Case Report

Two Cases of Rapid Thinning of the Choroid Prior to Appearance of Polypoid Lesions

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Abstract

Purpose: We encountered 2 cases of rapid thinning of the choroid prior to appearance of polypoid lesions in patients with age-related macular degeneration (AMD) receiving frequent intravitreal injections of ranibizumab (IVR).

Case Presentation: Case 1 was a 75-year-old man with polypoidal choroidal vasculopathy (PCV) who had a subfoveal choroidal thickness (SCT) of 300 µm 2 years prior to onset, but it decreased to 210 µm just before onset. He received 16 IVR over the next 2.5 years. SCT was roughly uniform at 250 µm. Case 2 was a 70-year-old woman with type 1 choroidal neovascularization (CNV) who received 15 IVR over a period of 1.5 years. SCT at the time of onset was 280 µm and decreased at a rate of −50 µm/year. Orange elevated lesions appeared after 10 months and thinning occurred afterwards at a rate of −20 µm/year.

Conclusion: SCT decreased before the onset of AMD in the first case and during treatment for type 1 CNV in the second case. It rapidly reduced by −50 µm/year before the appearance of polypoid lesions in both cases. Our findings suggest that the decrease in SCT might herald the development of PCV.

ABBREVIATIONS

AMD: Age-Related Macular Degeneration; IVR: Intravitreal Injections of Ranibizumab; PCV: Polypoidal Choroidal Vasculopathy; SCT: Subfoveal Choroidal Thickness; CNV: Choroidal Neovascularization

INTRODUCTION

The choroid, which nourishes the outer layers of the retina, is known to thin with age [1]. According to the report by Hirata et al, this occurs at a speed of −3.05 µm/year [2]. We believe that vascular endothelial growth factor (VEGF) is important for the maintenance of the choroidal vascular plexus. However, there are only three reports indicating a connection between intravitreal injection of ranibizumab and choroidal thickening [3–5], with some reporting significant thinning and others reporting non-significant thinning. Ranibizumab is commenced as three consecutive injections every month for the treatment of age-related macular degeneration (AMD) and injections are administered as needed thereafter. Patients are followed up for approximately 1 year. There has been a tendency towards thinning in cases where administration was performed frequently or during the first 3 months of treatment [3–5]. On the other hand, aflibercept induces a reduction in choroidal thickness [6]. Here, we report two cases of rapid choroidal thinning in which intravitreal ranibizumab injections had been frequent.

CASE PRESENTATION

Case 1

A 75-year-old man had polypoidal choroidal vasculopathy (PCV) in the left eye. The axial length of the eye was 23.38 mm. Two years prior to onset, optical coherence tomography (OCT) had been performed before cataract surgery and the subfoveal choroidal thickness (SCT) at that time was 295 µm. Prior to onset of PCV, the SCT decreased to 215 µm at a rate of −55.4 µm/year (R2=0.964). After PCV onset, the patient was started on intravitreal injections of ranibizumab (IVR). IVR were administered three times every month during the initial period and treatment was administered as required thereafter. He had received a total of 16 IVR 2.5 years after onset. SCT after starting IVR was relatively stable at 250 µm and thickness was increased at a rate of +2.15 µm/year (R2=0.0041).
Case 2

The patient was a 70-year-old woman who had type 1 choroidal neovascularization (CNV) in the left eye. The axial length of the eye was 24.16 mm. She became aware of reduced visual acuity 1 month before the first IVR. Orange, elevated lesions appeared 10 months after onset and IVR were required afterwards on a monthly basis. IVR were performed 15 times over a period of 1.5 years. SCT at the time of onset was 275 µm and was reduced to 230 µm 1 year later, indicating a rate of thinning of −33.9 µm/year (R²=0.513). The rate of thinning was 50.2 µm/year (R²=0.302) before the appearance of the orange, elevated lesions and decreased to −20.2 µm/year (R²=0.0912).

DISCUSSION

The thickness of the choroid is between 0.3 mm and 0.5 mm. starting from the inside moving outwards; it is made up of Bruch’s membrane, capillary lamina of the choroid, vascular lamina of the choroid, and suprachoroid lamina. The central fovea is the thickest region, with an increase in thickness moving from the nasal to temporal region and from the inferior to superior region. [2,7] Choroidal thickness is reported to be decreased in myopic patients and it reduces with age [1], decreasing by 3.05 µm per year [2], and is known to have diurnal variation [8,9].

In regard to the relationship between choroidal thickness and disease, Chung et al [10] reported that the SCT in eyes with PCV was thicker compared with normal control eyes of age-matched subjects, and SCT was thinner in eyes with classical AMD after excluding subjects with PCV and retinal angiomatous proliferation (RAP). A thickness of 438.3 ± 87.8 µm was reported in eyes with PCV, 171.2 ± 38.5 µm in eyes with classical AMD, and 224.8 ± 52.9 µm in normal eyes. PCV ultimately developed in both the choroid, and suprachoroid lamina. The central fovea is the thickest region, with an increase in thickness moving from the nasal to temporal region and from the inferior to superior region. [2,7] Choroidal thickness is reported to be decreased in myopic patients and it reduces with age [1], decreasing by 3.05 µm per year [2], and is known to have diurnal variation [8,9].

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our cases, but their SCT thickness matched that of control eyes in Chung et al’s study.

To our knowledge, there are three reports discussing the relationship between IVR therapy and SCT [3–5]. According to Yamazaki et al [3], the SCT is significantly reduced in eyes with AMD during the 12 months after initial IVR, compared with the contra lateral eye. The rate of SCT change after 12 months did not correlate with the number of IVR, and irrespective of the AMD subtype (i.e., classical AMD, PCV, and RAP) and history of treatment before IVR, SCT tends to decrease because of IVR. According to a report by Ogasawara et al [4], no change in SCT was observed during 12 months after initial IVR, despite a significant decrease in central foveal thickness in the AMD eye. Ellabban et al [5] reported that there was no change in SCT in the 8.4 months after initial IVR, despite a significant decrease in central foveal thickness in the AMD eye.

A simple comparison of the three reports is not possible as they had different percentages of classical AMD and PCV. However, given that the highest mean number of IVR was 5.8 in the report by Yamazaki et al, 5.2 in the report by Ogasawara, and 3.7 in the report by Ellabban et al, it is possible that SCT may decrease to a greater extent with an increase in the number of IVR. The tendency of SCT to decrease is more noticeable when three successive administrations are given during the initial period of ranibizumab, irrespective of the report and disease type, and the SCT may also decrease when monthly administrations are given.

In our cases, there was no SCT thinning during the period of ranibizumab administration in case 1, but SCT thinning was observed during ranibizumab administration in case 2. Case 1 suffered from PCV and his SCT was the same as that reported for normal elderly patients prior to treatment [10]. Rapid thinning of SCT was observed in case 1 prior to the onset of PCV. In case 2, IVR was performed 5 times in the 9 months prior to the onset of polypoid lesions and monthly after their appearance. It was noted that SCT thinned more rapidly before the appearance of the polypoid lesions than after their appearance. Measurements were always taken in the morning, so we believe there was no influence from diurnal variation.

In the present cases, one had a rate of SCT thinning of −55.4 µm/year prior to PCV onset while the other had a rate of SCT thinning of −50.2 µm/year before the appearance of polypoid lesions. PCV occurred after rapid thinning of SCT at a rate of −50 µm/year in both.

Extreme thinning has been reported in normal elderly individuals and in patients with decreased SCT associated with IVR. In both our cases, PCV occurred after the decrease in SCT. Therefore, attention needs to be paid to rapid thinning of the choroidal membrane.

COMPETING FINANCIAL INTERESTS

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REFERENCES