Sub-internal limiting membrane hemorrhage as an unusual presentation of polypoidal choroidal vasculopathy

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Abstract:
We report the two cases who presented with sudden decreased vision and sub-internal limiting membrane (ILM) hemorrhage without a history of Valsalva maneuver, trauma, or hematological disorders. Multimodal imaging revealed the features suggestive of polypoidal choroidal vasculopathy (PCV) in addition to the sub-ILM hemorrhage. A provisional diagnosis of sub-ILM hemorrhage secondary to PCV was made and was treated with intravitreal Bevacizumab injection. Treatment resulted in the improved visual acuity along with the resolution of the sub-ILM hemorrhage. These cases highlight the possibility of isolated sub-ILM hemorrhage as a presenting fundus finding in PCV, which is previously unreported. This report also highlights the importance of multimodal imaging in diagnosing chorioretinal disorders with unusual presentation.

Keywords:
Polypoidal choroidal vasculopathy, subinternal limiting membrane hemorrhage, Valsalva retinopathy

Introduction
Polypoidal choroidal vasculopathy (PCV) is characterized by the presence of choroidal polypoidal lesions, which could manifest as hemorrhagic or exudative type. Hemorrhagic PCV usually presents with sudden painless loss of vision due to subretinal fluid (SRF) associated with subretinal hemorrhage, subretinal pigment epithelial (RPE) hemorrhage, and occasionally break-through vitreous hemorrhage (VH).[1] Isolated sub-internal limiting membrane (ILM) hemorrhage is not a reported clinical presentation of PCV till date. The common causes of sub-ILM hemorrhages include Valsalva retinopathy, Terson syndrome, retinal artery macroaneurysm (RAM), hematological disorders, trauma, or idiopathic.[2] However, PCV has not been reported as a cause of isolated sub-ILM hemorrhage.

We describe the two cases of PCV presenting with sub-ILM hemorrhage.

Case Report
Case 1
A 46-year-old male was referred to us with sudden painless decreased vision in the right eye (RE) for 1 month. His medical record and optical coherence tomography (OCT) image (taken immediately after onset of complaints by the referring ophthalmologist) showed the presence of sub-ILM hemorrhage with SRF and pigment epithelial detachments (PEDs) [Figure 1d]. He had no history of

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systemic illnesses, Valsalva maneuver, or trauma. His best-corrected visual acuity (BCVA) in the RE was 20/200. RE fundus examination and OCT revealed the presence of foveal sub-ILM hemorrhage, SRF, small irregular notched PEDs, and double-layer sign [Figure 1a and e]. All blood investigations, including complete blood count and coagulation profile, were within the normal range. A diagnosis of RE PCV was made based on fundus fluorescein angiography (FFA) and Indocyanine green angiography (ICG) features [Figure 1b-d]. The patient was treated with RE intravitreal Bevacizumab (IVB) injection. One month later, fundus examination and OCT showed a reduction in the sub-ILM hemorrhage, disappearance of SRF, and reduction in the size of PEDs [Figure 2a and d] with BCVA improving to 20/60. IVB injection was repeated in the RE. At 1 month following second injection, RE BCVA improved to 20/30 with fundus appearing grossly normal and OCT showing near complete resolution of sub-ILM hemorrhage and flattening of PEDs [Figure 2b]. An enhanced-depth imaging (EDI) OCT done at this stage showed a choroidal thickness of 400µ in the RE suggestive of pachychoroid [Figure 2c].

Case 2
A 58-year-old female presented with sudden painless decreased vision in the left eye (LE) for 1 month. There was no history of any Valsalva maneuver or trauma. BCVA in the RE was 20/20 and LE was 20/200. Fundus examination as well as OCT LE showed hemorrhagic PED at the fovea and sub-ILM hemorrhage at inferonasal macula [Figure 3a and d]. LE EDI-OCT confirmed the presence of pachychoroid in the BE [Figure 3d]. ICG did not reveal any hyperfluorescence in the LE due to masking...
by the hemorrhagic PED [Figure 3b and c]. Hematological investigations were normal. With a provisional diagnosis of PCV, she was treated with LE IVB injection. At 1-month follow-up, her LE vision improved to 20/125. Fundus examination revealed the disappearance of sub-ILM hemorrhage with a reduction in the size of hemorrhagic PED which were confirmed on OCT [Figure 3e-g].

Discussion

Both cases highlight the fact that PCV may also present with isolated sub-ILM hemorrhage like Valsalva retinopathy. Multimodal imaging has an important diagnostic role in the absence of other common causes of sub-ILM hemorrhage such as Valsalva retinopathy, Terson syndrome, and RAM.

Valsalva retinopathy presents with sudden visual loss in a healthy individual caused by sub-hyaloid or/sub-ILM hemorrhage secondary to Valsalva stress such as vomiting, coughing, and physical stress. Valsalva maneuver causes increased intrathoracic pressure leading to an increased pressure in the intraocular veins, resulting in the spontaneous rupture of the perifoveal capillaries.[3] Despite the presence of sub-ILM hemorrhage, Valsalva retinopathy was ruled out in both cases due to the absence of any significant history such as forceful expiration, vomiting, straining or weight-lifting, and presence of alternate findings on multimodal imaging.

Terson syndrome presents with VH, sub-hyaloid, or sub-ILM hemorrhage in the presence of intracranial hemorrhage. The postulated pathogenesis involves the rupture of the thin retinal capillary walls secondary to increased intracranial pressure transmitted through the optic nerve sheath and veins causing hydro-dissection of the ILM from the neurosensory retina.[4] This entity was also ruled out due to the absence of a history of head injury or features of raised intracranial pressure.

RAM is an acquired abnormality of retinal vasculature, characterized by outpouching of major retinal arteriole usually seen in hypertensive females.[5] Hemorrhagic RAM can cause multilevel hemorrhage including sub-ILM, usually associated with macular edema.[6] A saccular or fusiform hyperfluorescence is seen on FFA with rapid early filling in saccular RAM and minimal in fusiform RAM. RAM was excluded in our cases due to the absence of characteristic fundus picture and noncorroborative FFA findings.

Blood dyscrasias such as anemia, thrombocytopenia, and pancytopenia are known to cause multilevel hemorrhages including sub-ILM hemorrhage due to reduced endothelial cell integrity and coagulability.[7] Fundus examination shows the presence of Roth’s spots and flame-shaped hemorrhage. Hematological workup for both patients was normal, and hence, these causes were ruled out.

In the setting of PED with SRF or hemorrhage in a middle aged or older patient, the possible causative sub-RPE lesions include wet age-related macular degeneration (ARMD) type 1 choroidal neo-vascular
membrane (CNVM) or type 3 retinal angiomatosus proliferation or PCV. Type 1 Vascularized PED in ARMD presents with subretinal hemorrhage and Type 3 with usually intra-retinal hemorrhage, with typical ARMD features like drusen in older patients. In the Indian or Asian scenario, 20%–60% patients presenting as neovascular ARMD are seen to be PCV, especially younger patients without typical ARMD features like drusen. Sub-ILM hemorrhage (without subretinal or intraretinal haemorrhage) as the presenting fundus finding has not been reported in PCV or Type 1 CNVM. Various findings noted on multimodal imaging in both cases lead us to consider PCV as the underlying pathology. The findings suggestive of PCV included OCT showing SRF with PED in case 1, a hemorrhagic PED in case 2 and pachychoroid features in both cases, and angiographic features in case 1. ICGA did not reveal a polyp, especially in case 2, but in the majority of hemorrhagic PCV cases, the sub-retinal or sub-RPE blood blocks/masks the classic finding of branched vascular network or polyps. Further, the resolution of SRF and flattening of PEDs in response to anti-VEGF injections supported the diagnosis.

To the best of our knowledge, sub-ILM hemorrhage as the presenting fundus finding in PCV has not been reported previously in the literature. Hemorrhagic PCV usually presents with sub-retinal and sub-RPE hemorrhage. Occasionally, massive hemorrhages may develop from the rupture of venules or sometimes arteries, resulting in break-through vitreous hemorrhage. However, an aborted hemorrhage which failed to rupture ILM could be the probable pathogenesis of sub-ILM hemorrhage in our cases.

Conclusion

This report highlights a new clinical presentation pattern of PCV with isolated sub-ILM hemorrhage, which is previously unreported, and also underlines the importance of multimodal imaging for the diagnosis of chorioretinal disorders with unusual presentations.

Declaration of patient consent

The authors certify that they had obtained all appropriate patient consent forms. In the form, the patients have given their consent for their images, and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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