

Case Study

A case study of a paediatric scrub typhus patient with optic nerve dysfunction

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Abstract

Optic neuropathy can be caused by various infections, with retinitis and vasculitis among the common ocular manifestations. Here, we report a case of scrub typhus that initially presented as meningoencephalitis and subsequently developed optic nerve dysfunction during the course of hospitalization. Significant visual improvement was noted after treatment with systemic steroids. In conclusion, it is crucial to maintain a high index of suspicion for rickettsial diseases when evaluating individuals presenting with visual abnormalities and systemic illness in endemic regions. Early detection and timely intervention can help prevent irreversible vision loss.

Keywords: Pediatric; Scrub Typhus; Optic Nerve Dysfunction

Introduction

Optic neuropathy results from damage to the optic nerve. It can be due to acute or sporadic assaults on the optic nerve axons, ultimately leading to the loss of retinal ganglion cells.¹ Various infectious agents can trigger optic neuropathy. The most frequent ocular manifestation associated with these infections is retinitis, often accompanied by vasculitis.^{2,3} This case report emphasises the importance of recognising visual disturbances as potential complications associated with rickettsial infections, which are rarely documented in the literature.

Case report

An 11-year-old girl was admitted to the PICU with fever, vomiting, and altered sensorium for 2 days. On examination, she had a GCS of 9/15 (M4V3E2), with equal and reactive pupils. Bilateral plantar reflexes were extensor, with meningeal signs. Power, tone and other reflexes were normal with no focal neurological deficits. Systemic examination was normal. Considering the provisional diagnosis of meningoencephalitis, she was started on ceftriaxone, acyclovir, and doxycycline empirically, along with fosphenytoin and dexamethasone.

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Lab investigations showed neutrophilic leukocytosis, a normal platelet count, and a peripheral blood smear with normocytic normochromic red blood cells without any atypical cells. Elevated ESR and CRP levels were noted, along with a mildly abnormal coagulation profile. A thoracic ultrasound showed minimal pleural effusion on the right side, accompanied by collapse and consolidation of the basal lung parenchyma. Abdominal ultrasound was within normal limits. Fundoscopy was normal. CSF analysis performed on day 3 of hospitalisation revealed an increased cell count (68 cells; 85% polymorphonuclear cells, 15% lymphomononuclear cells), with occasional pus cells. Sugar and protein levels were normal. Vancomycin was added for high WBC count on CSF analysis. Biofire Meningitis panel was negative. Tropical infection workup was positive for scrub typhus. Blood, Urine, and CSF cultures were sterile. MRI brain showed a focal infarct in the posterior parahippocampal gyrus with subtle post-contrast enhancement. Aspirin was started af-

ter a neurology consultation. Her sensorium improved after 72 hours of PICU stay (GCS 15/15) with no focal neurological deficits. She completed a 10-day course of doxycycline and 14 days of ceftriaxone and vancomycin.

During her hospital stay (6th day), she complained of sudden onset of left eye vision loss. Ophthalmologic evaluation revealed decreased light perception in the left eye. Contrast-enhanced MRI Brain with Orbit was normal. Perimetry revealed left-sided temporal hemianopia with right-sided superior quadrantonopia. Visual Evoked potential showed prolonged P100 latency on both sides (left > right). With the above findings, a provisional diagnosis of rickettsial infection-induced optic nerve dysfunction was considered. She was started on IV methylprednisolone pulse dose regimen (10 mg/kg/day) for 5 days, followed by oral prednisolone with a plan for gradual taper. Repeat perimetry after 4 days showed left-sided temporal hemianopia with considerable improvement (Figure 1). The pattern suggests left optic pathway dysfunction (Figure 2).

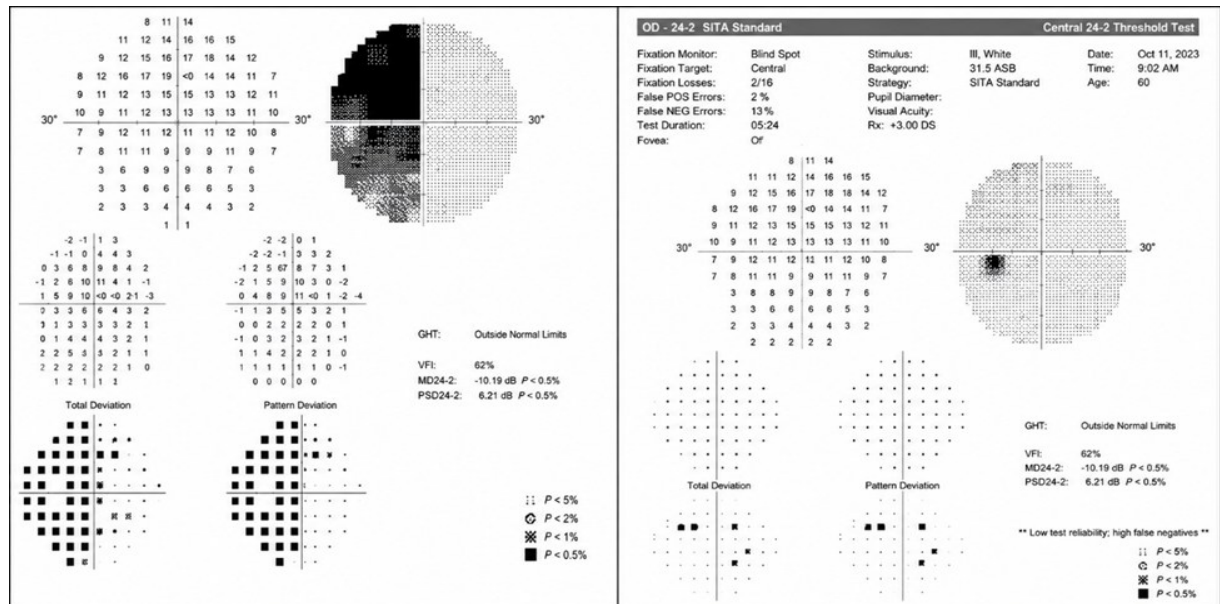


Figure 1 shows improvement in VFI (visual field index) after steroid therapy.

Visual Evoked Potentials

Trace	Label	Amplifier	SNP/d	LFF	HFF
1	MO1-2/M1	1	20a	1	100
2	MO1-2/M1B	1			
Trace	Label	Sweeps Averaged	Stimulus Side	Time	Stimulation Parameters
2	Trace Name	125	Right	15:45:18	1015/2015/Vigpr: 1.95 Hz

Left eye measurements

Test	Lat N75 ms	Lat P100 ms	Lat N145 ms	PP Amp 75-100 μV
MO	1-N75 206.1	1-P100 148.1	1-N145 193.9	1-N75-P100 2.460

Right eye measurements

Test	Lat N75 ms	Lat P100 ms	Lat N145 ms	PP Amp 75-100 μV
MO	2-N75 209.0	2-P100 152.1	2-N145 195.9	2-N75-2-P100 2.210

Interocular measurements

Test	Latency LT-RT ms	PP Amp Ratio LT-RT %
MO	1-P100-2-P100 -25.8	1-N75-P100/2-N75-P100 2.74

MO: Monocular stimulation

Figure 2 shows the Visual Evoked Potential (VEP) report, which measures the brain's electrical response to visual stimuli and can help detect issues along the optic nerve pathway.

Discussion

Rickettsial diseases are among the hidden, reemerging pathogens of the present time, and their symptoms can mimic those of bacterial, viral, or protozoal illnesses, making them difficult to diagnose.

Scrub typhus, the most common rickettsial illness in India, is caused by *Orientia tsutsugamushi* and transmitted through bites from the larval stages of chigger or trombiculid mites. It typically begins with fever, headache, myalgia, purpuric palpable rash, and may or may not have an eschar.⁵ Low-cost blood tests, such as the Weil-Felix test and IgM ELISA, can quickly detect it and be treated with inexpensive medications like doxycycline. 67% of scrub typhus patients experience ocular manifestations, especially during the recovery phase (2-4 weeks).⁶ Severe toxemia and generalized vasculitis contribute to ocular manifestations.⁷ It can be in the form of anterior uveitis, conjunctivitis, keratitis, panuveitis, retinitis, optic nerve involvement, and retinal vascular changes. Complaints include diminished vision, scotomas, floaters, or redness, petechiae, keratitis, subconjunctival haemorrhage, and non-granulomatous anterior uveitis. Chori-retinal involvement manifests as retinitis, serous retinal detachment,

and multiple small white retinal lesions. Cystoid macular edema, macular star, and hypofluorescent choroidal lesions may be observable on angiography. Retinal vascular lesions may present as focal or diffuse vascular sheathing, intraretinal haemorrhages with a white centre, subretinal haemorrhages, and retinal vascular occlusions, including branch and central artery occlusions, as well as branch retinal vein occlusions. These conditions can lead to transient or permanent visual loss. Optic disc involvement can occur with or without visual loss, highlighting the need for thorough examination.

Doxycycline is the antibiotic of choice for scrub typhus. In cases with ocular involvement, treatments may include topical antibiotics for conjunctivitis or keratitis, topical steroids and mydriatic drops for anterior uveitis, and systemic steroids for severe conditions like extensive retinitis or retinal vascular occlusions. In the study by Ganekal et al., Pediatric patients, double antigen-positive, bilateral involvement, and those with CNS involvement had poor visual outcomes.⁸

Ophthalmic manifestations associated with rickettsial infections generally follow a self-limiting course, with most patients showing improvement and resolution of symptoms within a period ranging from the third to the tenth week after their initial examination. Posterior segment involvement tends to a good overall visual prognosis. However, potential complications can lead to persistent vision

impairment, including retinal changes from macular oedema, retinal artery/vein occlusion, serous retinal detachment, foveal chorioretinal scars, choroidal neovascularisation, or optic neuropathy.⁹

Conclusion

A higher level of medical suspicion is necessary to diagnose the rickettsial infections, especially in endemic regions where patients present with headache, high fever, skin rash, and malaise. Although it is frequently asymptomatic and readily missed, ocular involvement is prevalent. Identifying these ocular symptoms can help with diagnosis while serologic testing is being performed. For patients from endemic areas with fever and/or skin rash, a routine fundus examination and a systematic ocular evaluation should be performed.

Declarations

Ethical considerations: Informed consent was obtained from the patient's parents for the publication of the case report and accompanying data.

Conflict of interest: The authors declare that they have no conflicts of interest to disclose.

Author's contribution

DR and SSM have prepared the manuscript for publication. SP and AA have revised it. The final version has been read and approved by all authors.

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