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Title: The diagnosis of central retinal artery occlusion after mRNA-SARS-CoV-2 vaccination

Keywords: vaccine, COVID-19, SARS-CoV-2, Central retinal artery occlusion, Stroke

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Dear Editor,

We read with interest the Case Report entitled "Combined central retinal artery and vein occlusion shortly after mRNA-SARS-CoV-2 vaccination".[1] However, we doubt about the underlying diagnosis accounting for the unilateral complete visual loss down to no light perception.

Firstly, central retinal artery occlusion (CRAO) or central retinal vein occlusion (CRVO) rarely causes visual loss down to no light perception. From our 3-year experience on running the territory-wide tertiary CRAO referral centre for hyperbaric oxygen therapy under the HORA study,[2,3] CRAO usually presents with visual acuity of finger counting, or hand movement. Cases presenting with total visual loss to no light perception were usually ophthalmic artery occlusion, instead of CRAO, which choroidal circulation was also compromised. As ophthalmologists, we know that CRVO causes only mild visual impairment unless cystoid macular oedema is developed in the later stage of the disease natural course, which is one of the common indications for intravitreal anti-vascular endothelial growth factor or steroid therapy. In contrast, optic nerve pathology is more often to cause severe visual impairment down to no light perception. By viewing the right eye fundus photo in Figure 1A,[1] optic disc margin blurring is evidenced, and we could not rule out optic neuropathy/ neuritis of either ischemic or non-ischemic type as the aetiology of the right eye total and complete visual loss.

Secondly, Ikegami et al described the patient to have papilledema.[1] By definition, papilledema is optic nerve head swelling secondary to raised intracranial pressure.[4,5] We are interested in the extent of the increase in intracranial pressure, which was not mentioned in the case report.[1] Besides, neuroimaging and the corresponding findings were not mentioned in the case report.[1] As a matter of fact, cerebral sinus thrombosis after COVID-19 vaccination has been reported. In addition, if papilledema is evidenced, how was the visual impairment over the left eye?

Finally, Ikegami et al used optical coherence tomography (OCT) angiography in the acute stage to reveal the absence of vascular flow in foveal and perifoveal areas.[1] From the OCT cross sectional scan over the fovea in Figure 1B, foveal and perifoveal areas were particularly oedematous with retinal thickening.[1] These thickening could cause masking artefact to the underlying vessel flow signals,[6] thus normal vascular perfusion might not to be detected by OCT angiography. Also, the extensive retinal haemorrhage involving the fovea seen over the colour fundus photo in Figure 1A could also explain the possible blockage, or alternation in the penetration of the OCT scanning beam by extravascular blood.[6] Therefore, non-perfusion (supporting the diagnosis of CRAO) might not be the only explanation to the absence of vascular flow signal on OCT angiography in the acute stage.

In conclusion, there is no doubt that CRVO is evidenced in this 54-year-old lady,[1] yet her total and complete visual loss down to no light perception might be of optic neuropathy or even central cerebral cause, instead of CRAO.

(477 words)

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