Valsalva Retinopathy Associated With COVID-19: Diagnosis and Surgical Management

ASRS American Society of Retina Specialists

Journal of VitreoRetinal Diseases 2023, Vol. 7(5) 444-447 © The Author(s) 2023 Article reuse guidelines: sagepub.com/journals-permissions DOI: 10.1177/24741264231167698 journals.sagepub.com/home/jvrd



Wesley Han¹ and Sean D. Adrean, MD²

Abstract

Purpose: To report a case of severe Valsalva retinopathy secondary to intense coughing and vomiting as symptoms of COVID-19 and describe the presentation, diagnosis, and surgical management. **Methods:** The patient's subjective findings, examination, fundus photography, optical coherence tomography (OCT) examinations, and laboratory results were used to diagnose the patient. **Results:** Surgical management was required to remove a vitreous hemorrhage (VH) and a sub-internal limiting membrane (sub-ILM) hemorrhage. Another foveal hemorrhage was determined to be intraretinal with intraoperative OCT. The patient's visual acuity improved from hand motions to 20/20 OD at postoperative week 6. **Conclusions:** The related COVID-19 symptoms of severe coughing and vomiting led to the Valsalva retinopathy. The VH and sub-ILM hemorrhage were successfully removed surgically. On intraoperative OCT, a foveal hemorrhage was determined to be intraretinal; thus, the decision was made to monitor it and allow it to resolve over time.

Keywords

Valsalva retinopathy, COVID-19, intraoperative OCT, vitrectomy

Introduction

Valsalva retinopathies were first described in 1972 by Duane,¹ who discussed the characteristics and treatment of several cases. Valsalva retinopathy is hemorrhaging occurring in multiple layers of the retina and vitreous including the preretina, sub-internal limiting membrane (sub-ILM), intraretina, and vitreous. The hemorrhage follows an increase in intrathoracic pressure. This leads to rupture of the retinal capillaries and arterioles. This can occur in individuals with otherwise healthy eyes as a result of activities that increase intrathoracic pressure, such as exercising, coughing, or sneezing. A history of hypertension can also be a factor in sub-ILM bleeding. Symptoms commonly consist of vision loss, floaters, and vision with a reddish hue.²

Treatment of Valsalva retinopathies typically involves observation. However, sometimes a neodymium:YAG laser membranotomy of the ILM is performed to open the blood cavity in the sub-ILM space or a pars plana vitrectomy (PPV) is required.³

COVID-19 is a global pandemic, with current cases numbering in the hundreds of millions. The virus follows the respiratory tract, causing symptoms such as fever, cough, fatigue, shortness of breath, and occasionally nausea and vomiting.⁴

We describe a patient with COVID-19 whose severe coughing and vomiting led to Valsalva retinopathy. The presentation, diagnosis, surgical management, and follow-up examinations are presented. Intraoperative optical coherence tomography (OCT) was used to assist in differentiating between intraretinal hemorrhages and sub-ILM hemorrhages.

Case Report

A 45-year-old woman presented to the emergency room reporting blurred vision, pain, and seeing blood in her right eye. Three days before presentation, the patient had symptoms of severe coughing, nausea, and vomiting. She was unable to keep down food or drink. She was given a test for COVID-19, which came back positive, even though she was fully vaccinated and had received a booster shot 4 months previously. Because of the severe nature of her vision loss, she was transferred to our clinic, despite being COVID-19 positive.

The patient had a history of hypertension that was well controlled with oral medication. She had no other relevant medical or surgical history. The Snellen visual acuity (VA) was counting fingers (CF) OD and 20/20 OS. The intraocular pressure was 20 mm Hg and 21 mm Hg, respectively. A slitlamp examination showed no abnormalities in either eye.

Corresponding Author:

Sean D. Adrean, MD, Retina Consultants of Orange County, 301 W Bastanchury Ave #285, Fullerton, CA 92835, USA. Email: seadrean@yahoo.com

¹ Undergraduate, College of Biological Sciences, University of California, Davis, CA, USA

² Retina Consultants of Orange County, Fullerton, CA, USA

A dilated fundus examination of the right eye showed a predominately subhyaloid hemorrhage with some vitreous hemorrhaging in the posterior pole and some of the fovea spared. There were also multiple intraretinal and subhyaloid hemorrhages (Figure 1). OCT images showed the subhyaloid



Figure 1. Color fundus photograph of the right eye shows a predominately subhyaloid hemorrhage in the posterior pole, with a mild vitreous hemorrhage. Multiple intraretinal and subhyaloid hemorrhages are present.

hemorrhage (Figure 2A). Fluorescein angiography showed no neovascularization of the disc or other vessel abnormalities and blockage by the subhyaloid, sub-ILM, and intraretinal hemorrhages. The patient's left eye was normal (Figure 3). This led to the diagnosis of a Valsalva retinopathy.

The decision was made to monitor the patient. At the second visit 1 week later, her vision had improved from CF to 20/250 as a result of the subhyaloid hemorrhage being layered more inferiorly, as shown by OCT images. Based on these findings, she continued to be monitored (Figure 2B). The patient returned emergently 1 week later with a significant decline in vision to hand motions, with a breakthrough vitreous hemorrhage (VH). The patient was very distressed; thus, a decision was made to operate urgently (Supplemental Video).

A standard 25-gauge PPV was set up. A posterior vitreous detachment was present; therefore, the VH was removed as far anteriorly as possible, taking care not to damage the lens. A sub-ILM hemorrhage along the superotemporal arcade as well as several intraretinal hemorrhages were noted. A possible sub-ILM hemorrhage was also seen in the central fovea. Intraoperative OCT was used to visualize an area of subhyaloid hemorrhage along the superotemporal arcade. This was removed with a soft-tipped cannula. Because the hemorrhage in the central fovea looked unusual and the intraoperative OCT was not definitive, brilliant blue was placed in the eye to faintly stain the ILM. A Finesse loop (Alcon, Inc) and an ILM forceps were used to peel the ILM for approximately 3 disc diameters around the foveal avascular zone. The clot was still visible.



Figure 2. (A) Optical coherence tomography (OCT) at presentation shows a subhyaloid hemorrhage, leading to the diagnosis of a Valsalva retinopathy. (B) OCT I week after presentation shows that the hemorrhage had become smaller.

Intraoperative OCT showed the clot to be intraretinal with no subhyaloid component. A decision was made not to do anything more. Using scleral depression, the peripheral retina was inspected for 360 degrees; no breaks or tears were identified.



Figure 3. Color fundus photograph of the left eye shows no abnormalities.

In the following weeks, OCT images (Figure 4) showed that the intraretinal clot had gradually resolved. By the 6-month postoperative visit, the best-corrected Snellen VA had improved to 20/20 OD.

Conclusions

The SARS-CoV-2 virus has introduced many new medical challenges since its onset in January 2020. The virus mainly infects the respiratory system, causing the common symptoms seen across most symptomatic individuals (ie, fever, cough, fatigue, and shortness of breath), although in some cases there are predominantly more gastrointestinal symptoms, such as nausea and vomiting.⁴

Here, we present a case of a Valsalva retinopathy associated with COVID-19. In this case it was unclear whether the patient's severe coughing or vomiting led to the retinopathy. The spike in intra-abdominal and intrathoracic pressure likely caused the retinal capillaries to rupture.¹ Another case of Valsalva retinopathy associated with COVID-19 was reported in 2021.⁵ That patient had intense coughing. Thus, depending on their severity, symptoms caused by COVID-19 can act as risk factors for conditions such as Valsalva retinopathies.

Our case report details the successful management of a case of Valsalva retinopathy associated with COVID-19. Treatment took advantage of intraoperative OCT imaging to reveal the



Figure 4. (A) Optical coherence tomography I week after surgery shows an intraretinal clot. (B) OCT image from 6 weeks shows the clot had gradually decreased in size.

foveal hemorrhage as intraretinal despite it initially appearing as potentially being both sub-ILM and intraretinal. If an attempt had been made to drain or remove this hemorrhage, the fovea would likely have been damaged, possibly leading to a macular hole and compromising VA.

Ethical Approval

This case report was conducted in accordance with the Declaration of Helsinki. The collection and evaluation of all protected health information was performed in a US Health Insurance Portability and Accountability Act-compliant manner.

Statement of Informed Consent

Informed consent was not necessary because the case described the care of one patient and excluded any identifiable information.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

ORCID iD

Sean D. Adrean (D) https://orcid.org/0000-0001-6004-0643

Supplemental Material

Supplemental material is available online with this article.

References

- Duane TD. Valsalva hemorrhagic retinopathy. *Trans Am Ophthal*mol Soc. 1972;70:298-313.
- Simakurthy S, Tripathy K. Valsalva retinopathy. June 27, 2022. In: *StatPearls* [Internet]. StatPearls Publishing; 2022 Jan–.
- Gabel VP, Birngruber R, Gunther-Koszka H, Puliafito CA. Nd:YAG laser photodisruption of hemorrhagic detachment of the internal limiting membrane. *Am J Ophthalmol.* 1989;107(1): 33-37. doi:10.1016/0002-9394(89)90811-8
- Chams N, Chams S, Badran R, et al. COVID-19: a multidisciplinary review. *Front Public Health*. 2020;8:383. doi:10.3389/ fpubh.2020.00383
- Baumal CR, Ponugoti A, Enriquez AB, Vajzovic L. Valsalvainduced retinal hemorrhage as a secondary effect of COVID-19 disease. *Asia Pac J Ophthalmol (Phila)*. 2021;10(1):125-126. doi: 10.1097/APO.00000000000358