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Major review

Acute macular neuroretinopathy: A comprehensive review of the literature

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ABSTRACT

Acute macular neuroretinopathy is a relatively rare condition originally defined by the presence of intraretinal, reddish-brown, wedge-shaped lesions, the apices of which tend to point toward the fovea. Acute onset of paracentral scotomas corresponding to the clinically evident lesions is both common and characteristic. Although the pathogenesis of acute macular neuroretinopathy is complex, recent research suggests a microvascular etiology. Advances in multimodal imaging have enabled better characterization of this retinal disorder and have led to newly proposed diagnostic criteria. We review 101 reported cases in the English and non-English language literature identified from 1975, when acute macular neuroretinopathy was first described, to December, 2014. We discuss common risk factors, demographic and clinical characteristics, and multimodal imaging findings, which together provide insights into pathogenesis and guide areas of future investigation.

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1. Introduction

Acute macular neuroretinopathy (AMN) is a rare retinal disorder initially described by Bos and Deutman in 1975.[5] Characteristic lesions of AMN arise acutely in the macula and are classically described as reddish-brown and wedge-shaped, the apices of which tend to be directed toward the fovea often in a petalloid or tear-drop configuration. Acute, symptomatic photopsias and paracentral scotomas associated with mild loss of vision are common at the onset of this condition. Patients tend to be young, white, and female. Although a number of antecedent triggers have been associated with the condition, studies using spectral-domain optical coherence tomography (SD-OCT) have only recently identified ischemia involving the deep retinal capillary plexus as a possible pathogenic mechanism.[52]

Turbeville and colleagues[69] published a major review of 41 cases of AMN in 2003, in which data regarding epidemiology, clinical characteristics, and fluorescein angiographic features were reviewed. The authors also analyzed their summary data to identify possible risk factors and to suggest future areas of research. Our comprehensive review of 156 eyes of 101 cases reported through December, 2014, more than doubles the number of total cases previously reviewed and analyzed. Particular emphasis has been placed on the results of more recently published studies using multimodal imaging techniques, many of which have provided important insights into the pathogenesis of AMN.

2. Results

2.1. Environmental triggers

Several associations or risk factors have been identified in patients with AMN, as summarized in Table 1. The most commonly reported associations are a nonspecific flu-like illness or fever (47.5%), use of oral contraceptives (35.6%), and exposure to either epinephrine or ephedrine (7.9%). Antecedent trauma (5.9%) was also noted[9] and included 4 cases of nonocular injury sustained by motor vehicle accident and 1 case of head trauma following a 3-meter fall. Several cases with systemic shock (5.0%) were also identified, including 1 case each of cardiac arrest, toxic shock syndrome, severe blood loss during total left hip arthroplasty, anaphylactic shock, and severe hypotension associated with epidural anesthesia. Other less common associations with 2 cases each (2.0%) included IV contrast exposure, pre-eclampsia, postpartum hypotension, and caffeine consumption—10 cups per day in 1 case and 2-3 cups per day in another.

Table 1 – Disease characteristics

Finding	Number (% of total)[a]
Symptoms	
Scotomas	73 (72.3)
Decreased vision	16 (15.8)
Blurry vision	12 (11.8)
Laterality	
Bilateral	55 (54.4)
Unilateral	45 (44.5)
Not reported	1 (1.0)
Associated factors[a]	
Infection or febrile illness[b]	48 (47.5)
Oral contraceptives	36 (35.6)
Epinephrine/Ephedrine	8 (7.9)
Severe bodily/nonocular trauma	6 (5.9)
Systemic shock	5 (5.0)

[a] Some cases have more than one associated factors.
[b] This category includes description such as influenza, upper respiratory infection, sinusitis, enteritis, pharyngitis, and bronchitis.

2.2. Demographic characteristics

One hundred fifty-six eyes of 101 cases are summarized in Table 2.[1–6,10,12–28,30–32,34–46,49–59,64,65,67,68,70,73] These clinical cases were reported from 13 countries, with roughly half (49.5%) originating from the USA. The vast majority (84.2%) of patients were female (M:F ratio = 0.16:1). The mean age of initial presentation was 29.5 years (median 26, range 12–65), with over half of the reported cases (51.5%) occurring in the third decade of life (Fig. 1). Although the youngest patient with AMN in the review by Turbeville and colleagues[69] was 17 years old, the present study identified 2 reports of AMN in children: a 12-year-old girl and a 15-year-old boy. Only 6 patients (6.0%) in were aged 60 years or older. Race was reported in only 35 of 101 patients (34.7%) and is summarized in Table 3. Among these 35 patients, 28 (80.0%) were non-Latino white, 3 (8.6%) were Asian-Indian, and 2 each (5.7%) were black and Latino.

2.3. Clinical characteristics

Acute macular neuroretinopathy was bilateral in 54.4% of patients. The vast majority (98.0%) with AMN reported visual symptoms, including scotomas in 73 cases (72.3%), decreased vision in 16 cases (15.8%), blurred vision in 12 cases (11.8%), floaters in 4 cases (4.0%), and metamorphopsia in 3 cases (3.0%). Visual acuity at presentation was generally good, documented to be 20/40 or better in 126 eyes (80.8%) and 20/200 or worse in 9 eyes (5.8%). At final follow-up, the timing of which varied considerably from case to case, persistent scotomas were present in 83 eyes (53.2%), visual acuity was 20/40 or better in 78 eyes (50.0%), and only 1 eye had a visual acuity of 20/200 or worse.

The distinctive wedge-shaped lesions (Fig. 2A–C) occurred in 38 eyes (24.4%). The configuration was described as petalloid in 14 eyes (9.0%), oval in 10 eyes (6.4%), tear-drop shaped in 6 eyes (3.8%), and horseshoe shaped in 1 eye (Fig. 2). The clinically observed lesions assumed a reddish-brown or orange color in 86 eyes (55.1%) but were reported to be hypopigmented or grayish-white in 3 eyes (1.9%). Nine eyes (5.8%) had no clinically identifiable changes, and near-infrared reflectance imaging was necessary to reveal the paracentral retinal defects. Superficial retinal hemorrhages (Fig. 2J and K) and macular edema were identified in 5 eyes (3.2%).[21,55] Accompanying optic disc edema was a rare clinical feature.[60,62,65] A single case of AMN occurred in association with multiple evanescent white dot syndrome.[21]