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LETTER TO THE EDITOR (BY INVITATION)

Big data are needed for analysis of the association of retinal vascular occlusion and COVID-19

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Key messages

- A few cohort studies have revealed conflicting trends regarding the association of retinal vascular occlusion with COVID-19 infection.
- Most reports of retinal vascular occlusion in association with COVID-19 vaccination have been cases.
- Considering the relatively low incidence of retinal vascular occlusion, investigations using big data such as national health claims databases might be useful to clarify the association of retinal vascular occlusion with COVID-19.

Dear Editor,

Prothrombotic and procoagulant mechanisms associated with COVID-19 result in various thromboembolic complications [1]. Spike proteins show a higher affinity for the angiotensin-converting enzyme 2 receptor of host target cells and trigger the release of proinflammatory cytokines [1]. This is followed by the activation of the prothrombotic pathway, leading to thrombotic angiopathy in multiple organs. As retinal vascular occlusion including retinal artery occlusion (RAO) and retinal vein occlusions (RVO) share common risk factors like hypercoagulability, a relationship between retinal vascular occlusion and COVID-19 has been proposed. RAO and RVO have thromboembolic disorders as a risk factor in common, and thromboembolic complications are also a hallmark of COVID-19.

Most reports of retinal vascular occlusion in patients with COVID-19 or after COVID-19 vaccination are limited to cases thus far. There have been a few cohort studies investigating the incidence of retinal vascular occlusion, but these studies showed conflicting results [2, 3]. One cohort study that investigated the prevalence of retinal vascular occlusion before and during the COVID-19 pandemic showed that the overall number of new patients with retinal vascular occlusion did not differ between the pre-COVID-19 and COVID-19 period [2]. On the other hand, another cohort study revealed that the incidence of new RVO was higher in COVID-19 patients, while that of new RAO was not significantly different compared to the pre-COVID-19 period [3]. A causal relationship has not been established, but the possibility of potential risks remains due to the prothrombotic state associated with COVID-19 infection, especially in young patients without other risk factors [4]. Taken together, the association between retinal vascular occlusion and COVID-19 requires further investigation.

No cohort studies have investigated the relationship of COVID-19 vaccination with retinal vascular occlusion. A recent multicenter study on COVID-19 vaccination reported no evidence for retinal vascular occlusion after vaccination, via age and sex-matched case–control analysis [5]. Otherwise, studies on COVID-19 vaccination and retinal vascular occlusion were mostly limited to case reports. As case reports are considered to represent

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the lowest level of evidence, clear conclusions cannot be drawn.

Big data studies using claims or registry data are being actively reported. The limitations of these studies are based on the accuracy of the diagnostic or procedural codes entered for each patient, as coding errors can happen in clinical practice. Accordingly, disorders that present typical findings and that require exact coding for claims are suitable targets for big data studies. The diagnosis of retinal vascular occlusion is usually clear, as retinal manifestations are very characteristic. COVID-19 diagnosis and/or vaccination history are also easily identifiable in most countries by diagnostic or procedural codes, making the relationship between retinal vascular occlusion and COVID-19 suitable for big data study. The analysis of the association of retinal vascular occlusion and COVID-19 would benefit from research using big data due to the relatively low prevalence of retinal vascular occlusion.

The world has been greatly affected by COVID-19 in the past three years. In the process of overcoming this pandemic, we have accumulated sufficient data on COVID-19 infection and vaccination to study their potential thromboembolic complications including retinal vascular occlusion. Further studies using big data are warranted to investigate the association of retinal vascular occlusion and COVID-19.

Declarations

Conflict of interest No conflicts of interest to declare.

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