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Case report

Case report: Vitreous hemorrhage as the presenting sign of retinal cavernous hemangioma in a newborn

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ABSTRACT

Purpose: To report a case of vitreous hemorrhage as the presenting sign of retinal cavernous hemangioma (RCH) in a newborn.

Observations: A five-week-old full-term male with a history of seizures and birth trauma underwent ophthalmology screening. Initial eye examination revealed vitreous hemorrhage. Subsequent examination under anesthesia with multi-modal imaging revealed vitreous hemorrhage and an intra-retinal mass with numerous sac-like aneurysmal dilatations, consistent with RCH.

Conclusions and importance: Vitreous hemorrhage in a neonate is an atypical presentation of RCH. Clinicians should be aware that birth trauma may lead to vitreous hemorrhage from RCH. This is the first description of RCH, a rare retinal vascular tumor, in a newborn.

1. Introduction

Retinal cavernous hemangioma (RCH) is a rare, benign vascular tumor with distinctive grape-like clusters of thin-walled intraretinal angiomatous lesions. [1] Patients are almost always asymptomatic; RCH is typically diagnosed as an incidental finding in children or young adults [2] and has only been described twice in infants, age 6 months [1] and age 10 months. [3] Vitreous hemorrhage is an uncommon initial presentation of RCH and is not typically trauma-related. [4,5] Here, we report the serendipitous finding of vitreous hemorrhage from RCH caused by birth trauma in a 5-week-old male. Multi-modal imaging, including intra-operative optical coherence tomography and fluorescein angiography, confirmed the diagnosis of RCH.

1.1. Case report

A newborn male (full-term, 40 weeks gestation) presented to Jackson Memorial Hospital for management of acute hypoxic respiratory failure following delivery at an outside hospital in the Cayman Islands. The delivery was vaginal, prolonged, and complicated by a 20 minute shoulder dystocia. The patient was delivered pulseless and cyanotic without respiratory effort, and consequently was intubated and mechanically ventilated. Computerized tomography of the brain at two days after birth showed a large sub-galeal hematoma involving the left fronto-parieto scalp and right parieto-occipital scalp, consistent with birth trauma. At four days after birth, the patient was noted to have seizures on electroencephalogram, which prompted genetic epilepsy panel testing (PreventionGenetics™). The patient was found to have a gene variant in the tuberous sclerosis-associated *TSC2* gene (heterozygosity for c.3386G > A, p. Arg1129His). Varsome and Franklin prediction models categorized this as a "likely benign variant" and "variant of uncertain significance", respectively. Nevertheless, given the unclear etiology of seizures, ophthalmology was consulted as part of a full systemic evaluation for tuberous sclerosis.

Ophthalmologic examination in the neonatal intensive care unit (NICU) revealed diffuse vitreous hemorrhage in one eye and a normal left eye. Ultrasonography in the NICU showed no tumors or masses. The patient was followed in the clinic and also underwent an examination under anesthesia before traveling back to the Cayman Islands. On fundus examination in the clinic, in the right eye there was a slightly hazy view with vitreous hemorrhage settling inferior to a nasal vascular lesion with intra-retinal hemorrhage, vascular bulbs, and overlying fibrosis (Fig. 1).

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The left eye fundus examination was normal.

During examination under anesthesia, B-scan ultrasonography of the right eye showed a well-defined, acoustically solid lesion corresponding to the RCH, with overlying hyperreflective band corresponding to gliosis, and mobile vitreous opacities consistent with vitreous hemorrhage (Fig. 2). There was no ultrasonographic evidence of retinal tear or detachment. A-scan ultrasonography of the lesion demonstrated high internal reflectivity, characteristic of a vascular lesion (Fig. 3). Fluorescein angiography of the right eye showed characteristic features of RCH, including slow filling of aneurysms with late staining of the lesion without leakage. A large area of the lesion was poorly visualized due to blockage from vitreous hemorrhage (Fig. 4). Optical coherence tomography (OCT) revealed sac-like aneurysms in the inner retina and overlying epiretinal membrane (Fig. 5). All intraoperative imaging of the left eye was normal. At the end of the case, intravitreous avastin and sub-Tenon's kenalog were administered to the right eye.

The rest of the systemic workup for this patient was unremarkable. Magnetic resonance imaging of the brain performed at day 11 after birth did not show any cortical tubers, vascular malformations, or signs of ischemic encephalopathy. Cardiac studies (electrocardiography, echocardiography) and renal imaging (abdominal x-ray and retroperitoneal ultrasound) were normal, as was dermatologic examination.

2. Discussion

Retinal cavernous hemangioma (RCH) is an uncommon retinal vascular tumor with characteristic findings that include numerous sac-like aneurysmal dilatations, superficial gliosis, lack of a feeder vessel, delayed filling of the lesion on fluorescein angiography, and unilaterality. [1,6] To our knowledge, this report of vitreous hemorrhage in a newborn secondary to birth trauma is the earliest clinical description of RCH; there have been only two prior reports of RCH in infants: age 6 months [1] and age 10 months. [3] Aside from the unusually early presentation of RCH, this case is notable because it introduces the concept that vitreous hemorrhage in newborns could be due to bleeding from an RCH lesion, particularly in those with a traumatic birth.

Vitreous hemorrhage is not common in RCH, and occurred in 10/70 (14 %) cases in one literature review. [7] Recurrent hemorrhage is not frequently reported but has been described [4]; in one instance, it led to repeated episodes of hyphema, secondary glaucoma and a blind painful eye that resulted in enucleation .[8] Although RCH is a congenital stationary lesion that has minimal growth potential, in certain cases such as those patients with vitreous hemorrhage, lifelong monitoring of patients with RCH may be prudent. Infants, in particular, should be monitored for recurrent hemorrhage given the risk for amblyopia.

Previously reported cases of vitreous hemorrhage secondary to RCH are typically spontaneous and not trauma-related. [1–5] One mechanism of atraumatic vitreous hemorrhage in RCH is contraction of epiretinal membrane that is attached to saccules. [9] However, in this patient, we postulate that the predominant reason for vitreous hemorrhage was a prolonged and traumatic vaginal delivery. Two potential mechanisms could explain the trauma-induced vitreous hemorrhage in this patient. For one, the thin-walled saccules of RCH might be predisposed to direct traumatic hemorrhage, as has been reported for cerebral saccular aneurysm rupture after head injury. [10] In addition, the birth trauma of vaginal delivery is thought to create an acute rise in intracranial pressure that leads to stasis of blood flow in the central retinal vein, which can cause acute changes in the pressure of the retinal vasculature and precipitate retinal capillary hemorrhage. [11,12] This concept is supported by the finding that vaginal delivery conferred substantially increased risk of fundus hemorrhages in healthy newborns in the Newborn Eye Screen Test (NEST) Study. [13] However, there were no cases of vitreous hemorrhage in the NEST cohort, nor in other large screening studies of healthy newborns [14–16]. On the other hand, a Korean study of newborns with peri-natal distress found that 0.7 % of newborns had vitreous hemorrhage [11]. There are also a few case reports of newborns without retinal pathology that developed vitreous hemorrhage, but these cases were all associated with birth trauma and fetal distress [17,18]. In summary, vitreous hemorrhage is not seen in healthy newborns. However, it may occur secondary to birth trauma and fetal distress, and as our case describes may also be associated with an underlying vascular lesion.

Treatment of RCH is generally not required, except in cases of vitreous hemorrhage that may be treated with vitrectomy, cryotherapy, plaque radiotherapy, or laser photocoagulation. [19] RCH can also present as part of a neuro-oculo-cutaneous syndrome, and patients should be evaluated for hemangiomas of the skin. Moreover, brain MRI should be considered to evaluate for cerebral cavernous angiomas. Genetic testing for *CCM1/2/3* genes may be performed, particularly in patients with neurologic abnormalities, or a family history of RCH or other cavernomas.

The finding of RCH in this report was fortuitous: the ophthalmology service was consulted to evaluate for a systemic cause of seizure disorder because genetic testing revealed a variant of uncertain significance in a disease-causing tuberous sclerosis gene. However, screening eye examination did not reveal any evidence of tuberous sclerosis-associated astrocytic hamartoma. Moreover, the patient had no clinical evidence of tuberous sclerosis, and a comprehensive systemic workup (cardiac, renal, dermatologic, and neurologic) did not reveal an underlying etiology of seizure disorder in this patient. It is possible that seizures were secondary to the patient's sub-galeal hematoma, which is a known cause of seizures. [20]

3. Conclusions

Retinal cavernous hemangioma (RCH) should be considered as an underlying etiology of vitreous hemorrhage in a neonate, particularly

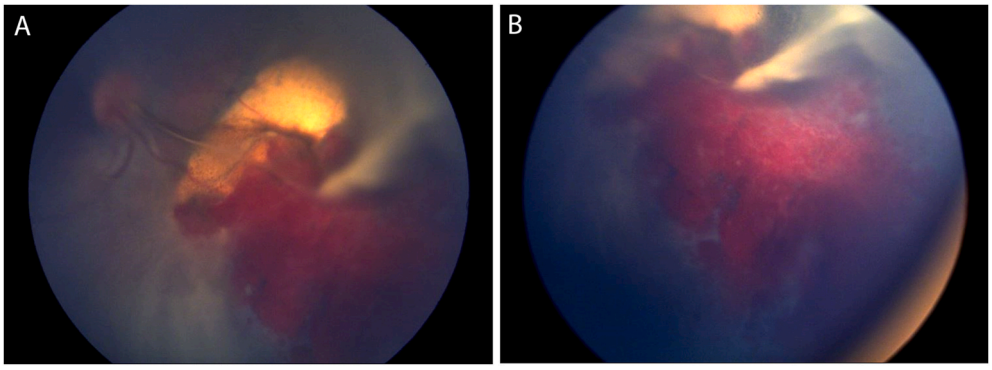

Fig. 1. Color fundus photographs (**A** and **B**) of the right eye showing red, blood-filled sacculations partially obscured by vitreous hemorrhage. Overlying and adjacent to the lesion there is a white fibrotic epiretinal membrane and a large yellow patch indicative of dehemoglobinized blood. (For interpretation of the references to colour in this figure legend, the reader is referred to the Web version of this article.)

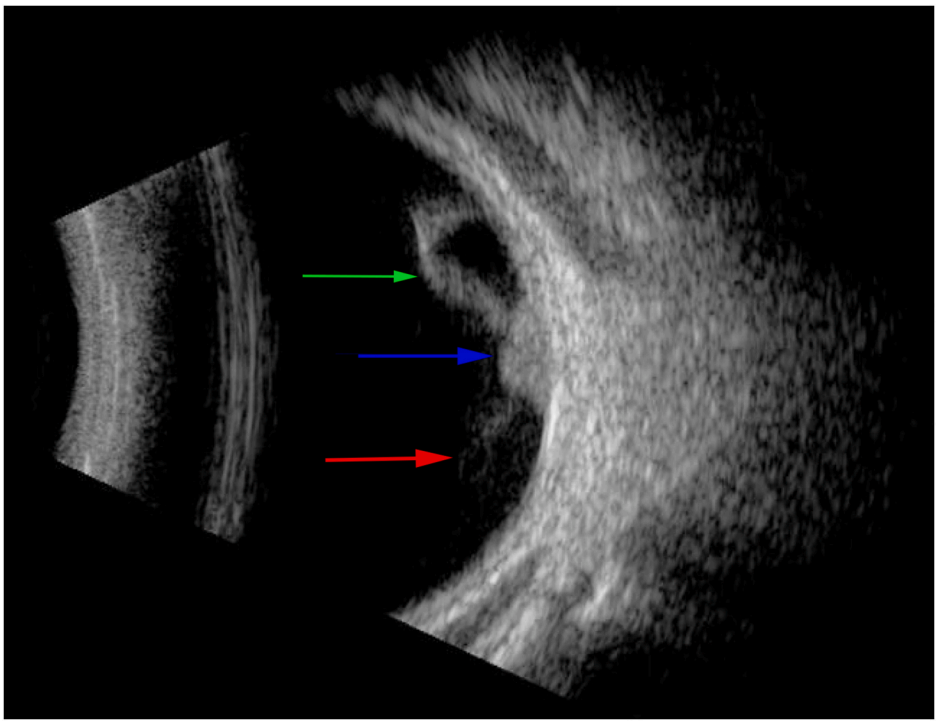

Fig. 2. B-scan ultrasonography of the right eye showing a well-defined, acoustically solid lesion corresponding to the retinal cavernous hemangioma (blue arrow), overlying hyperreflective band corresponding with overlying fibrous tissue/gliosis (green arrow), and scattered mobile vitreous opacities consistent with vitreous hemorrhage (red arrow). (For interpretation of the references to colour in this figure legend, the reader is referred to the Web version of this article.)

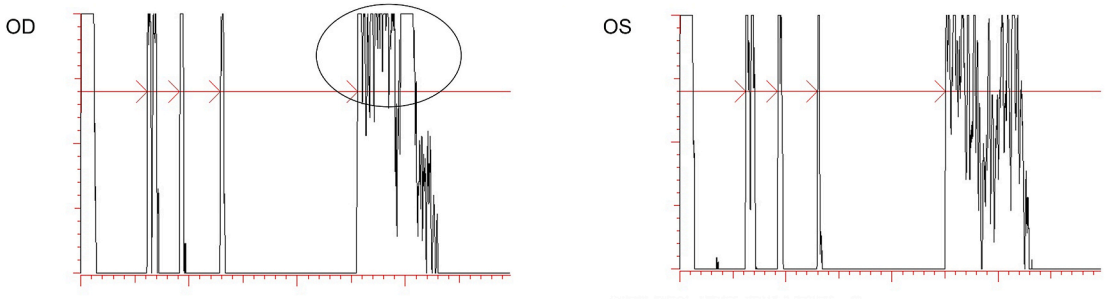

Fig. 3. Quantitative A-scan ultrasonography showing increased reflectivity of the lesion in the right eye (left panel, black circle) compared to the left eye (right panel).

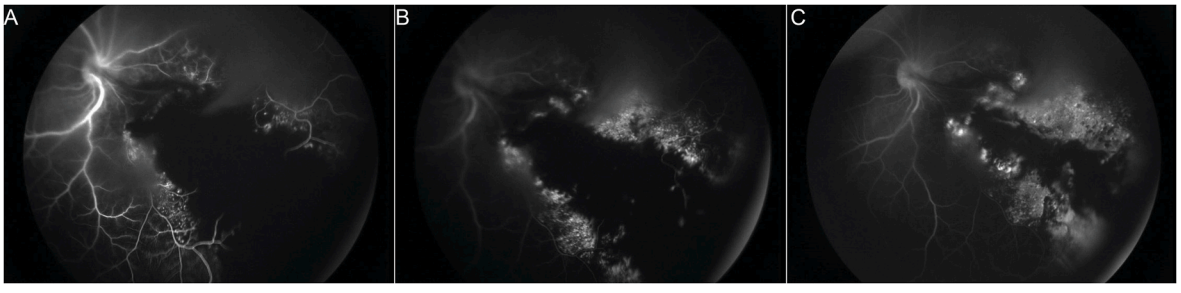

Fig. 4. Fluorescein angiogram of the right eye in the late arteriovenous/early venous phase showing early hypofluorescence of the lesion, while aneurysms at the periphery begin to fill (**A**, 22 seconds). There is slow filling of the lesion in the venous phase (**B**, 51 seconds). In the late phase (**C**, 2 minutes and 41 seconds) there was staining of the lesion with fading of the adjacent retinal vasculature. There was hypofluorescence from blocking secondary to vitreous hemorrhage in all panels.

those with a history of birth trauma. RCH is an uncommon condition that has not been described previously in a newborn. Recognition that vitreous hemorrhage may be associated with birth trauma in RCH may be important in the early detection and prevention of complications of RCH such as recurrent vitreous hemorrhage, amblyopia, and cerebral cavernous angiomas.

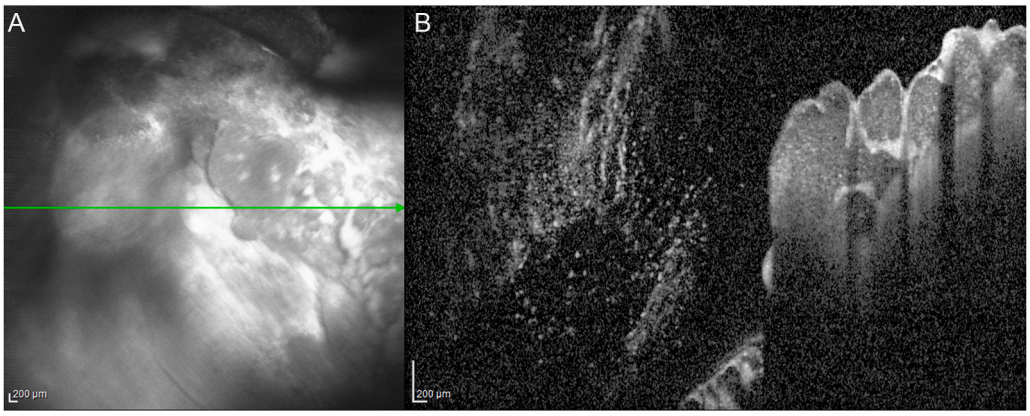

Fig. 5. OCT of the right eye through the RCH lesion showing vesicular cyst-like changes in the inner retina and overlying epiretinal membrane.

Patient consent

Consent to publish this case report was not obtained. This report does not contain any personal identifying information and is exempted from approval by the University of Miami Institutional Review Board.

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Authorship

All authors attest that they meet the current ICMJE criteria for Authorship.

Declaration of competing interest

None. The patients have no relevant financial disclosures.

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