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## **COVID-19 Associated Vestibular Neuritis in an Infant**

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**Introduction:**

Neurological manifestations of COVID-19 infection vary from undetectable to profound, and may include dizziness, headache, cognitive and sensory deficits, seizures, Guillain-Barré syndrome, or death<sup>1</sup>. Moreover, evidence is mounting to suggest that post-infection neurological impairment from COVID-19 may be longstanding or possibly permanent<sup>2</sup>. One such neurological manifestation of COVID-19 is vestibular neuritis, a benign self-limited condition that classically presents with vertigo, nausea, and gait imbalance<sup>3</sup>. There have been reported cases of COVID-19 associated nystagmus as the result of vestibular neuritis in adults<sup>4</sup>. Cases in adolescents are less described, with few reports of COVID-19 associated nystagmus in children<sup>5</sup>, and one reported nystagmus case in a 2 month old newborn resulting from fatal acute hemorrhagic necrotizing encephalitis<sup>6</sup>. Here we report a rare case of COVID-19 associated post-viral nystagmus in an infant as the result of vestibular neuritis.

**Case report:**

A 9-month-old African American female presented to the emergency department after her mother noted several episodes of conjugate horizontal nystagmus over the preceding hour. Additionally, she reported two weeks of staring spells, head-waving motions, and loss of balance compared to baseline. Medical history was significant for COVID-19 infection 2-3 weeks prior, as well as 5 independent ear infections over the past 4 months. She was born at full term and developmentally advanced for age as she was able to walk several steps unassisted at 9 months. She had no history of seizure or neurological disorder. On presentation, she was

afebrile with a white blood cell count of 18.7 cells per microliter. The patient was admitted to the pediatrics service with neurology and ophthalmology consults.

Physical and neurologic exam were normal for age except for a large head with mildly short philtrum. On ophthalmic exam, pupils were equal, round, and reactive without relative afferent pupil defect. She was orthophoric in all directions of gaze. Every 1 to 4 minutes she was observed to have brief episodes of horizontal jerk nystagmus lasting 4-5 beats, with fast phase noted in both directions at times. The remainder of the ocular exam was reassuring with no visualized anterior or posterior pathology. Magnetic resonance imaging (MRI) brain with and without contrast demonstrated reactive upper cervical lymph nodes but was otherwise normal with clear mastoid air cells, mastoid antra, and tympanic cavities. She was discharged the following evening with plans for close follow up. Lumbar puncture was not performed as the patient remained afebrile.

On 3-day outpatient follow-up with ophthalmology, the nystagmus was still present but less frequent, now occurring 12-15 times per day. Streak retinoscopy demonstrated mild hyperopia with +1.00 sphere bilaterally with the remainder of the ophthalmic exam again normal. A tentative diagnosis of post-viral COVID-19 induced vestibular neuritis was made, and the patient was scheduled for additional follow-up with ophthalmology and neurology. On subsequent neurology visits the patient underwent electroencephalography (EEG) to rule out epilepsy, but findings were normal and did not support the diagnosis of seizure. Two months after admission the patient's nystagmus episodes had resolved, and neurology findings supported the diagnosis of post-viral vestibular neuritis.

**Discussion:**

To our knowledge, post-viral vestibular neuritis in an infant following COVID-19 infection has not previously been described. While this case was self-limited, another reported case of COVID-19 associated nystagmus in a newborn was the result of a fatal acute hemorrhagic necrotizing encephalitis<sup>6</sup>. We therefore recommend that COVID-19 associated nystagmus be taken seriously, with appropriate exam, imaging, and follow-up for optimal diagnosis and care. It is important to point out that, while the timing of viral infection with onset of vestibular neuritis is suggestive of an association, a causative effect cannot be proven. As COVID-19 becomes ubiquitous and seemingly here to stay, we expect frequent and widespread infections with additive lasting neurological impacts to lead to more such cases.

**Patient consent:**

Consent to publish the case report was obtained. This report does not contain any personal information that could lead to the identification of the patient.

**Declaration of Conflicting Interests:**

The authors declare no conflicts of interest. All authors attest that they meet the current ICMJE criteria for Authorship. Acknowledgments: none.

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