
Mini Review

COVID19 AND THE EYE: MINIREVIEW OF OPHTHALMIC MANIFESTATIONS

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1. Introduction

In December of 2019, a severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) emerged in China in the city of Wuhan., The ongoing outbreak of coronavirus disease (COVID-19) has been declared by WHO as a global public health emergency on March 11, 2020 [1]. Transmission of the disease from human to human occurs through direct contact or droplets

from an infected patient through coughing or sneezing [20]. Patients presented with fever, dry cough, dyspnea, and bilateral pulmonary infiltrates in imaging examinations. Detailed analysis through nasopharyngeal swabs detected the causal agent by the Chinese Center for Disease Control and Prevention as Sars-CoV-2 which is a single-stranded RNA virus [3,4].

2. Pathogenesis**2.1. Immune mediated tissue damage**

This pathogen is one of the beta-coronavirus family and has spike proteins that interact heavily with the receptors of angiotensin-converting enzyme 2 (ACE2) in the human body. ACE2 is highly concentrated in the lung, heart, renal and intestinal tissue. A relationship between

ACE2 and the characteristic tissue damage of COVID-19 patients mediated by T-lymphocytes through antigen-presenting cells and macrophages, which have ACE2 receptors. ACE2 expression also occurs in the cornea and in the conjunctiva epithelial cells [5-7].

2.2. COVID-19 associated coagulopathy

Thrombotic events are characterizing to COVID 19 infection more than hemorrhagic events that are associated with coagulopathy [8]. COVID-19 associated coagulopathy caused by endothelial dysfu-

nction of sepsis induced coagulopathy and viral adhesion to (ACE2) on vascular endothelial cells with elevated levels of fibrinogen [9,10].

3. Eye as a gateway to COVID-19 infection and route of transmission

During the past 1918 influenza pandemic, respiratory infection transmission through the eye and lacrimal-nasal pathway was evident [11]. Ocular surface droplet deposition is greatly underestimated as a probable, common gateway to SARS-CoV-2 transmission due to its large surface area directly exposed to airborne viral

particles [11]. The virus may bind to (ACE2) receptors of the cornea, conjunctiva, and superficial tear film [12]. There are various studies that proves that viral shedding in tears and conjunctival secretions can occurs in patients of SARS-CoV-2 [13,14].

4. Prevalence of Ophthalmic symptoms in Covid 19

A large meta- analysis evaluating the prevalence of ophthalmic manifestations found that in 2,228 patients diagnosed with COVID-19 patients; 95 (4.3%) reported ocular symptoms and 21 (0.9%) presented with ophthalmic symptoms as their initial complaint [15].

Another recent meta-analysis of 12 studies in 1,930 patients reported that conjunctivitis or conjunctival congestion was found in up to 8% of COVID-19 patients [16] the prevalence of ocular manifestations was found It varies from 2% to 32% in another study [17].

5. Ophthalmic Manifestations in Covid 19

5.1. Follicular conjunctivitis

The most common ophthalmic manifestation in COVID-19 patients was reported to be Conjunctivitis is reported in [18]. Ocular manifestations were suggested to be more common in the middle

phase of the disease [19]. However, follicular conjunctivitis was reported to have delayed onset of four weeks after severe COVID-19 infection [20].

5.2. Viral keratoconjunctivitis

It was reported that, keratoconjunctivitis is the initial presentation in patients with positive swabs and mild respiratory symptoms with redness, discharge, and

photophobia [21]. Although SARS-CoV-2 could not be detected in conjunctival secretions, relapsing viral keratoconjunctivitis in COVID-19 was reported [22].

5.3. Hemorrhagic and pseudomembranous conjunctivitis

It was reported in a 63-year-old male patient with severe COVID-19 infection [23]. Conjunctival congestion was found to be an early sign of COVID-19

infection even before the development of systemic symptoms in 2.26% of the patients [24].

5.4. Episcleritis

Most of cases are idiopathic and self-limiting. It was presented with conjunctival, episcleral, and nasal congestion

which was followed by the systemic viral manifestations [25,26].

5.5. Blepharitis and dry eye

COVID-19 disease duration was positively correlated to blepharitis. It is associated with lid margin hyperemia or

telangiectasia and meibomian orifice abnormalities [27].

5.6. Posterior Segment Manifestations

Posterior segment manifestations, it includes retinal vascular occlusions,

5.6.1. Retinal vascular occlusion

Patients of COVID-19 are in a procoagulant state. It caused by elevated D-dimer, prothrombin time (PT), activated partial thromboplastin time (aPTT) and intermittent hypoxia which trigger extrinsic coagulation cascade. Central retinal vein

5.6.2. Acute macular neuro-retinopathy (AMN), paracentral acute middle maculopathy (PAMM)

Cases with acute macular neuro-retinopathy (AMN) and paracentral acute middle maculopathy (PAMM) have been

5.6.3. Retinal Abnormalities

Vitritis [35], acute retinal necrosis (ARN) [36], peripheral retinal hemorrhages

5.7. Uveal abnormalities

There are many uveal manifestations of Covid 19. A uveal abnormality includes

retinal abnormalities, and uveal abnormalities [18].

occlusion was reported in many reports [28,29] while other reports [30,31] documenting central retinal artery occlusion. Central retinal vein occlusion bilaterally was reported in a 40-Year-old man with severe coronavirus pneumonia [32].

reported concurrently with or following COVID-19 diagnosis.

and macular hyperpigmentation [37] were reported in different case reports.

reactivation of serpiginous choroiditis following COVID-19 infection [38].

6. Neuro-ophthalmic Manifestations:

They are not common presentation of Covid 19 infection, they include isolated case reports. They include Papillo

phlebitis [39], Optic neuritis [40], Adie's tonic pupil [41], Cranial nerve palsy [42] and Neurogenic ptosis [43]

7. Orbital Manifestations

They vary from intense retro-orbital pain to life-threatening invasive mucormycosis [18]. They include Acute Dacryoadenitis [44] Retro-orbital pain [45] which may be bilateral and pro-

minent Orbital cellulitis and sinusitis [46] by viral induced upper respiratory congestion which compromise mucociliary clearance with secondary sinus obstruction and bacterial infection.

8. Mucormycosis

Mucormycosis is a life-threatening, opportunistic infection and patients with moderate to severe COVID-19 are more susceptible to it because of the compromised immune system by the virus and steroids therapy [47]. Mortality rate is as high as 50% even with treatment. Rhino-orbital cerebral (ROC) mucormycosis can present concurrently with COVID-19 inf-

ection with developed as late as 30-42 days after the diagnosis of COVID-19 [18]. High index of suspicion, early diagnosis with histopathological and microbiological evidence, rapid management with antifungals and aggressive surgical debridement (functional endoscopic sinus surgery and orbital exenteration) can improve survival [48].

9. Conclusion.

As the pandemic continues to hazard the world, it is important to physicians to understand the manifestations of COVID-19. The prevalence of ophthalmic manifestations in COVID-19 patients ranges from 2-32%. The main pathogenesis of Covid eye manifestations caused by Immune mediated tissue damage and COVID-19 associated coagulopathy. The most common ophthalmic manifestation reported in COVID-19 patients, is Conjunctivitis. Other manifestations including orbital manifestations, posterior segment manifestations, and neuro-ophthalmic manifestations. Mucormycosis is a life-threatening opportunistic infection necessitating early diagnosis and treatment.

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