**Disseminated tuberculosis presenting as bilateral neuro-retinitis**

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A 24-year-old Nepalese male, ex-smoker, with past medical history of post-natal prolonged hospital

stay and recurrent pneumonia as an infant, presented with a 2-week history of progressive visual

impairment. He denied fever, chest pain, shortness of breath or unintentional weight loss. He recalled

a 2-week dry cough episode three months before admission.

Physical examination revealed a painless lump on the vertex of the skull and tenderness on lumbar and sacral spine. White blood cell count was 12x103 cells/L and CRP 15mg/L. HIV antigen/antibody test and syphilis serology were negative. MRI brain showed bilateral optic nerve oedema **(Fig 1, A)** and a skull soft tissue lesion with focal bone destruction displacing the dura **(Fig 1, C).** Ophthalmologists confirmed bilateral neuro-retinitis associated with severe bilateral visual loss and severe papillitis observed on fundoscopy (**Fig 1, B**). MRI spine showed a large inflammatory posterior sacral mass associated with areas of sacral osteomyelitis, and a presacral collection. CT-thorax showed mediastinal lymphadenopathies. An electrocardiogram showed sinus rhythm with diffuse saddle-shaped ST segment elevation. Echocardiography revealed acoustic enhancement of the posterior aspect of the pericardium consistent with pericarditis. Necrotising granulomas **(Fig 1, D)** were observed on haematoxylin-eosin staining of a sacral biopsy and Ziehl-Nielsen stain was positive **(Fig 1, D inset).** Polymerase chain reaction (PCR) for *Mycobacterium tuberculosis* resulted negative on sputum samples

and sacral tissue. However, sensitive *Mycobacterium tuberculosis* was isolated from sacral and scalp

tissue culture.

Quadruple anti-tuberculosis therapy with rifampicin, isoniazide, pirazynamide and moxifloxacin was started alongside high dose steroids, based on suspicion of disseminated tuberculosis (TB) with associated bilateral neuro-retinitis. After completion of a 2-week high dose steroid course, including 3-day daily pulses of methylprednisolone 1g, followed by iv dexamethasone 16mg twice daily, the patient’s visual impairment had little improvement at 4-week follow-up. On discharge, his right visual acuity improved from light perception to hand motion, whereas there was no change in his left visual acuity. Such poor outcome was deemed to be related to the patient’s late presentation.

Disseminated TB presenting with intraocular involvement is a rare condition which accounts for 2% to 18% of all cases of *Mycobacterium tuberculosis* infections **(1, 2).** *Mycobacterium tuberculosis* affects the eye primarily via hematogenous spread, however, intraocular findings can be a result of direct extension or hypersensitivity response from tuberculous infection elsewhere in the body **(3, 4).** Ocular TB can lead to profound visual loss if misdiagnosed. Hence the importance of prompt recognition of TB as an infective aetiology of neuro-retinitis to start early treatment and increase the chances of success.

This case highlights the challenges associated with the diagnosis and management of an extensively disseminated TB in a young immunocompetent patient presenting as bilateral neuro-retinitis, calvarial TB of both parietal bones and sacral osteomyelitis. Collaborative efforts between infectious disease specialists and ophthalmologists are essential to achieve a diagnosis of disseminated TB in patients presenting with visual impairment of unknown aetiology.

**Funding source**

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

**Keywords:** disseminated tuberculosis; neuro-retinitis; necrotising granuloma.

**Authorship contribution statement**

**Vanesa Anton-Vazquez:** Conceptualization, Investigation, Writing - original draft.

**Padmini Parthasarathi:** Investigation, Writing - original draft. **Gabriela Grimaldi:** Investigation.

**Thomas Dhanes:** Investigation. **Angela Rees:** Investigation. **Manuraj Singh:** Investigation**. Derek**

**Macallan:** Writing - review & editing. **Mauricio Arias:** Conceptualization , Writing - review & editing.



**Figure 1. A)** FLAIR MRI axial scan showing bilateral protrusion of the optic disc head (arrowheads). **B)** Colour fundus pictures showing signs of bilateral neuro-retinitis (right eye shown). Optic disc oedema with Paton’s lines (white arrowhead), retinal exudates (black arrowheads) and star-shaped macular exudates (black arrow), retinal flame haemorrhages**. C)** Abnormal soft tissue lesion extending from the scalp through to skull, to involve the sagittal sinus posteriorly towards the vertex. **D)** High power of haematoxillin-eosin staining showing necrotising granulomas**.** Ziehl-Nielsen stain showing red curved and beaded organism of *Mycobacterium tuberculosis* (inset*)*.

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