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Pre-eclampsia and branch retinal artery occlusion in a 29-year-old primigravida with type 1 diabetes: A case report

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ABSTRACT

Branch retinal artery occlusion is a rare cause of sudden vision loss. New-onset visual disturbances are considered a severe feature of preeclampsia and an indication for delivery regardless of gestational age. This report describes the management of a primigravida at 31 weeks of gestation, with multiple comorbidities, who presented with preeclampsia and a new dark spot in her vision. After extensive workup, her branch retinal artery occlusion was not attributable to her preexisting comorbidities nor an undiagnosed thrombophilia. Multidisciplinary collaboration and close observation enabled delay of delivery until 34 weeks of gestation without detriment and substantially mitigated the risks of preterm birth. Her visual defect was stable and permanent. This seems to be the first case in the literature to describe branch retinal artery occlusion diagnosed simultaneously with preeclampsia in the third trimester. Branch retinal artery occlusion may not be a severe feature of preeclampsia requiring delivery.

1. Introduction

Branch retinal artery occlusion (BRAO) is a rare cause of sudden vision loss. Preeclampsia can be a challenging diagnosis. Discerning whether criteria for severe features are present can be challenging, too. For women with complex medical conditions, it is important to efficiently exclude potential sources of symptoms and physical examination findings before attributing these to preeclampsia. This case of sudden vision loss secondary to BRAO, in a patient with multiple potential etiologies, occurred in the third trimester in the presence of preeclampsia. This seems to be the first reported case of BRAO in the third trimester of pregnancy. The work-up and multidisciplinary management that enabled the safe delay of delivery to reduce the risk of perinatal morbidity from immediate preterm birth are described. Although it produces visual changes, BRAO may not be a severe feature of preeclampsia. Further research is necessary.

2. Case Presentation

A 29-year-old nonsmoking primigravida at 31 weeks and 5 days of gestation called the on-call obstetrician to report a new-onset grey/brown spot in the center of her vision from her left eye. This spot moved wherever she looked and was the same during near and distance viewing. After it failed to resolve, she found her blood pressure (BP) was 150/90 mmHg. The patient also reported a recent throbbing headache that had begun five days prior to her call and radiated to the left frontal region, intensity 3/10. It failed to resolve after she took her daily low-dose aspirin. The headache persisted until she took acetaminophen the following morning and had not returned. She was directed to come directly to the hospital.

Upon presentation to the hospital, her BP was 147/81 mmHg. The fetal heart rate (FHR) was reactive. Medical history was significant for well-controlled type I diabetes mellitus (T1DM), managed with an insulin pump (Hb A_{1c} of 5.8% at conception), polycystic ovarian syndrome, a history of both migraine and cluster headaches, and myopia. At 13 weeks of gestation she began taking low-dose aspirin (81 mg) daily for preeclampsia prophylaxis. The patient's ophthalmologist had reported no evidence of proliferative diabetic retinopathy at her visit at 28 weeks of gestation.

Laboratory evaluation was remarkable for urine protein to creatinine ratio (UPC) of 0.31, above her baseline value of zero. Per institutional standards, no baseline 24-h urine test was performed and the diagnosis

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of preeclampsia was made using the UPC. Like her baseline laboratories, admission liver function tests, complete blood count including platelets, and creatinine were unremarkable.

Ophthalmology was consulted. Snellen visual acuity was 20/20 bilaterally. Slit lamp exam and intraocular pressure (IOP) were normal bilaterally. Bilateral fundal exam was performed. No vasculitis or Hollenhorst plaques were seen in either eye. There were rare scattered intraretinal hemorrhages in the periphery of both eyes. Optic nerves were normal bilaterally. The left fundus demonstrated an area of retinal opacification adjacent to the macula, of approximately 1.5 mm diameter (Fig. 1). Optical coherence tomography (OCT) demonstrated increased retinal reflectivity in the region of retinal whitening (Fig. 2). No embolism or thrombosis was seen. Branch retinal artery occlusion (BRAO) was diagnosed.

The main issue was whether to consider the BRAO a stroke, a severe feature of preeclampsia, which, according to current guidelines, would preclude expectant management and require delivery [1]. A multidisciplinary discussion, including the primary obstetrics, maternal-fetal medicine, and ophthalmology teams, was engendered.

Ophthalmology shared that the localized area of retinal whitening, resulting from interrupted retinal arterial circulation, and the increased reflectivity of the inner retina on OCT are pathognomonic for BRAO. The average age of BRAO onset is 66 and it rarely affects people under 30 [2]. Risk factors include glaucoma, trauma, vasculitis, atherosclerosis, migraines, diabetes, hypertension, and hypercoagulable states [3]. There was no evidence for glaucoma or history of trauma. Vasculitis was ruled out as the fundal exam did not show the retinal artery encased in inflammation. There were no Hollenhorst plaques: refractile particles in the retinal arteries usually indicative of an atherosclerotic embolus. The association between migraine headaches and BRAO is believed to emanate from vasospasm associated with the headache. Her headache's resolution four days prior to the visual field defect's onset made a migraine etiology less likely.

The patient did have well-controlled T1DM with mild non-proliferative diabetic retinopathy, diagnosed by the presence of the scattered intraretinal hemorrhages. More advanced diabetic changes, including proliferative retinopathy, would have raised concern for disseminated microvascular disease and recurrence risk. The patient also exhibited hypertension, a recognized risk factor. Even so, BRAO secondary to hypertension usually results in multiple findings in both eyes [4].

When BRAO occurs in patients under 50, it is commonly associated with thrombophilia [5]. This was deemed unlikely as no thrombus was seen on fundal exam and the patient's family history was noncontributory for a genetic predisposition to thrombophilia.

The team hypothesized the patient's BRAO resulted from a combination of the vasoconstrictive hypertension accompanying preeclampsia and the underlying mild diabetic retinopathy. Ophthalmology believed, based on her young age, the finding of only a single affected area, and lack of a clear etiology, that the risk of an additional episode was likely low.

Because of the uncertainty with the etiology, lack of evidence for other end-organ involvement, and recognition that guidelines recommend immediate delivery for vision changes associated with preeclampsia, cautious expectant management of her preeclampsia was undertaken, with delivery planned no later than 34 weeks of gestation, the specified delivery time for cases of preeclampsia with severe features. A course of antenatal corticosteroid therapy for fetal lung maturation was initiated. Since she had developed preeclampsia and thrombophilia was not considered the likely source of her BRAO, her aspirin was discontinued. Other thromboprophylaxis was not initiated as no thrombosis had not been seen on fundal exam and delivery for preeclampsia with severe features was being considered.

On the first hospital day, after being elevated for 16 h, her BP normalized without treatment. Fetal ultrasound showed normal amniotic fluid, vertex presentation and estimated fetal weight of 1873 g, correlated to the 40th growth percentile.

On the second hospital day, the patient reported diffuse slight "speckling" of vision in both eyes. Ophthalmology's evaluation showed a stable eye exam. The reported symptoms were felt to likely originate in the central nervous system. Brain magnetic resonance angiography and venography (MRI/MRV) were obtained and returned unremarkable; therefore, these symptoms were expectantly managed. Carotid dopplers and a cardiac echocardiogram were obtained and were also unremarkable, further reducing the chance of an atherosclerotic or thrombotic embolus. Daily laboratory evaluation showed no evidence for worsening preeclampsia. The magnesium infusion was discontinued at 48 h. By this time, tests for cardiolipin and β2 glycoprotein antibodies, lupus anticoagulant, and prothrombin and factor V leiden gene mutations had resulted negative. Antithrombin III and protein C activity were in the normal ranges. Protein S activity was 40%, normal for gestational age. With these results, anticoagulant therapy was not initiated. After a third day of laboratory evaluation showed no evidence of worsening preeclampsia, this evaluation was spaced to twice weekly and remained stable.

On hospital day 9, the patient reported a new visual disturbance in her right eye: a small, circular area of "darker greyness" through which she could see. Retinal exams were unchanged. The patient then reported resolution of this new symptom. The "speckling" that had begun on the second hospital day resolved spontaneously the next day, hospital day 10.

Throughout her inpatient stay the patient's BP exhibited intermittent values above 140/90 mmHg but all under 160/110 mmHg. Occasional headaches resolved with oral acetaminophen or prochlorperazine and diphenhydramine. Twice-daily nonstress tests were performed.

At 34 weeks, hospital day 16, magnesium seizure prophylaxis was

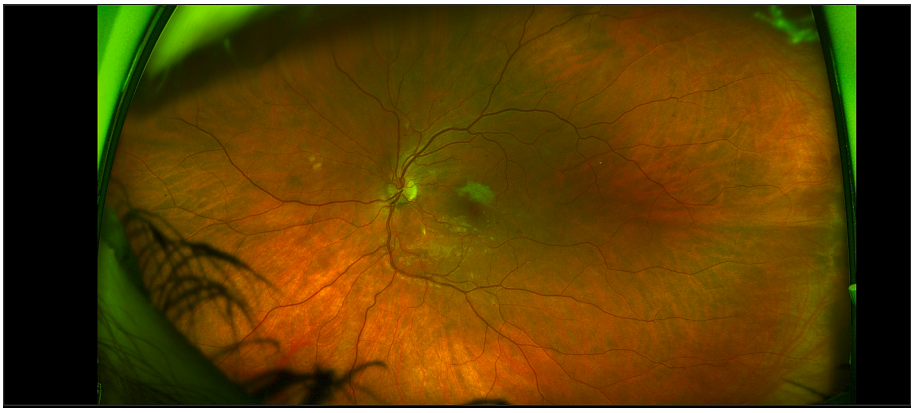

Fig. 1. Infrared reflectance and optical coherence tomography of the left retina.

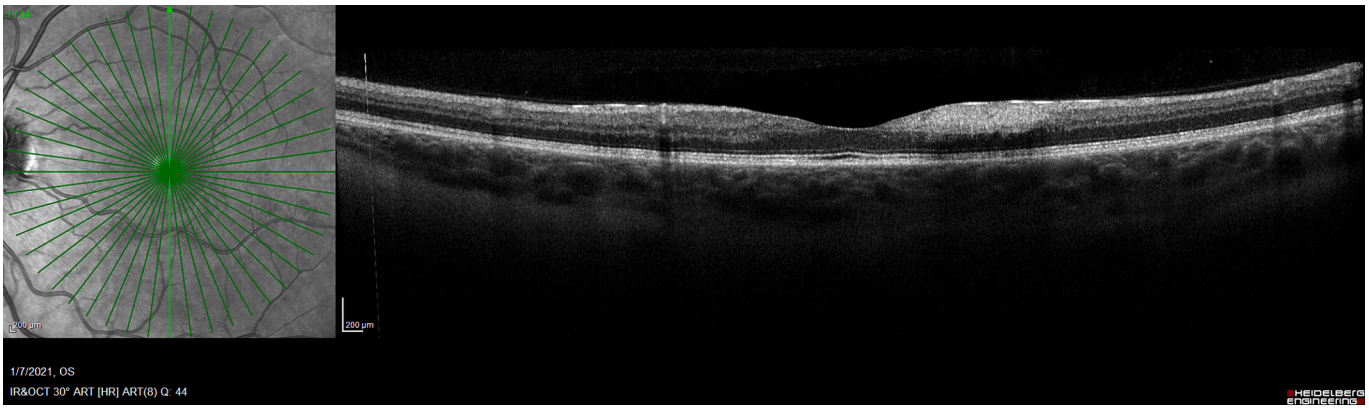

Fig. 2. Fundoscopic exam of the left eye.

reinitiated, followed by labor induction with misoprostol and, later, oxytocin. She delivered a viable, 2225 g female infant with Apgar scores of 6 and 8. Magnesium was continued for 24 h after delivery. Her postpartum course was uncomplicated, and she was discharged on postpartum day 2. Her baby did well.

Ophthalmologic exam five months after the BRAO event demonstrated normal fundi bilaterally with complete resolution of the retinal whitening and retinal hemorrhages. There were no new retinal occlusions. The patient's visual field defect was unchanged and is expected to be permanent.

3. Discussion

In cases of preeclampsia with severe features, indications for delivery regardless of gestational age include new-onset cerebral or visual disturbances, such as photophobia, scotomata, cortical blindness, and retinal vasospasm.

Branch retinal artery occlusion (BRAO) is occlusion of one of the branches of the retinal artery and can produce permanent vision loss. It remains unclear whether preeclampsia predisposes to BRAO and, consequently, there are no clear guidelines for the management, including timing of delivery, for patients with preeclampsia and BRAO. Active collaboration with ophthalmology enabled delivery to be safely delayed by more than two weeks and reduce the risk of fetal morbidity due to prematurity.

Systemic evaluation of BRAO in older patients typically includes carotid echography, cardiac echography, head MRI, and CBC. In younger patients, evaluation also includes testing for hereditary and acquired thrombophilia. Since it was unclear if preeclampsia explained the present patient's BRAO, the full evaluation was performed and was unremarkable.

Reports of BRAO occurring during pregnancy are few. BRAO was reported in a woman in her 30s at 12 weeks of gestation. Workup revealed previously undiagnosed hereditary hemorrhagic telangiectasia, an autosomal dominant condition characterized by abnormal vascular structures. She was treated with anticoagulation and embolization of a pulmonary arteriovenous malformation. Seven months after the BRAO, her best corrected visual acuity returned to baseline [6]. Kurtz et al. documented two cases of BRAO in 32- and 35-year-old women at 8 and 13 weeks of gestation, respectively [5]. Both were diagnosed with protein S deficiency and placed on anticoagulation. At time of their report, the first had reached 22 weeks of gestation without further incident. The second was delivered for eclampsia at 37 weeks of gestation. Long-term visual outcome was not reported for either. BRAO has also been reported in a 29-year-old at 12 weeks of gestation without a clear etiology. That pregnancy was continued without incident and the patient's vision improved from finger counting to 20/30 over two months [3]. Gull and Prentice reported BRAO in a 26-year-old at 24 weeks of gestation in her second pregnancy [7]. Examination showed a non-thrombotic embolus. Workup did not reveal a source. She experienced partial loss of vision in her left eye and delivered spontaneously at term without progression of the defect. Her vision had not improved by the time of her postpartum visit. In 2002, Lara-Torre et al. reported a teenage primigravida at term diagnosed with preeclampsia based on maximal blood pressure 168/103 mmHg, no proteinuria, creatinine of 1.5 and alanine- and aminotransferase 137 and 126 U/L, respectively, who developed sudden visual loss 24 h after cesarean that progressed to total bilateral blindness. Ophthalmologic exam demonstrated bilateral central retinal arteriole occlusions. Imaging was limited to CT of the head. No evaluation for thrombophilia or other potential etiologies for BRAO was reported. The patient required hospitalization until postpartum day 20 for complications including postoperative ileus, pancreatitis and postoperative fevers with suspected septic pelvic thrombophlebitis. Marked visual impairment persisted at six-month follow-up [8]. The complexity of this patient's course and absence of many elements of the current BRAO evaluation make conclusions difficult. In summary, the outcomes for vision loss secondary to BRAO vary among pregnant patients. In most of the reported cases, preeclampsia did not accompany BRAO.

The relationship between preeclampsia and BRAO remains unclear. In this case, careful exclusion of the recognized etiologies suggests the patient's BRAO resulted from a combination of the vasoconstrictive hypertension accompanying preeclampsia and the underlying mild diabetic retinopathy.

4. Conclusion

When a pregnant woman describes vision loss, the diagnosis of BRAO should be considered and ophthalmologic consultation obtained quickly. In this case, multidisciplinary care and no further evidence of end-organ involvement enabled delay of delivery to mitigate the risks of prematurity. BRAO may not be a severe feature of preeclampsia. The management of a patient with BRAO coexisting with preeclampsia is controversial and requires further study.

4.1. Patient Perspective

The patient shared disappointment with her vision loss and joy in delivering a healthy baby without sequelae from preterm delivery.

Contributors

Katerina Tori contributed to conception of the case report, acquiring and interpreting the data, drafting the manuscript and revising the article critically for important intellectual content.

William Wirostko contributed to patient care, conception of the case report, acquiring and interpreting the data, drafting the manuscript and

revising the article critically for important intellectual content.

Anna Palatnik contributed to conception of the case report, acquiring and interpreting the data, drafting the manuscript and revising the article critically for important intellectual content.

Timothy Klatt contributed to patient care, conception of the case report, acquiring and interpreting the data, drafting the manuscript and revising the article critically for important intellectual content.

All authors approved the final submitted manuscript.

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Patient consent

The patient provided signed informed consent for this work, which was granted exempt status by the Medical College of Wisconsin Institutional Review Board.

Provenance and peer review

This article was not commissioned and was peer reviewed.

Conflict of interest statement

The authors declare that they have no conflict of interest regarding the publication of this case report.

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