Case Study

Healthcare

THE EFFECTS OF INTRAVITREAL ANTI-VEGF INJECTION ON THE MACULAR EDEMA AND VISUAL ACUITY OF PATIENTS WITH WET ARMD

Keywords: ARMD; macular edema, coroidalneovascularisation, visual acuity, anti-VEGF treatment.

Ermal Simaku	Ophthalmologist, EYE clinic, University Hospital"MotherTheresa" Tirana, Albania
Brisilda Danaj	Ophthalmologist, International Clinic, Tirana, Albania

Abstract

Globally, age-related macular degeneration, or AMD, is the primary cause of irreversible vision loss. It has 2 late-stage manifestations, which may coexist: a nonneo-vascular form known as geographic atrophy and a neovascular form characterized by the presence of macular neovascularization, previously known as choroidal neovascularization. Risk factors for AMD may be nonmodifiable (eg, age) or modifiable (eg, cigarette smoking and low micronutrient intake). According to multiple genome-wide association studies, genetic factors account for at least 55% of total AMD risk, and the pathway most consistently implicated in AMD is the complement cascade. For exudative AMD, anti-vascular endothelial growth factor agents are the cornerstone of care and are typically administered using 1 of 3 broad approaches: fixed-interval dosing, as-needed dosing, or treat-and-extend dosing. In addition to AMD, multiple retinal pathologies may lead to choroidal neovascularization; these distinct exudative diseases are also frequently managed with antivascular endothelial growth factor drugs. Case report: We describe three months of treatment with three intavitrealaflibercept (EYLEA) in two cases of ARMD with macular edema. Following each injection, the visual acuity (VA) increased in both of the cases. The purpose of this article is to review how anti-VEGF medications affect macular edema and help ARMD patients see better.

Introduction

For those over 50, age-related macular degeneration, or AMD, is the leading cause of permanent vision loss. It is the most prevalent cause of legal blindness in the US, affecting an estimated 2.07 million individuals in 2010 and expected to impact 3.7 million by 2030. It is estimated that 71,000 new cases of neovascular AMD occur annually in North America. This complex disorder has 2 main clinical stages: an intermediate or earlier phase of nonexudative degeneration (often referred to collectively as dry AMD) and a late stage (also known as advanced AMD). Late-stage AMD is further subdivided into a nonneo-vascular form, known as geographic atrophy, and a neovascular form characterized by macular neovascularization (MNV). These 2 late stages often coexist in the same eye. Historically, the term choroidal neovascularization (CNV) or CNV membrane (CNVM) was used to refer to the neovascular complex associated with AMD. However, the term CMNV is now preferred because in some cases, the neovascularization arises from the retinal vasculature. The terms neovascular AMD, exudative AMD, and wet AMD are also used for the neovascular form. A range of changes affecting the outer retina, retinal pigment epithelium (RPE), Bruch membrane, and choriocapillaris are brought on by normal aging in the macula:

• Rods have fewer photoreceptors than cones, both in terms of density and distribution.

• The loss of melanin granules, the creation of lipofuscin granules, and the accumulation of residual bodies are examples of ultrastructural alterations in the RPE.

• Basal laminar deposits accumulate between the plasma membrane of the RPE cell and the native RPE basement membrane in AMD; these deposits consist of extra- cellular matrix proteins, including widely spaced collagen fibers.

• In AMD, lipoprotein particles that accumulate between the inner collagenous layer of the Bruch membrane and the basement membrane of the RPE cause basal linear deposits to accumulate and enlarge to soft drusen.

• There are progressive involutional changes in the choriocapillaris.

These alterations are all signs of aging and might not be related to AMD pathology.Neovascular or neovascular abnormalities connected to AMD that are unrelated to aging normally can be categorized.

Population-based studies have shown that the main risk factor for AMD is age. About 10% of people over 65 and 25% of people over 75 in resource-rich nations suffer from AMD. In addition to age, other nonmodifiable risk factors for AMD include female sex, family history of AMD, hyperopia, light iris color, and race. MESA, According to a 10-year longitudinal study, African Americans had the lowest prevalence of AMD (2.4%), while White participants had the highest prevalence (5.4%); among participants of Asian and Hispanic ethnicity, the prevalence was 4.6% and 4.2%, respectively. The most common modifiable risk factor for AMD is cigarette smoking. Hypertension, hypercholesterolemia, cardiovascular disease, a high waist-to-hip ratio in men, and elevated levels of C-reactive protein and other inflammatory markers are among the others.

ARMD risk factors include: Age, Ethnicity (more prevalent in Caucasians), Family history, Smoking, Hypertension, Diet (high fat intake), Drugs (e.g. aspirin), and other (exposure to sunlight, blue eyes, female>male, previous cataract surgery)

Classification

AMD is commonly categorized for non-specialists into two distinct clinical presentations: "Dry" AMD and "Wet" AMD. For managing care in specialized care, the Age-Related Eye Disease Study (AREDS) classification is a helpful staging system.

Absence of AMD: A few tiny drusen (diameter 63 microns) or none at all

Early AMD: Multiple small drusen, one or more medium-sized drusen (63–124 microns), or mild abnormalities in the pigmentation

Intermediate AMD is characterized by geographic atrophy that does not involve the fovea, multiple medium-sized drusen, or at least one large drusen (≥125 microns).

Geographic atrophy at the fovea or neovascular AMD is considered advanced AMD.

About 90% of AMD is represented by dry AMD (figure 1). It is "dry" because it is neither neovascular nor exudative. Drusen formation in Bruch's membrane, which is asymptomatic, is a characteristic of this stage of AMD. During a fundoscopy, tiny yellowish deposits called dauschen

can be seen. Fewer than five drusen, each measuring less than 63 μm, are thought to be a typical indicator of aging.

Figure nr. 1

Other pathological changes, such as geographic atrophy and pigmentary alterations in the retinal pigmentary epithelium (RPE), emerge as AMD worsens. This is a sign of advanced AMD when it occurs at the fovea, and it frequently results in significant visual loss.

When dry AMD occurs, visual impairment usually happens gradually over many years, but it gets worse as the quantity and size of drusen increase. Blindness and advanced AMD (geographic atrophy or wet AMD) are possible outcomes. It is crucial to remember that the retina's appearance does not always correspond with measured visual acuity, even in later stages.

The development of a choroidalneovascular membrane, which is composed of new, abnormal blood vessels beneath the retina, is a characteristic of wet AMD (figure 2). This is driven by vascular endothelial growth factor (VEGF), a growth hormone that promotes angiogenesis and neovascularization.This is driven by vascular endothelial growth factor (VEGF), a growth hormone that promotes angiogenesis and neovascularization. As a result, either through bleeding or exudate from the new, leaky vessels, blindness progresses more quickly.

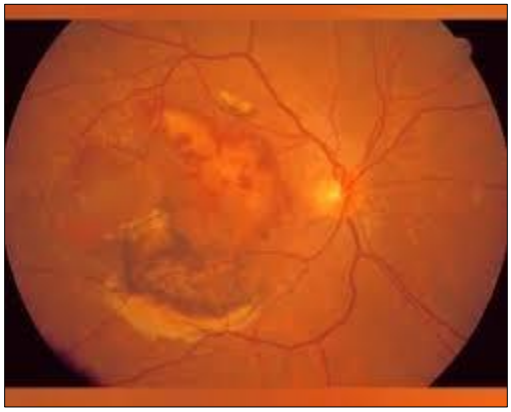

Figure nr. 2 [14] [15]

Clinical features

The most frequent complaint from patients is a central, progressive visual loss. They may have seen this as difficulties reading, identifying faces, or having trouble making out images because of a decrease in visual contrast.

Typical AMD symptoms also include the following:

- Affected visual field (central vision is typically affected by AMD)

- The onset and duration of symptoms (an ocular emergency if the symptoms are extremely acute, as this indicates wet AMD)

- Variation in symptoms throughout the day (low light conditions frequently exacerbate symptoms of AMD)

- Similar symptoms, such as flashes, floaters, eye pain, and visual abnormalities near lights (if any of these are present, look into other illnesses)

Check to see if the patient is losing vision in one or both eyes (both eyes may be affected by asymmetric distribution of AMD).

Wet AMD is characterized by a fast onset of symptoms or a rapid decline in vision in a patient with established AMD. For sight-saving treatment, an urgent ophthalmological review is necessary.

- ± related risk variables

- No additional pre-existing ailments

Clinical examination

It is necessary to do a comprehensive fundoscopy and eye examination.

Typical examination results include: Central scotoma (loss of central vision) in the visual field assessment; Amsler grid: central metamorphopsia (central grid loss of linearity); Fundoscopy: visualization of drusen, choroidal neovascular membrane, and geographic atrophy with a hand-held ophthalmoscope or slit lamp Investigations, Fluorescein angiography; Indocyanine green angiography (ICG); Ocular coherence tomography; Autofluorescent imaging.

Treatment

AMD has no known treatment.1-3. The goal of treatment is to keep functional vision for as long as possible while addressing problems with quality of life as they come up. Management generally changes according to the disease's stage.

DRY ARMD

Early on, low vision refractory aids might be beneficial.

Patients with early-stage dry AMD may benefit from taking vitamin supplements containing the AREDS2 formula.

Antioxidants from outside the body: Vitamins C and E, Beta-carotene, Zinc, Macroscopic, pigments, Lutein, Zeaxanthin.

WET ARMD

Since wet AMD is a serious condition that advances quickly, management needs to be more active. The treatment of sight-threatening AMD has been completely transformed by intravitreal anti-VEGF therapy.

Among the intravitreal anti-VEGF drugs are: Pegaptanib, Bevacizumab, Ranibizumab, and Aflibercept

The frequency of additional doses depends on how well the patient responds to the treatment and is typically given monthly for three months. In two-thirds of patients receiving anti-VEGF therapy, rates of visual loss stabilize, while in the remaining third, rates of visual loss improve.

CASE REPORT 1

G.S., a 70-year-old man, first visited the UHC "Mother Theresa" Tirana eye clinic one month after experiencing central vision blur in both of his eyes. He had smoked for forty-five years and suffered from hypertension for eight years. Following the examination, it was discovered that the right eye had dry ARMD with BCVA 12/20 and the left eye had wet ARMD with a choroidal neovascular membrane and severe macular edema (figure nr. 3).

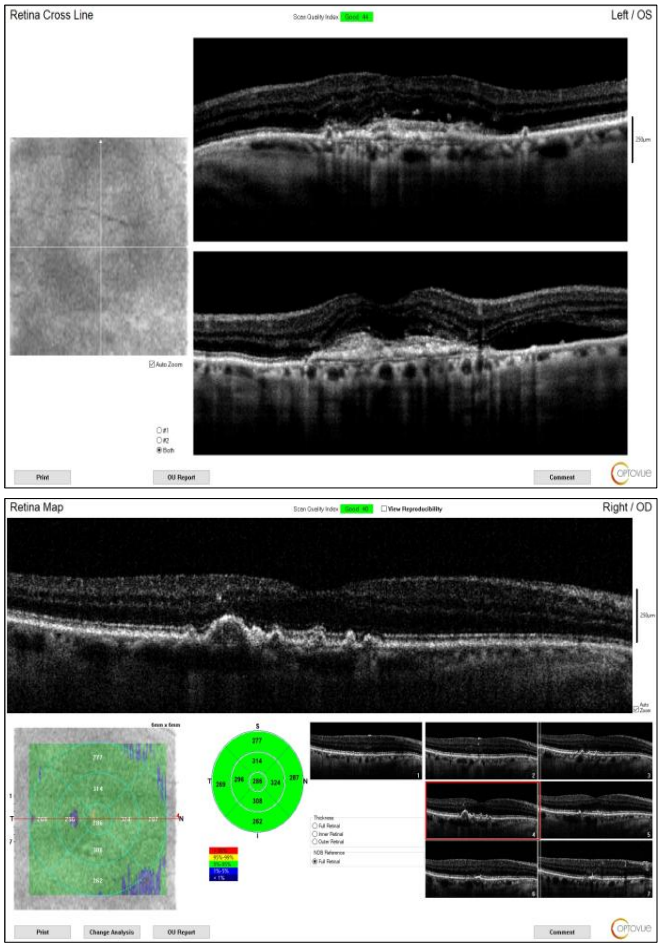

Figure nr. 3

We gave an intravitreal injection of aflibercept 40 mg/ml (EYLEA) in 0.05 ml volume right after the examination, and we gave another injection every two months after that. Three months later, the macular edema had decreased, and the BCVA was 8/20 (figure nr. 4).

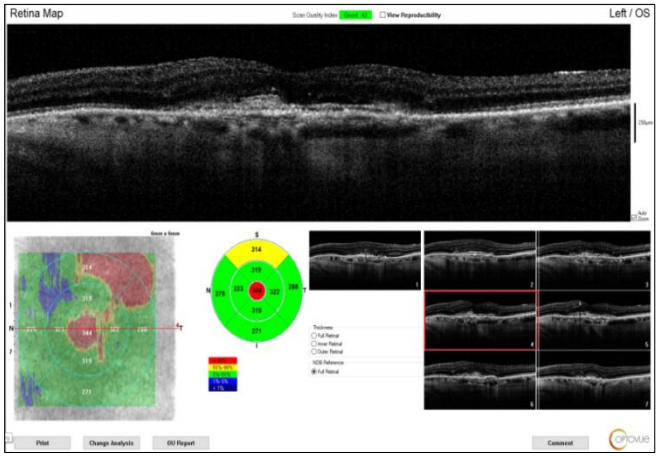

Figure nr. 4

CASE REPORT 2

N.T., a 72-year-old man, has had hypertension and hyperlipidemia for the past 15 years. Three months after he saw a decrease in her central visus in both eyes, she showed up at the eye clinic with flashes and floaters. We performed an intravitreal injection of aflibercept 40 mg/ml in both eyes as soon as we noticed a wet ARMD with subretinal fluid, VA of 4/20 in OD, and wet ARMD with severe macular edema, VA of 1/20 in OS, following the examination with OCT and fluorescein angiography. Reference number: 5. After this injection, there were 2 more injections administered every 4 weeks for OD and 3 more injections administered every 4 weeks for OS.

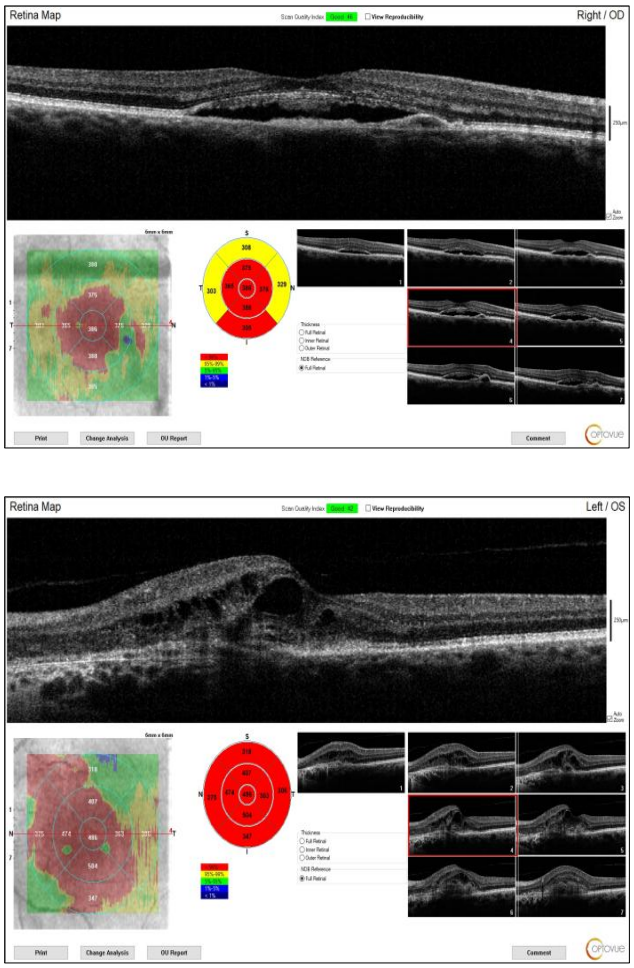

Figure nr. 5

Four months later, we observed a decrease in subretinal fluid and macular edema, as well as an improvement in the patient's visual acuity, which was 10/20 in OD and 6/20 in OS. (Fig. No. 6).

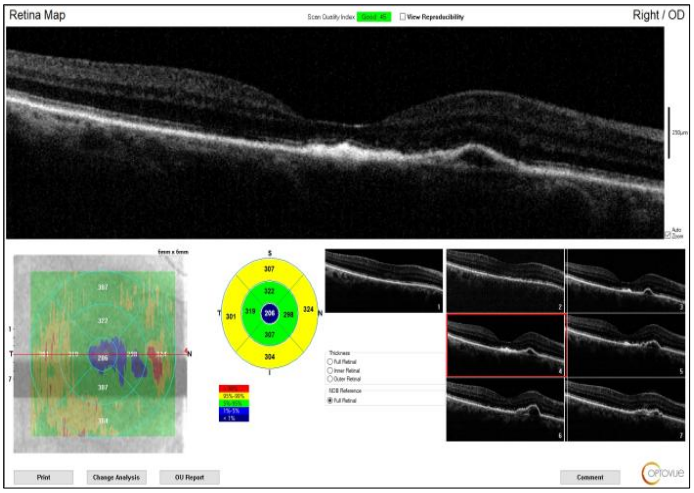

Figure nr. 6

Discussion

The largest obstacle to antiangiogenic therapies' clinical application—despite their effectiveness in AMD—is the requirement for repeated doses in order to achieve the best long-term results. Many clinical techniques can be employed when anti-VEGF medication is used to treat exudative AMD. These broadly include one of three approaches, or a combination of them: fixed dosing; as-needed dosing, also known as pro renata (PRN); and treat-and-extend dosing, also known as TAE, T&E, or TREX.

In patients with MNV, the goal of TAE management is to suppress exudative activity using as few re-treatments as possible. This typically involves 3 phases. First, monthly anti-VEGF therapy is administered until exudation is resolved. Second, treatment continues at progressively increasing intervals, with intervals between doses often lengthened by 2-week increments, until recurrent exudation is identified.

Third, a fixed-interval dosing strategy is initiated using an interval just less than the interval at which signs of exudation recurred. In the TREND study, 650 patients with exudative AMD were randomly assigned to either monthly or TAE management with ranibizumab. When compared to monthly management, which was connected to a mean of 11.1 injections at 1 year, TAE management was associated with a mean of 8.7 injections, and it was discovered to be noninferior. In addition, TAE and monthly regimens were associated with mean gains of 6.6 and 7.9 ETDRS letters, respectively, and 62% of eyes managed with TAE were receiving injections at intervals of 8 weeks or longer.

Numerous extensive, prospective, randomised studies on non-ocular macular degeneration (AMD) have shown that ranibizumab and bevacizumab are equally effective. A 2-year study of 1208 patients in the multicenter CATT trial, funded by the US National Eye Institute, revealed that the effects of ranibizumab and bevacizumab on VA were similar, and that fixed monthly dosing was superior to PRN treatment in terms of VA gains. The groups receiving ranibizumab monthly, bevacizumab monthly, ranibizumab PRN, and bevacizumab PRN had mean gains from baseline of 8.8 letters, 7.8 letters, 6.7 letters, and 5.0 letters, respectively. While the percentage of patients experiencing one or more systemic adverse events was considerably higher in the bevacizumab group (39.9%) compared to the ranibizumab group (31.7%), there was no statistically significant difference in terms of death or arteriothrombotic events between the two medications. While 50% of eyes maintained a VA of 20/40 or better at five years, the vision improvements of the first two years were not maintained.

The complex relationships between fibrosis, angiogenesis, and inflammation that are thought to be involved in the pathophysiology of exudative AMD have been studied in relation to treatment combinations. Research has indicated that when paired with PDT, ranibizumab re-treatment rates may be lower than when administered alone. When anti-VEGF monotherapy is not effective for PCV patients, combination strategies may be especially helpful. Cytokines and other molecular pathways other than VEGF-A are also being investigated for exudative AMD patients in an effort to improve outcomes and lower treatment frequency.

Conclusion

In Ireland and the UK, AMD is the leading cause of blindness in people over 60. The main risk factor is getting older. Smoking, UV exposure, and family history are additional significant risk factors. The hallmark of AMD is a progressive loss of central vision. The most helpful imaging modality is optical coherence tomography (OCT). To date; there is no curative therapy available. Intravitreal anti-VEGF injections are used to treat neovascular AMD. Early-stage AMD can be treated with low-vision aids and vitamins.

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