

## Ocular and Neuro-ophthalmic Manifestations Post COVID-19 Infection

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### ABSTRACT

A 39-year-old male with a history of COVID-19 infection presented with ocular manifestations: dendritic ulcer in the left eye cornea followed by diplopia in the same eye. Extraocular motility was restricted in the levo-lateral gaze with maximum diplopia measuring 25Δ exotropia. Slit lamp biomicroscopy showed dendritic patterned lesion with diffused superficial punctate keratitis in the cornea. There are various reports associated with COVID-19 and the neuro-ophthalmic system. Although the clinicopathological aspect of COVID-19 and the neurological system is still to explicate. However, the patient showed gradual improvement with topical and systemic antiviral therapy and orthoptic exercise. This points to the need for detailed neurological and ophthalmic workup in symptomatic COVID-19 patients. Taking the risk of viral spread into serious consideration, a thorough evaluation is though mandatory.

**Keywords:** COVID-19; dendritic ulcer; lateral rectus palsy; superficial punctate keratopathy

### INTRODUCTION

Nothing can replace the devastation and disastrous change caused by the horrific virus: COVID-19. Human lives are still in peril with a new strain variant of COVID-19 as Omicron (B 1.1.529).<sup>1</sup> The menacing encroachment of this virus on the human race cannot be spared to date. The virus has not shown mercy to any of the human systems. The onset of neurological symptoms or disorders could be associated with viral infections with variable immune responses. Symptomatic treatment and follow-up is the prime modality of managing such case. This case focuses on similar Neuro-ophthalmic changes following COVID-19 infection.

### CASE REPORT

A 39-year-old male from Bhagwanpur, Siraha presented to the outpatient department of Sagarmatha Choudhary Eye Hospital with a complaint of binocular diplopia. The patient did not have any co-morbidities like Diabetes Mellitus, Hypertension. He also had a negative history of dizziness, vertigo, or any abnormal body movements. He gave a history of PCR positive COVID-19 infection which

was treated symptomatically in home isolation for two weeks. After a month of being treated for COVID-19, the patient showed neurological manifestations. The patient was evaluated for ocular pathology, neuro-ophthalmology, and orthoptics for compromised eye movement. Visual acuity was noted as 20/20 in the oculus uterque. Slit lamp evaluation unveiled mild superficial punctate keratitis with a dendritic patterned lesion present over the paracentral cornea from eight to six O'clock in the left eye's cornea with a quiet anterior and posterior chamber (Figure 1). The eye movements were restricted to the left eye's lateral gaze (Figure 2) and showed diplopia in the worth four dot test (WFDT). Diplopia charting (Figure 3) showed uncrossed diplopia and confirmed left lateral rectus palsy with maximum separation at levoersion. The prism bar cover test for the left eye measured 25Δ esotropia at levoersion, 4Δ esotropia at adduction, and 15Δ esotropia at the primary position. The MRI report did not show any significant pathological changes. The patient was started with topical Anti-viral ointment (Ocuvir 3% w/w) 5 times for 2 weeks oral corticosteroid in dosage 60mg tapered weekly and systemic antiviral therapy (Acyclovir 400mg) twice daily for two months under observation, along with

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brock string exercise-far to near bead concentration for fusion. At the time of discharge, the patient did not have any restricted lateral gaze. The diplopia resolved, and the WFDT showed fusion. We obtained informed written consent from the patient for this case report. We are obliged to Sagarmatha Choudhary Eye Hospital in giving permission to report this case.

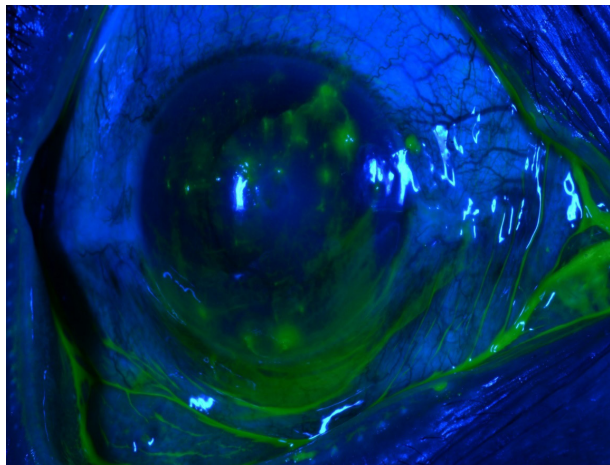


Figure 1. Slit lamp examination showing mild superficial punctate keratitis in Left Eye.



Figure 2. Normal primary gaze with restricted lateral gaze on left side.

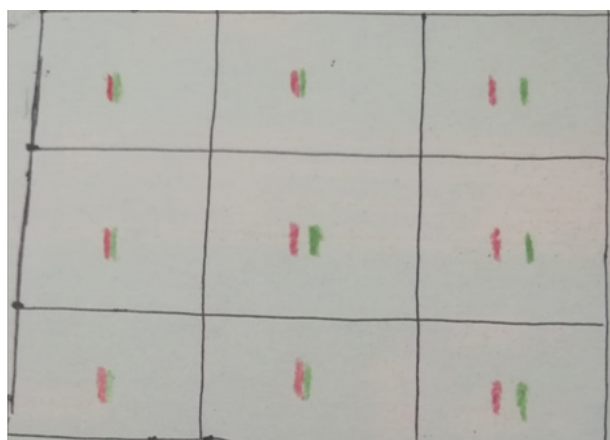


Figure 3. Diplopia Chart showing uncrossed diplopia with maximum separation on leversion.

## DISCUSSION

Viral transmission to or from the eye could be due to direct contact with virus-containing droplets or aerosolized particles with the mucous membrane.<sup>2-3</sup> Progressive sub-epithelial infiltrates with overlying epithelial defects and pseudo-dendrites have been reported in one post-COVID-19 case.<sup>4</sup> Three pathophysiological basis has been proposed for neuronal damage caused by this novel virus: Direct viral central nervous system invasion, endothelial dysfunction, neurological effect from increased inflammation, and release of cytokine.<sup>5</sup> COVID-19 uses spike protein S1 to attach to host cell Angiotensin-converting enzyme 2 (ACE-2) receptors, which has been detected in the respiratory, gastrointestinal, and neurological tract.<sup>6-7</sup> The above points can be highlighted as one of the causes for causing neuronal changes in the ophthalmic branch of the trigeminal nerve and abducens nerve, the latter being one of the most commonly isolated cranial nerve palsy.<sup>8</sup> Lack of any Magnetic Resonance Imaging (MRI) findings and or any further cranial nerve change makes this case an exclusion.

There has been reported case of an otherwise healthy young patient presenting with a complaint of diplopia following COVID-19 infection.<sup>9</sup> Although systemic review for abducens nerve palsy has not been done, indeed in the systemic review in facial palsy following COVID-19 infection 35.62% of treatment were kept a combination of anti-viral and corticosteroid-based therapy, 69.86% with corticosteroids and 31.51% with anti-virals. Out of which, 83.58% showed positive outcomes.<sup>10</sup>

## CONCLUSION

The patient gained binocular single vision and the ocular signs of viral infection subsided after 2 months of treatment. This report further points out the need for detailed neurological and ophthalmic workup in symptomatic COVID-19 patients. Taking the risk of highly contagious viral spread into serious consideration, a thorough evaluation is mandatory and challenges still exist ahead in this pandemic era. The neurological manifestation of COVID-19 needs to be studied in a detailed manner among a larger group of people for better outcomes in the future.

## CONFLICT OF INTEREST

The authors declare no conflict of interest

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