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A Case Report of Vitreous and Subretinal Hemorrhage Causing Central Scotoma Monitored Via a Vision App

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Abstract

This report presents a case of vitreous and subretinal hemorrhage without identifiable risk factors, aside from the potential impact of oral contraceptive pills (OCP) on retinal health. Emphasizing the need to consider non-interventional management. The Eye C Tester app was designed with a patient-focused approach to simplify follow-up and continuous monitoring. The app utilizes the smartphone's front camera, employing technology to ensure tests are conducted consistently at standardized distances and appropriate ambient lighting. This guarantees reliability to the various available tests in the app, including visual acuity testing, Amsler grid, contrast sensitivity, and color vision testing. A 24-year-old female presented with a one-week history of headaches and central scotoma in her right eye. Examination revealed vitreous, retinal, and subretinal hemorrhage, along with a temporal arcuate visual field defect, disc edema, macular detachment, and a relative afferent pupillary defect (RAPD) of 0.6. Initial considerations included retinal artery macroaneurysm (RAMA) or choroidal neovascular membranes (CNVM), which were ruled out after diagnostic tests, including fluorescein angiogram, magnetic resonance imaging (MRI), and hematological and autoimmune panels. The only abnormal finding was an abnormal urine- creatinine ratio. The patient had a history of taking desogestrel and ethinyl estradiol oral contraceptive pills (OCP), which emerged as another possible cause. Consequently, she ceased using them. The final diagnosis was idiopathic vitreous, retinal, and subretinal hemorrhage. Symptoms resolved after non-interventional monitoring, with a remaining defect in the lower right quadrant. The utilization of the Amsler's grid app, particularly its drawing tool, proved to be beneficial in communicating and documenting the progression of the patient's scotoma, highlighting the value of technology in visual defect assessment and patient care. This case supports a conservative "watch-and-wait" management approach for retinal hemorrhages and raises questions about the impact of OCPs on retinal health, warranting further research.

Keywords: Vitreous hemorrhage; Subretinal hemorrhage; Scotoma; Oral contraceptive pills

List of Abbreviations: OCP: Oral contraceptive pills; RAMA: Retinal Artery Macroaneurysm; CNVM: Choroidal Neovascular Membranes; RAPD: relative afferent pupillary defect; MRI: magnetic resonance imaging; VH: vitreous hemorrhage; ILM: internal limiting membrane; OCT: optical coherence tomography; FFA: Fundus fluorescein angiography

Introduction

Retinal health is crucial for overall visual function with disruptive mechanisms leading to severe conditions such as vitreous and subretinal hemorrhage. Among the most common conditions that lead to retinal hemorrhage are proliferative diabetic retinopathy, trauma, retinal breaks, rhegmatogenous retinal detachment, and retinal vein occlusion [1, 2]. However, there are less well- known factors to consider for retinal hemorrhage including hematological and autoimmune conditions, as well as lifestyle factors such as hypertension and smoking3. Additionally oral contraceptive pills, though infrequently associated to ocular complications, can induce vascular effects that may result in conditions such as retinal hemorrhage [4, 5].

This case report presents a unique case study of a young female patient who experienced significant retinal hemorrhages despite lacking common and lesser-known risk factors, except for her history of OCP use. The potential role of OCPs as a less recognized risk factor for retinal hemorrhage presents an intriguing avenue for research.

Non-interventional management, as illustrated in this case, may be appropriate when other causes have been ruled out and the condition seems self-limiting. Tools such as vision-monitoring apps offer added value by enabling continuous remote patient monitoring without the need for patient attendance to office testing procedures [6]. This case underscores the potential value of a conservative management strategy, especially in the absence of urgent intervention needs, and emphasizes the broader implications of personalized, non-interventional treatment approaches in retinal health management [7].

Case Presentation

A 24-year-old female presented with a one-week history of unilateral headaches, throbbing sensation, and central scotoma in her right eye. Symptoms initially appeared as three days of photopsia in the right eye, followed by the onset of a scotoma described as a red-brown spot. No history of metamorphopsia, eye pain, hyperemia, or diplopia. Ophthalmologic examination revealed right vitreous and subretinal hemorrhage. Differential diagnoses considered retinal artery macroaneurysm (RAMA) or choroidal neovascular membranes (CNVM) as potential etiologies. The patient sought a second opinion for further evaluation.

The patient is a young, generally healthy woman with no chronic or immune-related illnesses or history of trauma. She has a past medical history of infraorbital shingles but no illicit drug use or unprescribed medication intake. However, she has a history of taking desogestrel and ethinyl estradiol (0.15 mg/0.03 mg) oral contraceptive pills. She is a non-smoker, does not use tobacco, and consumes alcohol occasionally. Additionally, she wears glasses and contact lenses.

Clinical examination revealed a right vitreous hemorrhage and subretinal hemorrhage, along with a temporal arcuate visual field defect. There was also disc edema with macular detachment and a relative afferent pupillary defect (RAPD) of 0.6 in the right eye. The patient was then sent to a retina specialist for further evaluation. The initial differential diagnoses considered retinal artery macroaneurysm (RAMA), choroidal neovascular membranes (CNVM), and peripapillary choroidal melanoma due to the presentation of the hemorrhages and visual symptoms. The patient underwent various diagnostic tests, including fluorescein angiogram which showed no evidence of vascular abnormalities or neovascular membranes, eliminating RAMA and CNVM. Similarly, B- scan Ultrasound, did not showed evidence of choroidal melanoma and this clinical picture was atypical for this entity ruling it out.

Additionally magnetic resonance imaging (MRI) with and without contrast did not reveal any mass effect or abnormal structures near the optic nerve. Comprehensive hematological and autoimmune panels yielded unremarkable results discarding systemic disease. The only abnormal finding was an elevated urine-creatinine ratio, but this was deemed unrelated to the ocular condition. Based on these results, the most likely conclusion was idiopathic vitreous and subretinal hemorrhage, managed with close monitoring due to the self-limiting nature of the condition.

The patient was instructed to monitor changes in vision using the vision app and keeping a headache diary. She discontinued the use of oral contraceptive pills (OCP). Reassessment of diagnosis after vitreous hemorrhage started to reabsorb was the plan of treatment. Despite the absence of significant diagnostic findings, the patient's symptoms improved significantly within a few months without specific treatment, suggesting a potentially self-limiting or transient nature of the condition.

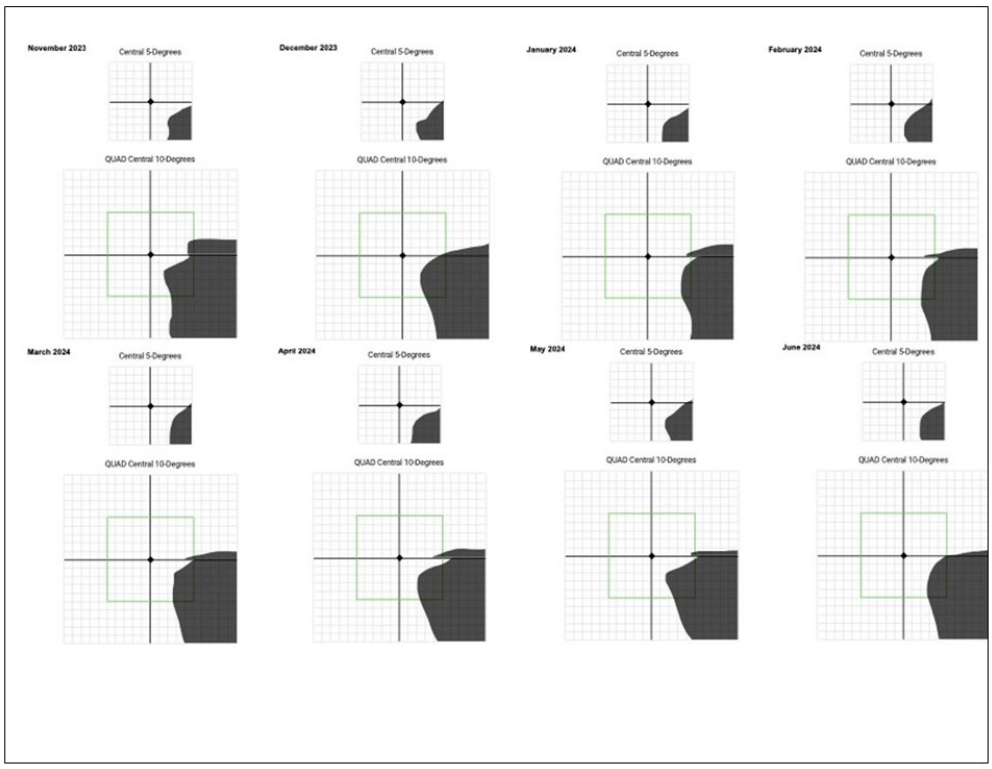

Figure 1: Presents the results from the continued evaluation of the visual resolution of the scotoma in the right eye utilizing a visual monitoring app with an Amsler grid tool form November 2023 to June 2024

The patient reported experiencing fewer or no flashes in the right eye, and the red-brown spot in the right eye disappeared. However, she noted a new persistent gray spot in the lower right quadrant of the right eye, visible only when using that eye individually and not when both eyes are open. The patient also reported experiencing dry eyes, which they treated with over-the--counter drops, resulting in symptom reduction. Regarding her headaches, both the frequency and intensity decreased. The patient attributed this improvement to using a mouth guard for teeth grinding and occasionally using Tylenol for headache relief.

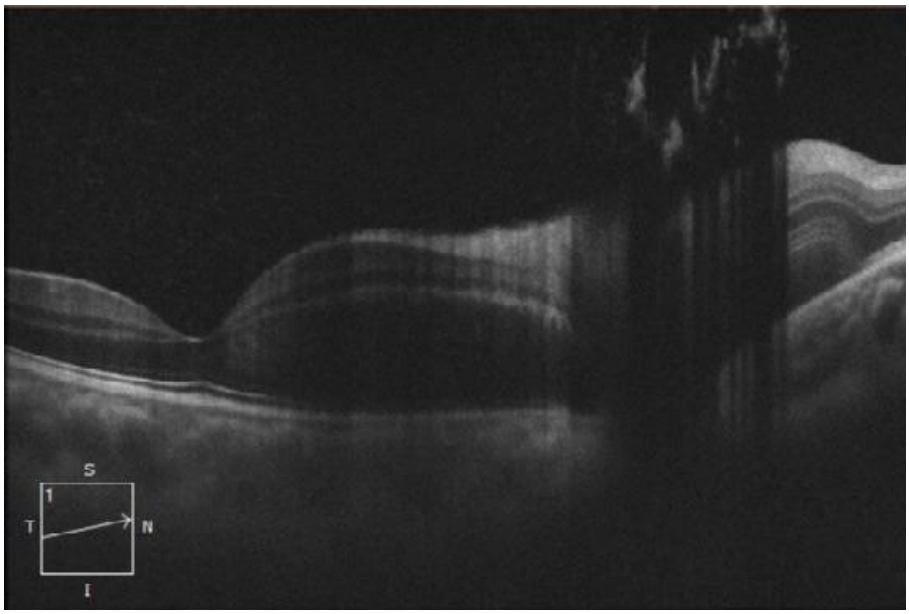

Figure 2: Optical coherent tomography Raster taken on the first visit of the patient showing retinal/ subretinal hemorrhage most nasal oriented

Discussion

This case presents a diagnostic scenario involving both vitreous hemorrhage and subrental hemorrhage. A vitreous hemorrhage (VH) involves the extravasation of blood into the vitreous cavity, delineated by anatomical landmarks such as the posterior lens capsule anteriorly, the non- pigmented epithelium of the ciliary body and internal limiting membrane (ILM) laterally, and the ILM posteriorly. VH can result from various cases, including retinal vascular disorders and trauma [3]. Concurrently, subretinal hemorrhages, which occur between the photoreceptor layer and the retinal pigment epithelium, are commonly associated with conditions such as age-related macular degeneration and high myopia [8]. Clinical presentations often include vision loss, blurry vision, scotomas, floaters, haziness, perception of shadows, flashes, and fluctuations visual acuity. Therefore, a thorough medical history, including an evaluation of systemic diseases and lifestyle factors, is essential. In this case, the patient presented with symptoms of flashes, blurry vision, and scotoma but had no history of systemic diseases or trauma-only a background of oral contraceptive use.

The patient's clinical presentation is indicative of the hemorrhagic form of retinal macroaneurysm (RM), which accounts for approximately 50% of cases. This form is characterized by abrupt onset of vision loss and associated hemorrhage near the optic disc[9]. Most cases involve solitary lesions and typically resolve spontaneously without the need for treatment. While systemic hypertension is a common risk factor, its absence in this case underscores the diverse etiology of RM. Additional potential risk factors, including arteriosclerosis, abnormal lipid levels, inherent structural defects in blood vessels, Coat disease, von Hippel-Lindau disease, diabetic retinopathy, and radiation retinopathy, were systematically ruled out. It is noteworthy that the demographic profile of this case, being a young woman, deviates from the typical profile of RM patients.

Extensive in-depth investigations, encompassing hematological and immune system analyses, ocular ultrasound, Optos retinal imaging, optical coherence tomography (OCT), fundus fluorescein angiography (FFA), and neuroimaging (MRI), yielded unremarkable results, ruling out common etiologies such as peripapillary choroidal neovascularization, proliferative diabetic retinopathy, posterior vitreous detachment with or without retinal tear, and ocular trauma. Peripapillary choroidal neovascularization was excluded due to the lack of abnormal neovascularization or subretinal fluid on optical coherence tomograph and fundus fluorescein angiography. Proliferative diabetic retinopathy was ruled out as the patient had no history of diabetes, and reti-

nal imaging showed no signs of exudates, ischemia or neovascularization. Posterior vitreous detachment and retinal tears were excluded based on a normal ocular ultrasound and the absence of floaters. Ocular trauma was ruled out due to the lack of injury history or trauma-related clinical findings. Viligance approach was initiated with close monitoring during hemorrhage reabsorption. Despite persistent evaluation, the precise cause remained elusive, culminating in a diagnosis of idiopathic vitreous hemorrhage and subretinal hemorrhage.

Figure 3: Progression of the right vitreous hemorrhage and subretinal hemorrhage from the first evaluation in office 9/18/2023 to the latest follow-up visit in 3/14/2024. The progression of the lesion was normal and the resolution spontaneous.

A) Presence of right vitreous and subretinal hemorrhage, B) Resolution of hemorrhage with presence of secondary fibrosis.

The patient's use of oral contraceptive pills (OCPs) was considered a potential cause for her unexplained vitreous and subretinal hemorrhage, disc edema, and macular detachment. OCP- related ocular complications have an estimated incidence of 1 in 230,000 cases. The presence of estrogen and progesterone receptors in the eye is responsible for their ocular effects, which may manifest as dry eye, corneal edema, lens opacities, and various retinal neuro-ophthalmologic or vascular complications. Severe neuro-ophthalmologic complications may include 6th cranial nerve paralysis, parietal syndrome, hemianopsia, papillary edema, and retrobulbar neuritis. Vascular complications associated with oral contraceptives encompass central retinal artery or vein occlusion, intraocular hemorrhages, aneurysms, macular or papillary edema, and acute ischemic optic neuropathy. These complications can lead to temporary or permanent consequences [4].

Although no definitive evidence implicates OCPs as the primary cause, all other differential diagnoses were ruled out, prompting consideration of OCPs as a potential etiology. Nonetheless, the patient chose to discontinue OCP usage. Further research is warranted to explore the side effects of OCPs on the eyes and overall health of individuals who use them.

Consistent, meticulous monitoring is absolutely imperative for tracking resolution and gaining crucial insights into the underlying cause. It is essential to maintain vigilant follow-up in order to swiftly anticipate any signs of relapse or complications, ensuring prompt and effective intervention as needed [10].

Conclusion

This case is unusual because a young, healthy woman experienced a sudden onset of vitreous and subretinal hemorrhage, which resolved on its own without specific treatment within a relatively short timeframe. Following the vitreous hemorrhage, the patient developed a central scotoma, which was monitored using a vision app. Although the hemorrhage resolved anatomically, the disruption to the retinal layers caused a persistent scotoma to remain. In select cases, a conservative "watch-and-wait" approach, along with monitoring using a vision app to track visual improvement, may be appropriate, especially when the risks of intervention outweigh the potential benefits. Ocular trauma and diabetic retinopathy, the most common causes for this condition, were ruled out. Additionally, general blood work was done, and aside from an abnormal urine-creatinine ratio, no other abnormal results were found.

Moreover, the positive outcome of the patient could be attributed to their young age and overall good health, as younger individuals generally have higher healing capabilities. Additionally, the absence of underlying conditions, apart from a previous history of infraorbital shingles and discontinuation of contraceptive pill use, might have minimized the risk of complications or exacerbations. However, it's important to note the limitations of this case report, such as the lack of long-term follow-up data and the potential for recurrence or progression of ocular pathology in the future. Close monitoring and periodic ophthalmic assessments may be required to identify any signs of relapse or complications.

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