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A Rare Occurrence of Valsalva Retinopathy

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ABSTRACT

The purpose of this article is to discuss the pathophysiology of valsalva retinopathy and its associated retinal findings; present a case report on valsalva retinopathy as a result of lifting a heavy box; review possible treatment options for valsalva retinopathy and the associated benefits.

INTRODUCTION

A Valsalva maneuver occurs as a result of a forced attempt of exhalation against a closed airway. Examples of Valsalva-related maneuvers are movements of which require physical straining such as heavy lifting, aerobics, straining on the toilet, child birth, severe vomiting, sneezing and or coughing. The sudden increase in intrathoracic or intra-abdominal pressure causes a rapid increase in venous pressure which can ultimately lead to spontaneous hemorrhage of the retinal vasculature.[1] Valsalva retinopathy can result in a sudden, painless loss in vision. This type of retinopathy is irrespective of systemic history and can occur in healthy individuals. Prognosis is typically good. Resolution spontaneously occurs in weeks to months but is dependent on the location of the hemorrhage and the level of retinal vasculature involved.

CASE REPORT

An 83-year-old African American male, who was new to the clinic, presented as a triage for sudden, painless, loss of vision in the left eye. He complained of a "red blob" in his vision that presented after lifting a heavy box four days prior. He denied any pain or flashes of light associated with the loss of vision as well as any history of recent trauma. Medical record included a history of prostate cancer and two cerebral vascular accidents that occurred ten years ago. The only medication he was taking was a chewable aspirin (daily, 81mg).

Entering visual acuity, with current spectacles, was 20/40+1 in the right eye and counting fingers (CF) at 3 feet in the left eye. There was no relative afferent pupillary defect present, extraocular muscles had full range of motion and confrontation visual fields were full to finger count. Intraocular pressures were within normal limits at 14 millimeters of mercury (mmHg) in both eyes. Slit lamp anterior segment findings were also unremarkable with only an isolated finding of age-related corneal arcus presenting bilaterally. Posterior segment fundus findings (Image 1), were unremarkable in the right eye, however, the left eye revealed an elevated, well-demarcated, central macular hematoma under the internal limiting membrane (ILM) with an adjacent paramacular preretinal hemorrhage. Asymmetry of the optic disc cup-to-disc ratio was also apparent with the left optic nerve more vertically elongated and suspicious in appearance when compared to that of the right.

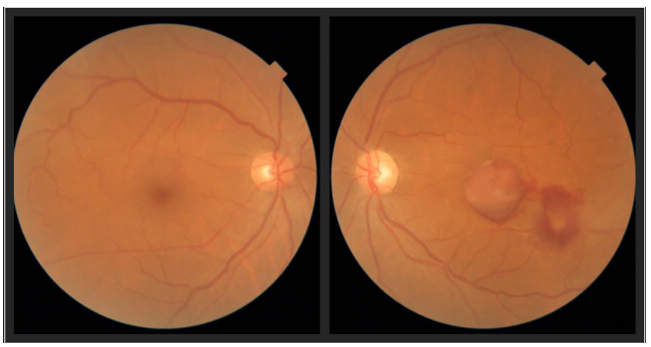


Image 1: Fundus photography of the right and left eyes, initial visit

Ancillary optical coherence tomography (OCT) testing was performed which can be seen in (Figure 1) below representing a macular 5 Line raster as well as a macular cube scan of the left eye. The results indicate a large dome-shaped sub-ILM hemorrhage obscuring the underlying retinal and choroidal detail. Baseline glaucoma testing can be seen in (Figure 2). Baseline retinal nerve fiber layer and ganglion cell analysis results show superior temporal thinning in the left eye greater than right eye. Since the patient had no predisposing systemic conditions that could be contributing to the funduscopic findings and no other signs of retinopathy were appreciable upon dilated fundus examination, due to patient's case history, the final diagnosis was presumed to be valsalva retinopathy. The patient was also diagnosed as a glaucoma suspect with treatment dependent on remaining baseline testing results. The decision was to closely observe the retina and have the patient return in three weeks for a repeat dilated fundus exam and OCT testing. He was given explicit instructions to return sooner with any sudden changes or worsening of vision. Due to the left eye's reduced visual acuity, baseline humphrey visual field (HVF) testing was scheduled for a later date.

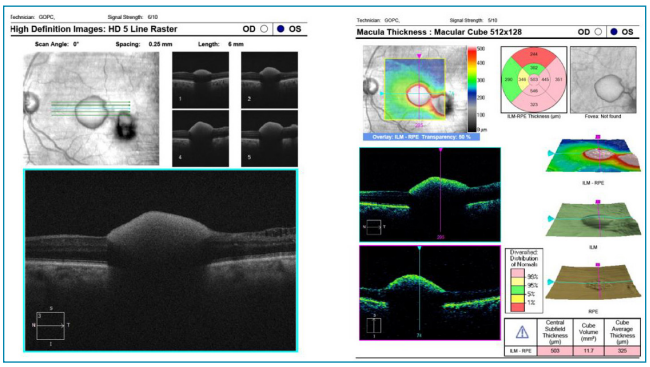


Figure 1: Optical Coherence Tomography 5 line raster scan of macula, left eye (left side) and macular cube of the left eye (right side)

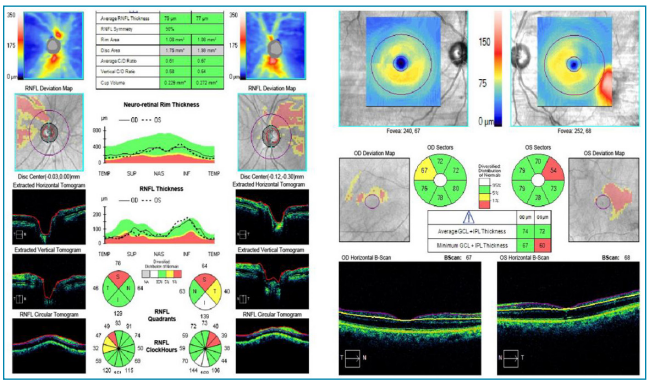


Figure 2: Optic Nerve Head Retinal Nerve Fiber Layer, OU (left side); Superior temporal thinning, OS>OD; Ganglion Cell Analysis, OU (right side); Superior temporal thinning OS>OD

At the three week follow-up, the patient reported a singificant improvement in his vision. Entering visual acuity in the right eye was 20/25-1 and 20/150+1 in the left eye. Intraocular pressures were measured at 14mmHg in both eyes. Upon completion of the dilated fundus examination, the right eye was found to be stable with normal findings and the left eye showed a resolving hemorrhage that was dehemoglobinized in coloration with an adjacent 3/4 disc diameter paramacular preretinal hemorrhage. See (Image 2) for fundus phots and (Figure 3) for macular OCT. A one month follow-up was scheduled.

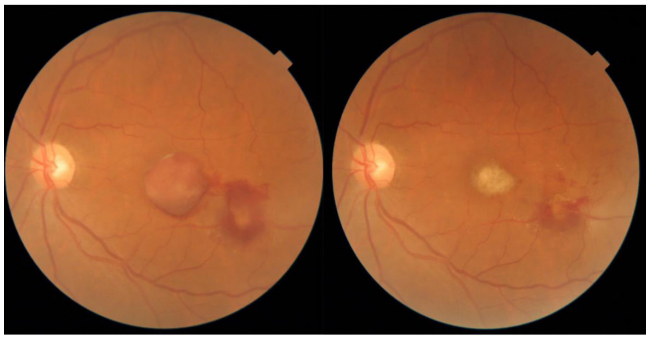


Image 2: Fundus photography of left eye, initial presentation (left side), 3 week follow-up (right side)

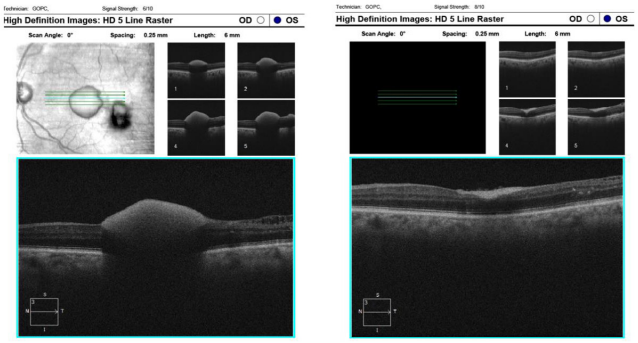


Figure 3: Optical Coherence Tomography 5 line raster scan of macula, left eye; initial presentation (left side), 3 week follow-up (right side)

At his eight week follow-up from his initial presentation, the patient expressed overall improvement in his vision. His entering visual acuity at this exam was 20/25-1 in the right eye and 20/60+2 in the left eye. A manifest refraction was performed with a best corrected visual acuity of 20/25 in the right eye and 20/40+2 in the left eye, 20/25-2 both eyes together. Vision reduction of the left eye was a due to a combination of mild nuclear cataracts and well as the resolving retinopathy. The patient's dilated fundus exam and OCT testing were repeated showing significant improvement in posterior segment findings. The retinopathy was nearly resolved with only minor residual findings of the previous retinal hemorrhage, see (Image 3). The macular OCT was also updated which can be found in (Figure 4).

Baseline HVF 24-2 testing was completed. The results were indicative of glaucomatous damage of the left eye. A dense inferior arcuate defect sparing central fixation with early superior nasal extension can be seen in (Figure 5). Due to the glaucomatous retinal nerve fiber layer thinning and the severity of associated visual field defects, the patient was started on Latanoprost OU and Timolol 0.5% ophthalmic solution to be instilled in the morning in the left eye only. A three month follow-up was recommended.

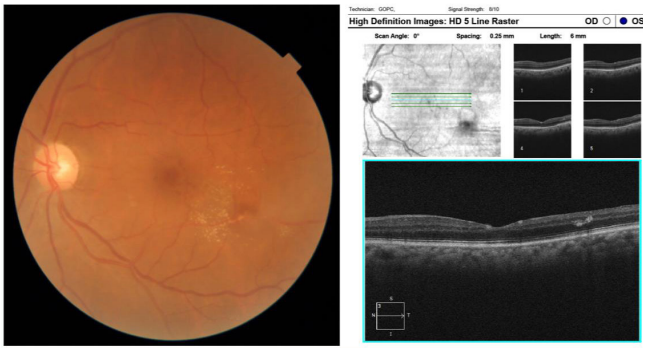


Image 3: Fundus photography, left eye, 8 week follow-up

Figure 4: Optical Coherence Tomography 5 line raster scan of macula, left eye, 8 week follow-up

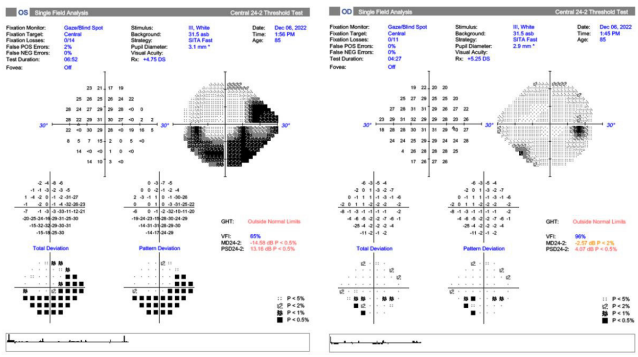


Figure 5: HVF 24-2 testing

At his six month follow-up from his initial examination, the retinopathy was nearly resolved with only mild residual findings remaining where the previous hemorrhaging was present, see (Image 4 and Figure 6).

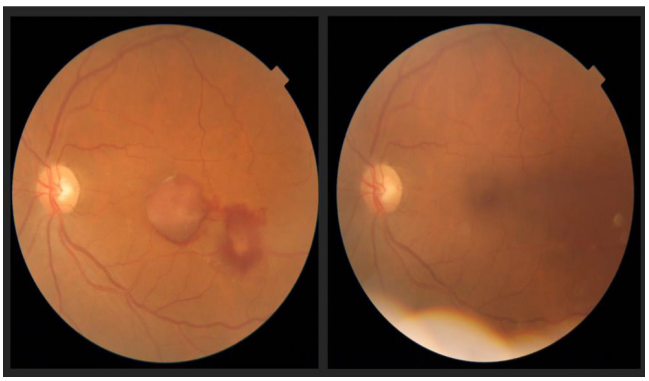


Image 4: Fundus photography, left eye, initial visit (left side) and 6 month follow-up (right-side)

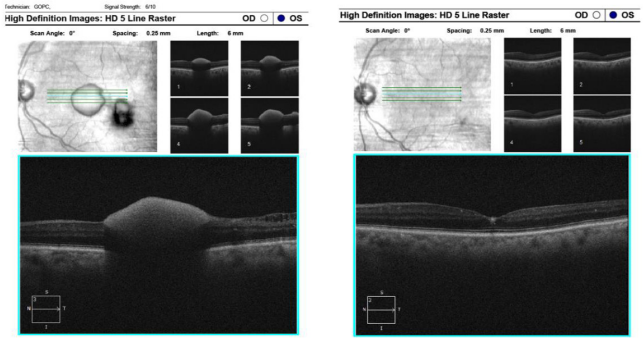


Figure 6: (below) macular 5 line raster, initial visit (left side) and 6 month follow-up (right-side)

DISCUSSION

Valsalva retinopathy is a result of a forced expiration against a closed glottis leading to a brief but exaggerated increase in intrathoracic or intra-abdominal pressure.[1,2] This increase in pressure leads to an abrupt increase in venous blood pressure. Absence of adequate valves in the venous system of the head and neck allows transmission of this pressure to reach the ophthalmic vasculature resulting in the spontaneous rupture of the superficial retinal capillaries.[2] Complications of Valsalva maneuvers can occur when the maneuver is performed excessively, either too forcefully or for too long in duration.[1] During a Valsalva type of maneuver, often times the individual holds their breath while exerting themselves.

Irrespective of systemic history, this type of retinopathy can occur in healthy individuals. Although uncommon, Valsalva retinopathy induced hemorrhages can have a severe impact on visual acuity.[3] Hemorrhages resulting from Valsalva retinopathy typically occur in either the subhyaloid space or just below the internal limiting membrane (ILM) referred to as a sub-(ILM) or a preretinal hemorrhage. In some cases, hemorrhages can occur in both locations and present as a "double ring sign".[3] When this occurs, optical coherence tomography testing is an invaluable source that can be used to determine which level of retinal tissue is being affected. For a double ring sign presentation, the "outer ring" represents blood trapped in the subhyaloid space and the "inner ring" representing blood within the sub-ILM.[3]

Vaslava-related hemorrhages have a predilection for the macula but can occur elsewhere, including near or adjacent to the optic nerve head.[1,2] They present spontaneously as a unilateral, isolated, circumscribed, preretinal hemorrhage, often fairly large and well-demarcated in appearance. The hemorrhages often obscure the detail of the underlying retinal and choroidal anatomy.[1] This type of hemorrhage is also characteristically bright red in comparison to the more commonly encountered hemorrhages seen with retinopathy secondary to systemic diseases or those of neovascular membranes that present with macular degeneration. Due to the nature of this condition, other hemorrhage types can also occur in the form of intraretinal, subretinal or hemorrhages of the vitreous. Although less common,

these later hemorrhages usually result from underlying systemic conditions. Subretinal hemorrhages carry more sight-threatening risks due to the mechanical obstruction of oxygen and nutrients to the photoreceptors causing toxicity.[2] Reabsorption of these deeper hemorrhages takes longer than those in the subhyaloid space. The longer the bleeding remains within the retinal tissue, the greater the risk for the development of permanent visual impairment. Complications in the form of epiretinal membrane formation, pigmentary macular changes or toxic retinal damage from persistent interaction of hemoglobin and iron are what can lead to these permanent visual changes.[3]

There are various conditions that can resemble similar findings to those of Valsalva retinopathy, including retinopathies associated with systemic disease such as hypertensive retinopathy, anemic retinopathy, Terson syndrome and a hemorrhage associated with an acute posterior vitreous detachment.[6] However, there are few ocular conditions that present with multilayered retinal hemorrhaging, those hemorrhages concurrently presenting at the pre-retinal, intraretinal and subretinal levels. For such presentations, consider angiopathy such as diabetes, leukemia, anemia as well as Valsalva and trauma. A thorough case history and review of the patient's medical record can assist with the development of differential diagnosis.

Pre-retinal hemorrhages similar in appearance to those of Valsalva retinopathy can occur in a normal, healthy patient with no apparent history of a recent Valsalva type of maneuver. For cases with no antecedent history of a Valsalva maneuver, it is necessary to rule out potential undiagnosed systemic conditions such as hypertension, diabetes, or other hematological related abnormalities through laboratory testing and co-management with the patient's primary care physician.[2]

TREATMENT

Once the diagnosis of Valsalva retinopathy has been decided, the type of treatment and management is dependent upon the location and severity of the hemorrhage.[2] The prognosis is typically reassuring and findings spontaneously resolve over the course of weeks to months, varying from six weeks to as long as six months or more. Traditionally, the initial form of treatment is conservative in nature requiring only observation. However, for larger and deeper hemorrhages, reabsorption time will take longer to occur. Prolonged exposure to hemoglobin resulting from the hemorrhage can increase the risk for irreversible retinal damage in the form of pigment accumulation in the retinal pigment epithelium.[4]

In the present case study, significant improvement was observed within three weeks, but full recovery with no residual retinal findings took six months. In more severe cases of Valsalva retinopathy, when the amount of hemorrhaging present is substantial and absorption of blood is delayed, or for large subhyaloid and sub-internal limiting membrane hemorrhages that obscure the macula, a membranotomy can be performed with an Nd YAG (neodymium-doped yttrium-aluminum garnet) laser.[2,4,5] By making an opening of the ILM, at the inferior margin of the hemorrhage, the blood can then be released into the vitreous cavity and allowed to settle inferiorly clearing the visual axis and improving visual acuity. Risk of complications include retinal tear, retinal detachment, epiretinal membrane formation, and or hemorrhage into the subretinal and choroidal space.[2]

Consider co-management with the patient's primary care physician if temporary discontinuation of anticoagulants is recommended. Consider a stool softener for frequent bouts of straining due to constipation. Avoid further Valsalva maneuvers while the hemorrhage is resolving.[2] Restrict resting positions to upright or propped up.

CONCLUSION

Valsalva retinopathy can be alarming in both presentation and its associated visual reduction potential. Case history is an imperative factor when determining final diagnosis and treatment plan. It is important to rule out any systematically associated retinopathy and/or trauma related complications. Visual prognosis is good, with almost all cases of the hemorrhaging resolving on its own. However, the speed of visual recovery is dependent upon the severity and anatomical location of the hemorrhage as well as the retinal layer involved. In the case of this patient, his case history was straight forward with no systemic or medication related concerns and no other signs of retinopathy. His hemorrhage was centralized over the macula and he was monitored intermittently over the course of six months. Significant improvements were documented within three weeks but the entirety of the hemorrhage and its remnants were resolved after six months. It is important to understand that this type of preretinal hemorrhage can occur in any person irrespective of their systemic health status.

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