



A 25-Year-Old Female with One Week of Flashes in Her Left Eye

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Introduction:

A 25-year-old white female with one week of flashes in her left eye was referred to our office to rule out a retinal tear. The patient described a sudden onset of a blurry spot in her left eye and a sensation "like someone taking pictures with a camera flash". Her past ocular history was unremarkable. She had a past medical history of migraines and seasonal allergies. Aside from birth control pills she used no other medications except over the counter allergy medication as needed. A review of systems was significant for a recent upper respiratory illness 3 weeks prior to presentation.

Figure 1a (Subtle reddish-brown lesion nasal to fovea in Left eye)

Her visual acuity was 20/20 in the right eye and 20/20-2 in the left eye. There was no relative afferent pupillary defect in either eye. Intraocular pressures by applanation were 13 and 15 in the right and left eyes, respectively. The anterior chambers were deep and quiet and there was no evidence of vitritis in either eye.

On dilated fundus examination, the optic nerves were sharp and pink in both eyes. The macula in the right eye was normal, but the left macula showed a subtle reddish-brown lesion nasal to the fovea (Figures 1). The vessels and periphery were otherwise unremarkable in both eyes.

Spectral domain optical coherence tomography (SD-OCT) was obtained to better characterize the macular lesion in the left eye. The SD-OCT revealed a discrete hyperreflective band nasal to the fovea in the outer nuclear layer (Figure 2b). There was also disruption of the inner segment/outer segment junction (IS/OS, or ellipsoid zone) in addition to the OS/RPE junction (interdigitation zone) in this area. The corresponding infrared image (IR) of the SD-OCT showed a sharply demarcated wedge-shaped lesion along the papillomacular (PM) bundle pointing to the fovea (Figure 2a).

Discussion:

The differential diagnosis for this patient includes:

- Multiple evanescent white dot syndrome
- Acute posterior multifocal placoid pigment epitheliopathy
- Branch retinal artery occlusion
- Central serous chorioretinopathy
- Acute macular neuroretinopathy

The patient was diagnosed with acute macular neuroretinopathy based on her history and clinical findings.

Acute macular neuroretinopathy (AMN) was first described by Bos and Deutman in 1975 when they reported characteristic dark-red, wedge-shaped parafoveal lesions in four women with decreased vision and paracentral scotomas.¹ The women in their cases series were 24 to 35 years old, all were taking oral contraceptives, and 2 of the 4 patients had a viral prodrome

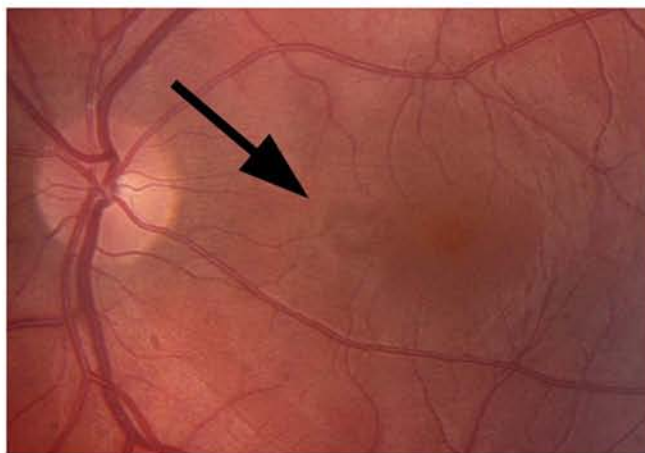


Figure 1b (Magnified color photo of left macula)

prior to their visual symptoms.¹ The authors hypothesized at the time that the disease primarily affected the superficial retina although the nerve fiber layer was not obviously involved.

AMN is a rare condition, and since Bos and Deutman's first case series less than 100 cases have been reported in the English literature to date.^{2,3} It is a disease that primarily affects young women, as 86% of reported cases from 1975 to 2012 were female, and the average age of presentation was 30 years.^{2,3} The etiology of AMN is unknown, but it has been commonly associated with a flu-like illness (46%) and oral contraceptive use (37%).² AMN has also been reported in association with contrast media⁴, epinephrine injection⁵, trauma⁶, hypotension⁷, and caffeine intake.^{8,9} Patients usually present with normal or mildly decreased visual acuity, photopsias, and a paracentral scotoma. Patients can often draw out their scotomas on the Amsler grid with remarkable resemblance to the exact shape and location of the retinal lesions.² Although originally thought to affect the inner retina, Priluck et al. were the first to propose that the deep neurosensory retina, and specifically the photoreceptor layer, to be the principle site of involvement in AMN.¹⁰

Imaging:

AMN lesions can be seen on biomicroscopy as sharply-demarcated, petaloid or wedge-shaped lesions that often point towards the fovea. They are most commonly located nasal to the fovea, and can be reddish, purple, or brown in color depending on the amount of underlying fundus pigmentation.² The lesions are best appreciated on red-free or infrared imaging, and more invasive imaging techniques such as fluorescein and indocyanine green angiography are usually normal.

Advancements in imaging technology, most notably multimodal imaging and higher resolution spectral domain OCT (SD-OCT), has allowed for more detailed study of the exact location in the retina affected by AMN.¹¹ A hyperreflective band involving the outer plexiform layer (OPL) and outer nuclear layer (ONL) is believed to be the earliest detectable finding in AMN, preceding the appearance of the classic petal-shaped lesion on biomicroscopy.^{3,11} Within days of

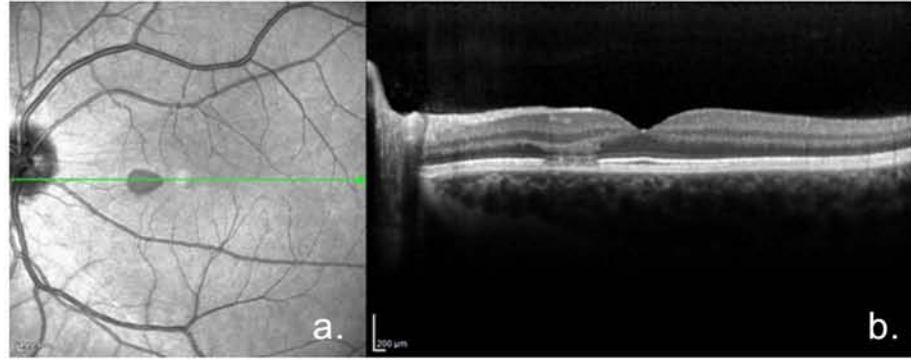


Figure 2 (2a. Infrared image of the Left eye showing a sharply demarcated wedge-shaped lesion pointing to the fovea. 2b. SD-OCT showing a hyperreflective band involving the OPL/ONL, as well as disruption of the IS/OS and OS/RPE layers)

onset of symptoms, disruption of the IS/OS and OS/RPE layers can be seen on SD-OCT, followed by eventual thinning of the ONL.^{11,12}

Furthermore, Sarraf and colleagues have recently reported a new variant of AMN in 5 patients with acute onset paracentral scotomas and SD-OCT findings of a hyperreflective band above the OPL, naming it paracentral acute middle maculopathy (PAMM), or type 1 AMN.¹² In the same series, they report 5 patients (all young women) with the more classic findings of AMN and a hyperreflective band below the OPL on SD-OCT, and proposed classifying it as type 2 AMN. Their findings as well as those of other authors point towards ischemia of the deep capillary plexus as the cause for AMN.^{9,11,12}

Conclusion:

Our patient had a history and findings consistent with type 2 or "classic" AMN. She had a flu-like illness several weeks prior to presentation, was taking birth control pills, and also reported taking an over-the-counter cold remedy containing pseudo-ephedrine. One month after her initial visit, she returned to our office with

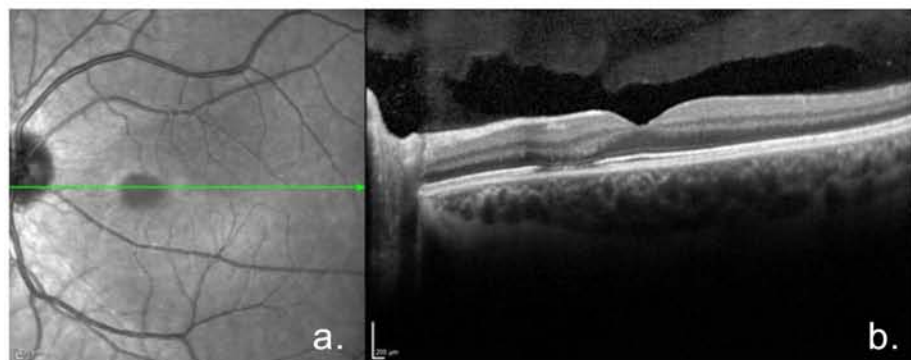


Figure 3 (3a. Follow-up 1 month later showing lateral extension and loss of margins of hyporeflexive lesion on IR imaging of the left eye. 3b. SD-OCT showing thinning of the ONL and restoration of the IS/OS over the area of the lesion)

improvement in her scotoma but was still able to notice a faint outline of the defect in her vision. Her visual acuity remained 20/20 in the left eye. Repeat IR imaging showed lateral extension and loss of the sharp margins of the parafoveal defect, and SD-OCT showed normalization of the IS/OS junction but persistent OS/RPE disruption (Figure 3).

Take Home Points:

- Acute macular neuroretinopathy is a rare condition that primarily affects young females of reproductive age, with a flu-like illness preceding visual symptoms in about 50% of cases.
- Visual acuity is often only mildly affected, and patients present acutely with photopsias and dense paracentral scotomas.
- Distinct wedge-shaped lesions pointing to the fovea are best appreciated on infrared or red-free images; fluorescein and indocyanine green angiography are often normal.
- SD-OCT findings of AMN show a characteristic hyperreflective band involving the OPL/ONL in addition to disruption of the IS/OS and OS/RPE layers.
- Although no definitive cause for AMN has been proven, evidence is building based on newer imaging modalities that both "classic AMN" (type 2 AMN) and the newly described PAMM (type 1 AMN) represent ischemia of the retinal deep capillary plexus. Studies utilizing OCT angiography for this condition could be of further value.

References:

1. Bos PM, Deutman AF. Acute macular neuroretinopathy. *Am J Ophthalmol* 1975;80(4):573-84.
2. Tuberville SD, Cowan LD, Gass JM. Acute macular neuroretinopathy: a review of literature. *Surv of Ophthalmol* 2003;48(1):1-11.
3. Aziz HA, Kheir WJ, Young RC, et al. Acute macular neuroretinopathy: a case report and review of the literature, 2002-2012. *Ophthalmic Surgery, Lasers & Imaging Retina* 2015;46:114-24.
4. Guzak SV, Kalina RE, Chenoweth RG. Acute macular neuroretinopathy following adverse reaction to intravenous contrast media. *Retina* 1983;3:312-7
5. O'brien DM, Farmer SG, Kalina RE, Leon JA. Acute macular neuroretinopathy following intravenous sympathomimetics. *Retina* 1989;9:281-6.
6. Gillies M, Sarks J, Dunlop C, Mitchell P. Traumatic retinopathy resembling acute macular neuroretinopathy. *Aust NZ J Ophthalmol* 1997;25:207-210.
7. Leys M, Van Slycken S, Koller J, Van de Sompel W. Acute macular neuroretinopathy after shock. *Bull Soc Belge Ophthalmol* 1991;241:95-104.
8. Tsui I, Sarraf D. Paracentral acute middle maculopathy and acute macular neuroretinopathy. *Ophthalmic Surg Lasers Imaging Retina* 2013;44:S33-S35.
9. Querques G, LaSpina C, Miserocchi E, et al. Angiographic evidence of retinal artery transient occlusion in paracentral acute middle maculopathy. *Retina* 2014;34(10):2158-60.
10. Priluck IA, Buettner H, Robertson DM. Acute macular neuroretinopathy. *Am J Ophthalmol* 1978;86:775-8.
11. Fawzi AA, Pappuru RR, Sarraf D, et al. Acute macular neuroretinopathy: long-term insights revealed by multimodal imaging. *Retina* 2012;32(8):1500-13.
12. Sarraf D, Rahimy E, Fawzi AA, et al. Paracentral acute middle maculopathy. *JAMA Ophthalmol* 2013;131(10):1275-87.

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