

Oculomotor Nerve Palsy in an Asymptomatic Child with SARS-CoV-2 Virus Infection

Paulo de Tarso Ponte Pierre-Filho^{1*} and Lucas Linhares Pierre²

¹Department of Ophthalmology, Pierre Ophthalmology Clinic, Brazil

²School of Medicine, Uninta, Brazil

***Corresponding Author:** Paulo de Tarso Ponte Pierre-Filho, Department of Ophthalmology, Pierre Ophthalmology Clinic, Brazil.

Received: June 12, 2023; **Published:** June 29, 2023

Abstract

Neuro-ophthalmological complications of coronavirus disease 2019 (COVID-19) are being increasingly recognized. We report the case of a 10-year-old girl with acute onset diplopia and ptosis in the left eye. She was subsequently diagnosed with COVID-19 and complete oculomotor nerve palsy. She did not present any respiratory or specific neurological findings. Orbital and brain magnetic resonance imaging were unremarkable. The patient was managed conservatively with remission of palsy. COVID-19 should be suspected among children presenting with ocular nerve palsy, even in those without typical symptoms of disease.

Keywords: Oculomotor Nerve Palsy; Diplopia; Coronavirus; COVID-19; SARS-CoV-2; Case Report

Abbreviations

COVID-19: Coronavirus Disease 2019; SARS-CoV-2: Severe Acute Respiratory Syndrome Coronavirus 2; GBS: Guillian-Barré Syndrome; CSF: Cerebro-Spinal Fluid

Introduction

The coronavirus disease 2019 (COVID-19) appeared first in China in december 2019, caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) which has rapidly spread worldwide. As of 7 June 2023, the World Health Organization estimates that there have been over 767 million confirmed cases of COVID-19, including more than 6.9 million deaths globally. The epidemiological and clinical patterns of COVID-19 remain uncertain among children, because pediatric patients have their own clinical features. In contrast to adult patients, children are less infected and tend to present with milder symptoms [1].

Although COVID-19 is predominantly a respiratory disease, the disease remain a challenge due to its multiorgan involvement with very variable presentation. Numerous neurological complications have been reported in patients with SARS-CoV 2 infection, including central nervous system and peripheral nervous system manifestations [2-7]. The manifestations include headache, ageusia, anosmia, dizziness, seizures, ocular pain, ataxia, encephalopathy, visual impairment, diplopia, optic neuritis, Guillian-Barré syndrome (GBS), cranial nerve palsies, and nystagmus [2,3].

Citation: Paulo de Tarso Ponte Pierre-Filho and Lucas Linhares Pierre. "Oculomotor Nerve Palsy in an Asymptomatic Child with SARS-CoV-2 Virus Infection". *EC Ophthalmology* 14.7 (2023): 01-04.

The exact prevalence of ocular manifestations in COVID-19 patients is still unknown, because the tendency to neglect eye complaints and owing to the paucity of comparative studies with large sample sizes. Facial nerve and the abducens nerve are the most frequently cranial nerves affected among COVID-19 patients. Palsy of the oculomotor nerve is very rare in patients with coronavirus disease, particularly in children [2,3]. Here, we describe the case of an asymptomatic child with SARS-CoV-2 infection who developed isolated acute unilateral palsy of the third cranial nerve. *Written informed consent was obtained from the patient's parents.*

Clinical Case

A-10-year-old previously healthy girl was admitted to our Emergency Department with a 2-day history of acute diplopia and ptosis in the left eye. She did not present any other systemic signs at examination, including fever, cough, fatigue, dyspnea, headache, myalgias, diarrhea, or anosmia. There was no antecedent history of trauma, insect bites, recent vaccination or strabismus. On examination, her visual acuity was 20/20 (Snellen's chart) in each eye. The patient's cycloplegic refraction was +0,75 spherical diopters in both eyes. Intraocular pressure and fundoscopy were normal in both eyes. Biomicroscopy revealed anisocoria, with discrete mydriasis on the left. Pupillary light reflex showed an unreactive left pupil to illumination of both eyes. She had complete ptosis of the left eyelid, and her left eye was down and out at rest. Ocular versions showed adduction, look up, and depression limitations (Figure 1). Left eyelid closure was weak. Krimsky test revealed an exotropia of 30DP, fixating with the right eye. Both eyes were without orbital pain. Color vision and contrast sensitivity were normal in both eyes. No neurological or neuroimaging alterations were identified. Routine blood tests were normal including complete blood count, inflammatory markers, coagulation, auto-immune antibodies, liver and kidney function. Tests for hepatitis A virus antibody (IgM), hepatitis B virus surface antigen, and hepatitis E virus antibody (IgA) were negative. Lumbar puncture showed a normal opening pressure (20 cm H₂O) and normal cerebro-spinal fluid (CSF). The search for the main neurotropic viruses (Varicella-Zoster virus, enterovirus, Herpes simplex virus 1/2, Cytomegalovirus) was negative. CSF IgM, IgG Antibody tests were not performed for SARS-CoV-2. A complete palsy of the third cranial nerve was diagnosed. There were no other focal neurological deficits. Because the patient had previous contact with her mother, who tested positive for COVID-19 seven days before, a nasopharyngeal swab for SARS-CoV-2 real-time reverse transcription-polymerase chain reaction (RT-PCR) was made, with positive result. Orbital and brain magnetic resonance imaging (MRI) with gadolinium were normal. She was discharged 72-hours post admission with a persisting ophthalmoparesis. The child was managed conservatively with ocular physiotherapy and occlusion for alleviation of diplopia. At one month follow up, there was complete resolution of the oculomotor nerve palsy and diplopia and she remained systematically well.



Figure 1: Motility examination of patient revealed isolated left oculomotor nerve palsy.

Discussion

Oculomotor palsy results in adduction and vertical ocular motility deficits when the entire nerve is affected and the pupil can be involved as the pupillary fibers course through third cranial nerve. Acquired causes in childhood are varied and can include traumatic, neoplastic, vascular, inflammation, and migrainous or infectious etiologies [8]. Accompanying symptoms such as fever, headache, ocular pain, vomiting, ataxia, and visual loss may be present depending on the palsy's etiology.

Both diplopia and ptosis have been reported in patients within days of resolution of typical COVID-19 symptoms suggesting Miller-Fisher variant of the GBS. It is an autoimmune condition that encompasses a variety of different immune-mediated polyneuropathies, and typically presents as ophthalmoplegia with ataxia and hyporeflexia [6]. Most cases of cranial nerve palsy associated with COVID-19 presented with severe manifestations of the disease and required treatment [2,6]. Our patient showed anisocoria, ptosis, and restricted extraocular motilities suggestive of a complete oculomotor palsy. She had normal MRI with no signs of masses or hyperintensity at presentation and unremarkable laboratory blood test. SARS-CoV-2 was detected in the nasopharyngeal swab. She showed spontaneous remission of palsy through 1-month period.

COVID-19 remains a challenge due to its different manifestations, particularly in pediatric group. Asymptomatic infection is common in children, but they are tested less frequently than adults. The rapid expansion of COVID-19 pandemics led to the development of a growing number of ophthalmological and neurological syndromes, ranging from conjunctivitis to vision impairment and facial, abducens and oculomotor nerve paralysis. More frequently, patients with SARS-CoV-2 infection and ophthalmoplegia have been reported in adults who presented with typical COVID-19 symptoms and diplopia [2]. To our knowledge, only 2 cases indicating a possible association between SARS-CoV-2 infection and acquired oculomotor nerve palsy have been reported in asymptomatic children [4,5]. Both cases recovered completely in a few days, as in our case. Dinkin and colleagues [6] also suggest that cranial neuropathies should be considered even in the context of mild symptoms and signs of COVID-19.

It has been unclear whether neurological symptoms in COVID-19 infection could be due to direct viral injury, or indirect neuroinflammatory and autoimmune mechanisms [7]. The neuroinvasive mechanism of SARS-CoV-2 is not fully understood. Some studies have shown that the pathophysiology of SARS-CoV-2 infection involves the penetration of the virus into the cell, and requires the binding of a spiculated protein with an angiotensin-converting enzyme 2 receptors expressed on the cell surface, facilitating the invasion of host cells of different organs. However, other studies in patients with COVID-19 and neurological disorders have reported low levels or absence of viral RNA in the cerebrospinal fluid CSF [9,10].

Our patient presented with isolated oculomotor nerve palsy, and she did not present with any other signs or symptoms that suggest vascular or immune involvement. However, an indirect action of the virus response cannot be ruled out. Other neurotropic viruses such as herpes simplex virus, varicella zoster, cytomegalovirus, dengue, and chikungunya also have developed mechanisms to escape host immune surveillance to gain access to the nervous system causing cranial nerve palsy [11-13].

Although the vast majority of patients with SARS-CoV-2 infection have an uncomplicated course with good outcome, neuro-ophthalmic symptoms can be the only manifestation of the disease. In cases with cranial nerve involvement, COVID-19 infections are usually mild and may be associated with GBS [14]. However, these patients should be carefully clinically and neuroimaging examined, and tested for COVID-19.

Conclusion

This case demonstrates the possible acute occurrence of oculomotor palsy induced by SARS-CoV-2 virus in pediatric patients, and the importance of co-management between health care practitioners. In addition, as cases continue to rise across the globe, we suggest considering asymptomatic SARS-CoV-2 infection in children presenting with ocular motor palsy without other risk factor. Early follow up

suggests a full recovery can be possible without specific treatment. Finally, further studies investigating neuro-ophthalmological manifestations of COVID-19 are important to improve the clinical management of the disease, particularly in patients with cranial nerve involvement, such as oculomotor nerve palsy.

Conflict of Interest

Authors report no conflict of interest.

Financial Support

The authors received no financial support for this work.

Bibliography

1. WHO. WHO Coronavirus (COVID-19) Dashboard. Geneva: World Health Organization (2022).
2. Luís ME., *et al.* "A review of neuro-ophthalmological manifestations of human coronavirus infection". *Eye Brain* 12 (2020): 129-137.
3. Gürlevik SL., *et al.* "Neurologic manifestations in children with COVID-19 from a tertiary center in Turkey and literature review". *European Journal of Paediatric Neurology* 37 (2022): 139-154.
4. De Oliveira MR., *et al.* "Oculomotor nerve palsy in an asymptomatic child with COVID-19". *Journal of AAPOS* 25.3 (2021): 169-170.
5. Elenga N., *et al.* "Unilateral diplopia and ptosis in a child with COVID-19 revealing third cranial nerve palsy". *Journal of Infection and Public Health* 14.9 (2021): 1198-1200.
6. Dinkin M., *et al.* "COVID-19 presenting with ophthalmoparesis from cranial nerve palsy". *Neurology* 95.5 (2020): 221-223.
7. Vonck K., *et al.* "Neurologic manifestations and neuro-invasive mechanisms of the severe acute respiratory syndrome coronavirus type 2". *European Journal of Neurology* 27.8 (2020): 1578-1587.
8. Ng YSP and Lyons CJ. "Oculomotor nerve palsy in childhood". *Canadian Ophthalmological Society* 40.5 (2005): 645-653.
9. Kremer S., *et al.* "Neurologic and neuroimaging findings in patients with COVID-19: a retrospective multicenter study-a retrospective multicenter study". *Neurology* 95.13 (2020): e1868-e1882.
10. Espíndola OM., *et al.* "Cerebrospinal fluid findings in neurological diseases associated with COVID-19 and insights into mechanisms of disease development". *The International Journal of Infectious Diseases* 102 (2021): 155-162.
11. Costa ALFA., *et al.* "Third cranial nerve palsy after a Chikungunya infection". *Strabismus* 25.4 (2017): 172-175.
12. Biswas NM and Pal S. "Oculomotor nerve palsy in dengue encephalitis - a rare presentation". *Indian Journal of Medical Research* 140.6 (2014): 793-794.
13. Harthan JS and Borgman CJ. "Herpes zoster ophthalmicus - induced oculomotor nerve palsy". *Journal of Optometry* 6.1 (2013): 60-65.
14. Finsterer J., *et al.* "COVID-19 associated cranial nerve neuropathy: A systematic review". *Bosnian Journal of Basic Medical Sciences* 22.1 (2022): 39-45.

Volume 14 Issue 7 July 2023

©All rights reserved by Paulo de Tarso Ponte Pierre-Filho and Lucas Linhares Pierre.