color returned to normal, and the macula was normal with a few hard exudates in the papillomacular bundle (Fig. 4). OCT showed

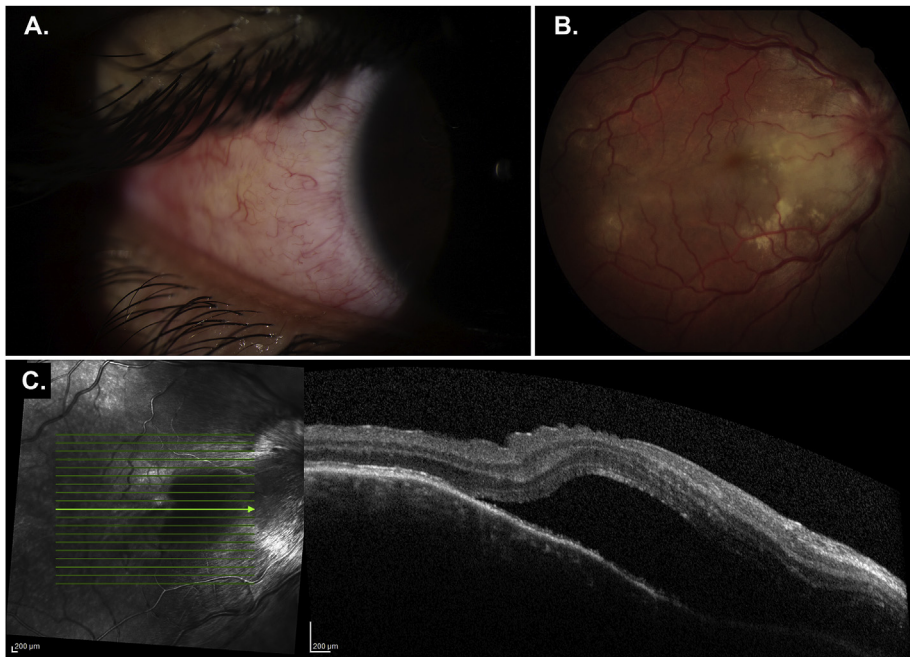


Fig. 3. Ancillary tests done on day 14. (A) A photo of the ocular surface shows a red right (OD) eye. (B) A color fundus photo of OD shows significant optic disc edema. (C) Optical coherence tomography of OD shows that the subretinal fluid has increased. (For interpretation of the references to color in this figure legend, the reader is referred to the Web version of this article.)

complete resolution of the subretinal fluid (Fig. 4); ultrasound B-scans showed complete resolution of the NPS (Fig. 4).

More than a year after a complete treatment for tuberculosis, patient keeps 20/20 and no pain.

3. Discussion

To the best of our knowledge, this is the first report of nodular posterior scleritis associated with presumed ocular TB with no known systemic source. Ocular TB has a wide differential diagnosis, as it can resemble other diseases such as multifocal choroiditis, choroidal metastasis, and sympathetic ophthalmia. The history should include inquiry about recent travel to a country with endemic TB or contact with an infected patient. The appearance of a choroidal mass might lead the clinician to rule out causes of choroidal granuloma such as sarcoidosis and syphilis. Perforating trauma to the other eye also should be ruled out.

Although FA is not ideal for evaluating the choroid, information can be obtained about choriocapillaris perfusion manifesting as early choroidal hypofluorescence or non-perfusion in several choroiditis entities, including Vogt-Koyanagi-Harada (VKH) disease, serpiginous choroiditis, acute posterior multifocal placoid pigment epitheliopathy, and multiple evanescent white dot syndrome. Ultrasonography still has a role in posterior scleritis and VKH and visualizes the classic T sign on the first and diffuse low-to-medium reflective choroidal thickening most evident in the posterior pole in the latter. Nodular posterior scleritis causes scleral thickening and a diffuse hyperechogenicity of the mass without orbital shadowing, unlike melanoma or metastasis, which are both characterized by moderate hyper- or hypoechogenicity. Diffuse posterior scleritis can involve the entire sclera or involve only a part of it in its nodular presentation.¹ Derby reported the first case of suspected nodular involvement in 1915 in a patient with brawny scleritis with massive scleral granuloma.³

Nodular posterior scleritis is rare, as Shields et al.⁴ reported in a series of 400 ocular tumors and pseudotumors, with only 1.5% of eyes having NPS. The disease can result from an infectious process, ocular trauma, previous surgery, associated systemic disease, or be idiopathic. The appearance of a choroidal mass can masquerade as a choroidal melanoma, lymphoma, metastatic deposit, or hemangioma. Its clinical differential diagnosis from choroidal tumors is sometimes difficult, and

occasionally a chorioretinal biopsy is needed. The usual clinical characteristics are female preponderance; strict unilaterality; sometimes painful; associated with inflammatory systemic disease; intraocular inflammatory signs; a solitary, non-pigmented subretinal mass with choroidal folds; and absence of lipofuscin. Ultrasound shows a sessile unilobed lesion with high reflectivity and edema in the sub-Tenon space (T sign).⁵

Due to the wide differential diagnoses and no pathognomonic findings for ocular TB, the patient should always undergo blood tests, pulmonary imaging, and PPD testing if suspected. Ocular TB can occur in the absence of pulmonary TB, so a normal chest radiograph does not exclude the diagnosis of intraocular TB.

A positive reaction after the Mantoux intradermal injection of tuberculin PPD indicates a successful cellular immune response by the patient. The antigen used in PPD is a mixture of more than 200 proteins derived from *M. tuberculosis*. The proteins can cross-react with bacillus Calmette-Guérin vaccine and nontuberculous mycobacteria antigens, undermining the specificity of the test. Hence, the PPD test has limited specificity; a positive result may not confirm the disease. Patients with ocular TB also can have a negative PPD test 40% of the time.⁶ In Brazil where TB is endemic, the value of the test is considered positive only with reactions of 10 mm or more. The current patient had a PPD below 10 mm. With this result and a high suspicion for ocular TB, the IGRA test was performed.

Commercially available QuantiFERON-TB (QFT) and TSPOT.TB are commonly known as interferon-gamma release assays (IGRA). T-cells collected from the patient are exposed to these specific tubercular antigens. The assay measures the interferon- γ released by sensitized T-cells of the patient. The Centers for Disease Control and Prevention guidelines state that IGRAs can be used in all situations in which the PPD test currently is used. The Canada and United Kingdom national guidelines suggest using IGRAs only to confirm a positive PPD test.⁷ Although these tests were designed originally to screen for latent TB, they also have been tested in active systemic and ocular TB cohorts. A meta-analysis on IGRA concludes that the diagnostic sensitivities of both IGRAs are higher than that of the tuberculin skin tests and the specificity is lower. PPD and IGRA were found to be equally predictive of progression to TB disease; IGRA was not superior to PPD in a cohort of adolescents in a population with a high systemic TB burden from South Africa and in uveitis.⁸ The IGRA results together with the PPD

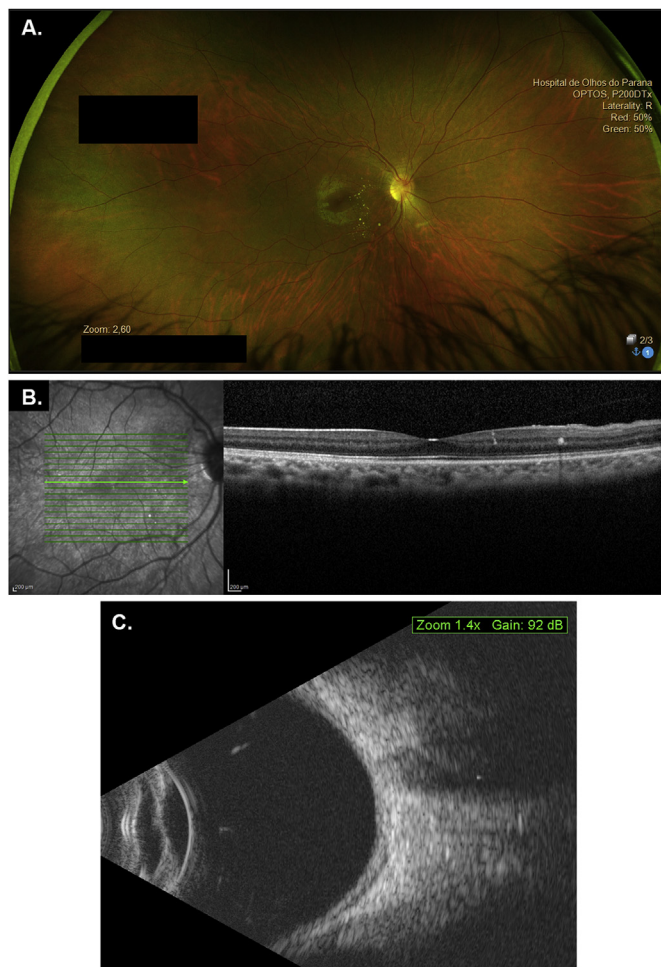


Fig. 4. Ancillary tests done in month 4 post treatment. (A) Wide-field fundus photograph of the right eye (OD) shows an optic disc with normal color, complete resolution of all subretinal spots, and few exudates in the papillo-macular bundle. (B) Optical coherence tomography B-scan OD shows complete absorption of the subretinal fluid and few intraretinal hyperreflective dots (exudates). (C) Ultrasound shows complete resolution of the scleral lesion and sub-Tenon fluid. (For interpretation of the references to color in this figure legend, the reader is referred to the Web version of this article.)

test may increase the sensitivity. The positive and negative predictive values of IGRA depend on the prevalence of TB in that population. Regarding systemic TB concerned, the evidence is increasing that IGRA performs differently in high-burden compared to low-burden countries. The lack of a gold standard for diagnosing TB infection prevents an effective and interpretable comparison of the IGRAs and the PPD in ocular TB.⁹

There are certain situations where both PPD and IGRA may be useful. When the initial test is negative and there is clinical suspicion for TB disease and confirmation of *M. tuberculosis* infection is desired.

The current patient had a choroidal mass, a T sign on echography, lived in an endemic country, and only the IGRA test was positive. The diagnosis of nodular posterior scleritis due to presumed TB was made. The patient was co-managed by an ophthalmologist and an infectious disease specialist who initiated antitubercular treatment (ATT) and the steroids were sustained.

While choroidal tubercles and tuberculomas often respond well to ATT alone, many other intraocular manifestations of TB require corticosteroids plus ATT to prevent damage to the ocular tissues secondary to the inflammatory response. Corticosteroid treatment can be critical for certain manifestations of ocular TB, such as choroiditis, which can actually undergo paradoxical worsening upon initiation of ATT.

However, it is critical that corticosteroids are never used without ATT, because this not only leads to more frequent recurrences of ocular inflammatory symptoms but also can cause significant worsening and potentially dissemination of the infection.¹⁰

4. Conclusion

In conclusion, ocular TB is not always easy to diagnose. The differential diagnosis is large and there is no pathognomonic sign or a gold standard examination. A high index of suspicion, multimodal imaging testing, and results of skin and blood tests help to establish a diagnosis with certainty and initiate early treatment, thus avoiding irreversible visual loss.

Patient consent

The patient(s)/patient's legal guardian consented to publication of the case in writing/orally.

Authorship

All authors attest that they meet the current ICMJE criteria for Authorship.

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Declaration of competing interest

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Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.ajoc.2019.100558>.

References

- McCluskey PJ, Watson PG, Lightman S, Haybittle J, Restori M, Branley M. Posterior scleritis: clinical features, systemic associations, and outcome in a large series of patients. *Ophthalmology*. 1999;106:2380–2386.
- Gupta A, Bansal R, Gupta V, Sharma A, Bambery P. Ocular signs predictive of tubercular uveitis. *Am J Ophthalmol*. 2010;149:562–570.
- Derby GS. Massive granuloma of the sclera (brawny scleritis), with the report of an unusual case: pathologic examination by dr. F. H. Verhoeff. *Trans Am Ophthalmol Soc*. 1915;14:110–124.
- Shields CL, Shields JA, Kiratli H, De Potter P, Cater JR. Risk factors for growth and metastasis of small choroidal melanocytic lesions. *Ophthalmology*. 1995;102:1351–1361.
- Agrawal R, Lavric A, Restori M, Pavesio C, Sagoo MS. Nodular posterior scleritis: clinico-sonographic characteristics and proposed diagnostic criteria. *Retina*. 2016;36:392–401.
- Wroblewski KJ, Hidayat AA, Neafie RC, Rao NA, Zapor M. Ocular tuberculosis: a clinicopathologic and molecular study. *Ophthalmology*. 2011;118:772–777.
- Schluger NW, Burzynski J. Recent advances in testing for latent TB. *Chest*. 2010;138:1456–1463.
- Mahomed H, Hawkridge T, Verver S, et al. The tuberculin skin test versus QuantiFERON TB Gold(R) in predicting tuberculosis disease in an adolescent cohort study in South Africa. *PLoS One*. 2011;6:e17984.
- Ang M, Htoon HM, Chee SP. Diagnosis of tuberculous uveitis: clinical application of an interferon-gamma release assay. *Ophthalmology*. 2009;116:1391–1396.
- Bansal R, Gupta A, Gupta V, Dogra MR, Bambery P, Arora SK. Role of anti-tubercular therapy in uveitis with latent/manifest tuberculosis. *Am J Ophthalmol*. 2008;146:772–779.