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A Case Of Linezolid Induced Optic Neuropathy

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Abstract

Synthetic antimicrobials like linezolid are frequently used to treat extensively drug-resistant (XDR-TB) and multi-drug-resistant (MDR-TB) tuberculosis. Even though it works well, long-term usage can cause toxic optic neuropathy, which can seriously damage vision. We present a case of 21 year old female who came to Ophthalmology OPD with complaints of gradual progressive diminution of vision both eyes past 15 days .Patient is known case of MDR TB with past history of EPTB (paraverteberal abscess).Patient was on oral Linezolid 600mg OD ,cycloserine 500mg , clofazamine 100 mg and pyridoxine 100mg . Patient also given Bedaquiline 200 mg for 6 month . On examination unaided vision FC<3mts ,Pupils were central circular reactive to light , anterior segments normal of both eye .Colr vision on Ishihara plates was 6/16 in right eye and 7/16 in left eye . EOMS were full and free of all gazes . Dilated fundus examination revealed Both eye disc edema with mild temporal pallor. Neurological examination CT brain and (Plain +Contrast)was within normal limit .MRI brain could not be done as patient had history of spinal surgery with screw fixation .

OCTRNFL shows increase in RNFL thickness . BAL was performed shows no AFB,KOH and Cytology was negative. Therapeutic trail of withdrawing Linezolid was performed . Withdrawing Linezolid ,patient shows improvement in vision with resolving disc edema .Based on the clinical investigation and examination , we came to the diagnosis of Linezolid induced optic neuropathy .

Keywords: Linezolid; Optic Neuropathy; MDR-TB; Visual Impairment; Ophthalmology

Introduction

The oxazolidinone class of synthetic antimicrobials, including linezolid, is widely used globally in the treatment of extensively drug-resistant (XDR-TB) and multi-drug-resistant (MDR-TB) tuberculosis. Additionally, it demonstrates action against a variety of pathogens, such as Vancomycin-Resistant Enterococcus spp. (VRE) and Methicillin-Resistant Staphylococcus aureus (MRSA) [1]. Patients taking linezolid have lately been documented to have toxic optic neuropathy, which is defined as toxic optic nerve damage leading to significant visual impairment. Usually bilateral, slow, painless, and progressive in nature, this illness may be curable with quick diagnosis and treatment. Drugs (e.g., ethambutol, amiodarone, pyrazinamide, clofazimine, bedaquiline, and tamoxifen), nutritional deficiencies (e.g., vitamin B12 and folate), alcohol consumption, and tobacco use are common etiologies known to produce toxicity. A unique side effect of linezolid use that is becoming more and more common is visual neuropathy [2,3].

Here, we describe a 21-year-old female patient with MDR-TB who developed reversible bilateral toxic optic neuropathy while on linezolid therapy.

Presentation Of Case

The Ophthalmology Outpatient Department (OPD) received a complaint from a 21-year-old female patient who had been experiencing painless, progressive loss of vision in both eyes for the previous 15 days. The patient had a history of extrapulmonary TB (paravertebral abscess) and had been diagnosed

with MDR-TB a year earlier. During her year-long anti-tubercular therapy (AKT), she was administered 600 mg of oral linezolid, 750 mg of levofloxacin, 500 mg of cycloprimine, 100 mg of clofazamine, and 100 mg of pyridoxine. The patient did not have a history of alcohol consumption, dietary deficits, or peripheral neuropathy.

On Examination:

Right Eye:

1. Distant Vision: FC at 3 meters (NI)
2. Color Vision: 6/16
3. Anterior Segment: Within normal limits
4. Pupils: Central, circular, reactive to light
5. Lens: Clear
6. Extraocular Movements (EOMs): Full and free
7. Fundus: Blurred nasal and superior margins
8. Intraocular Pressure (IOP): 12 mmHg

Left Eye:

1. Distant Vision: FC at 2 meters (NI)
2. Color Vision: 7/16
3. Anterior Segment: Within normal limits
4. Pupils: Central, circular, reactive to light
5. Lens: Clear
6. EOMs: Full and free
7. Fundus: Blurred nasal and superior margins
8. IOP: 12 mmHg

Perimetry could not be performed as the patient's vision was FC at 3 meters in the right eye and FC at 2 meters in the left eye.

Table 1. Initial Ophthalmic Examination Findings

Parameter	Right Eye (OD)	Left Eye (OS)
Vision	FC at 3 meters	FC at 2 meters
Color Vision	6/16	7/16
Pupils	Central, circular, reactive to light	Central, circular, reactive to light
Anterior Segment	Within normal limits	Within normal limits
Lens	Clear	Clear
EOMs	Full and free	Full and free
Fundus	Blurred nasal and superior margins	Blurred nasal and superior margins
IOP	12 mmHg	12 mmHg

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Figure 1. Fundus Photo at Initial Presentation

OCT (Optical Coherence Tomography) revealed increased retinal nerve fiber layer thickness in both eyes, consistent with toxic optic neuropathy

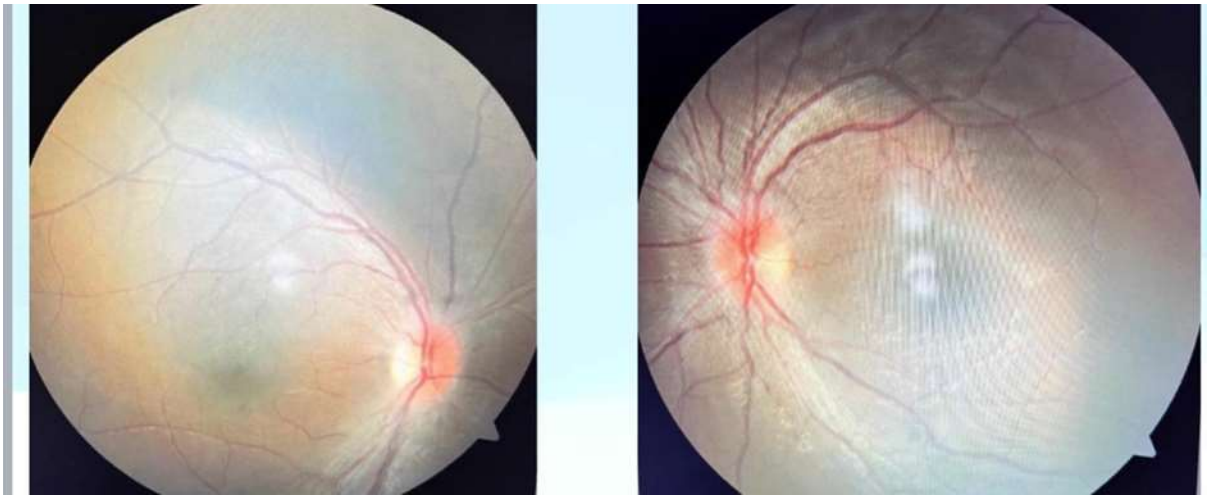
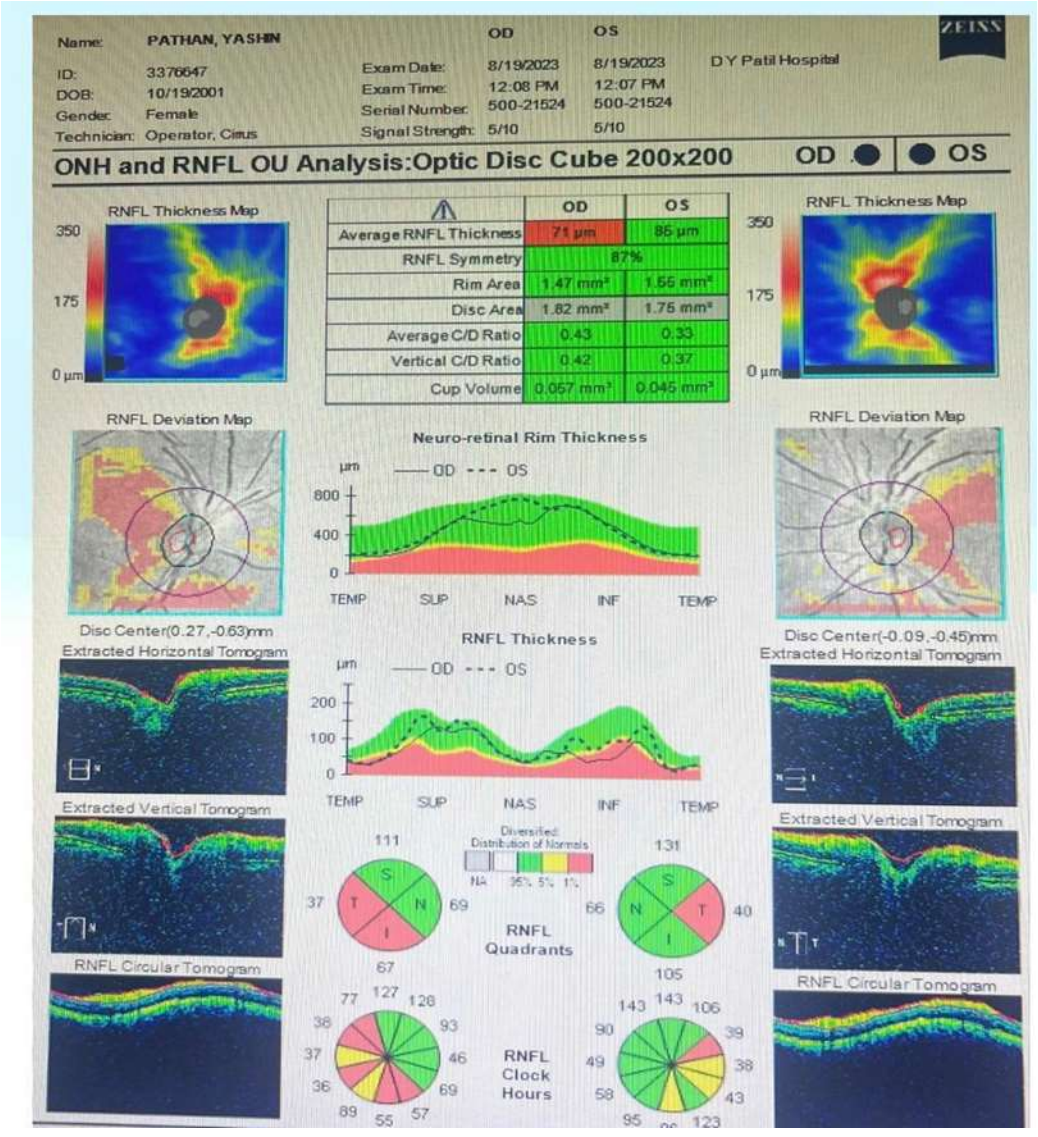


Figure 2. OCT Images Showing Increased Retinal Nerve Fiber Layer Thickness



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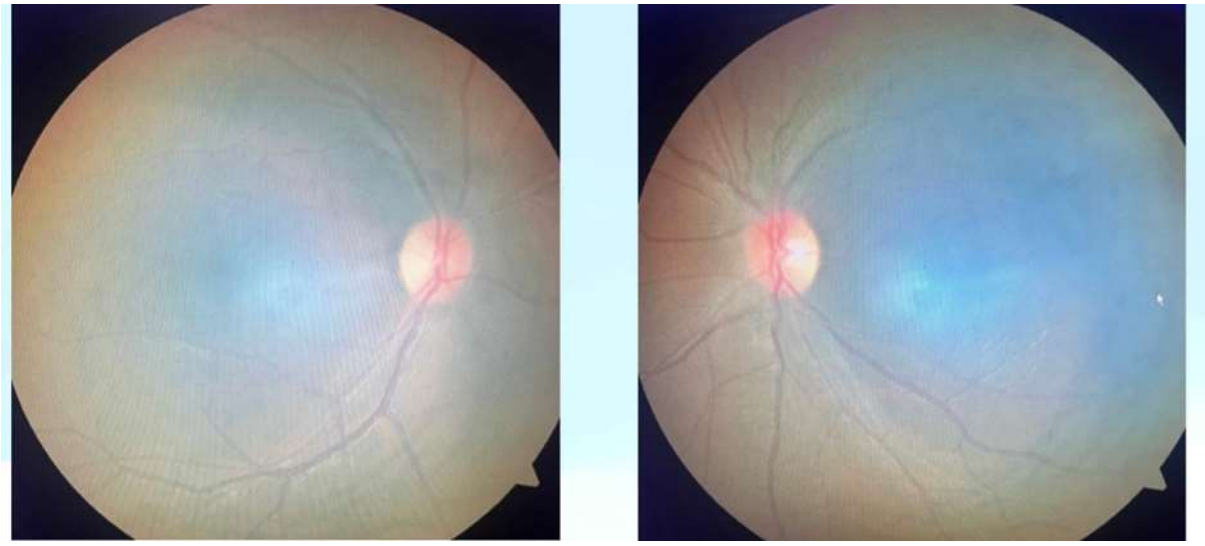
CT Brain and Orbit (Plain + Contrast) were within normal limits. MRI Brain could not be performed as the patient had a past history of spinal surgery with screw fixation. After consulting with the Pulmonary Medicine team, a therapeutic trial of withdrawing Linezolid was planned, and the patient was started on another AKT drug (Pyrazinamide 1000 mg OD).

At a two-week follow-up, both eyes' vision improved to 6/6, and color vision improved to 16/16. Fundus examination revealed complete resolution of the bilateral nasal and superior margin blurring.

Figure 3. Fundus Photo Post Linezolid Withdrawal.



Thus, the diagnosis of Linezolid-induced optic neuropathy was confirmed, and the adverse effects were reversed after discontinuation of the drug.

Discussion

M. tuberculosis complex strains that are resistant to isoniazid and rifampicin are the cause of MDR-TB (multidrug-resistant tuberculosis), often referred to as RR-TB (rifampicin-resistant tuberculosis). A synthetic antibiotic, linezolid is a second-line AKT medication for the treatment of Gram-positive bacteria, including MDR-TB. By binding particularly to the 23S rRNA of the 50S ribosomal subunit, linezolid inhibits bacterial protein synthesis and prevents the development of the protein synthesis initiation complex, which is how it works [4].

It is hypothesized that linezolid causes toxicity through a mechanism known as drug-related mitochondrial optic neuropathy, in which the optic nerve is damaged by disruption of mitochondrial oxidative phosphorylation. Stages of mitochondrial aggregation, slower axonal transport, and axon swelling precede apoptosis and can be reversed at the functional impairment level without irreversible axon loss [5].

Linezolid is quite effective in treating XDR-TB and exhibits a wide range of activity against MRSA, VRE, and MDR-TB. A global systematic evaluation of data from multiple research revealed that more than 80% of MDR-TB infections responded to therapy. When taken for a brief period of time, linezolid medication is generally well-tolerated and has few adverse effects. However, its safety has only been confirmed for usage for up to 28 days. Toxic optic neuropathy was identified as an adverse drug response (ADR) in 13.2% of patients using linezolid at dosages greater than 600 mg per day for a mean of nine months in a comprehensive review and meta-analysis of MDR-TB cases [6,7].

In our instance, the administration of AKT medications in conjunction with 600 mg OD of Linezolid for a full year led to the development of bilateral visual neuropathy during the treatment of MDR-TB. The patient improved once the medication was withdrawn, and the patient's symptoms and signs, as well as tests including color vision and OCT, confirmed the diagnosis of toxic optic neuropathy.

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Conclusion

Physicians and ophthalmologists need to be aware of the potential ocular side effects of long-term Linezolid medication. When the medication is stopped, most patients with optic nerve damage get well; this is probably because the inciting component is removed before apoptosis starts and irreversible axonal loss occurs. The visual prognosis can be improved and the toxic effects of Linezolid-induced optic neuropathy reversed with prompt diagnosis and discontinuation.

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