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Multimodal Imaging of Circumscribed Choroidal Hemangioma

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1. Abstract

Circumscribed choroidal hemangioma (CCH) is a benign vascular tumor that may clinically mimic malignant choroidal lesions, particularly amelanotic melanoma.

Accurate diagnosis is essential to avoid unnecessary invasive interventions.

We report the case of a 36-year-old patient presenting with progressive visual decline over two months.

Best-corrected visual acuity was 20/60 in the affected eye. Fundus examination revealed a well- circumscribed orange-red elevated lesion in the posterior pole without overlying orange pigment or subretinal hemorrhage. Indocyanine green angiography (ICGA) demonstrated rapid early hypercyanescent filling, persistent homogeneous hyperfluorescence in the intermediate phase, and relative washout in the late phase.

Spectral-domain optical coherence tomography (SD-OCT) showed smooth dome-shaped choroidal elevation with associated subretinal fluid and neurosensory retinal detachment.

These findings were consistent with circumscribed choroidal hemangioma. Multimodal imaging is crucial for differentiating benign vascular tumors from malignant choroidal lesions.

2. Keywords: Choroidal Tumor; Circumscribed Choroidal Hemangioma; Differential Diagnosis; Indocyanine Green Angiography; Optical Coherence Tomography

3. Introduction

Circumscribed choroidal hemangioma is an uncommon benign vascular hamartoma composed of cavernous vascular channels within the choroid, as described in the clinicopathologic study by Witschel and Font [1] and later large clinical series by Shields et al. [2].

Although histologically benign, it may cause visual impairment secondary to chronic subretinal fluid or exudative retinal detachment according to Shields et al [2]. Clinically, CCH can resemble amelanotic melanoma or choroidal metastasis, making accurate diagnosis challenging, as emphasized in subsequent large cohorts by Dalvin et al. [3] and reviews by Mashayekhi and Shields [4].

Indocyanine green angiography (ICGA) provides valuable information regarding choroidal vascular lesions, as detailed in ophthalmic angiography references by Albert and Jakobiec [5]. Multimodal imaging, particularly ICGA and OCT, plays a central role in establishing the diagnosis.

4. Case Presentation

A 36-year-old patient presented with progressive blurred vision in the right eye for two months. Best- corrected visual acuity was 20/60 in the right eye and 20/20 in the left eye. Anterior segment examination was unremarkable.

Fundus examination of the right eye revealed a well-demarcated, orange-red elevated lesion located in the posterior pole. The lesion appeared smooth and dome-shaped. Notably, there was no overlying orange pigment (lipofuscin), subretinal hemorrhage, or irregular margins suggestive of malignancy.

Indocyanine green angiography demonstrated rapid early hypercyanescent filling of the lesion, consistent with a high-flow vascular tumor (Figure 1).

During the intermediate phase, the lesion remained homogeneously hypercyanescent (Figure 2).

Late-phase imaging showed relative washout compared to the early phase, a characteristic feature of circumscribed choroidal hemangioma (Figure 3).

Spectral-domain optical coherence tomography revealed smooth dome-shaped choroidal elevation with increased choroidal thickness and overlying subretinal fluid resulting in neurosensory retinal detachment (Figure 4). There were no signs of choroidal excavation, intrinsic vascular loops, or irregular internal reflectivity suggestive of melanoma.

Based on clinical and multimodal imaging findings, a diagnosis of circumscribed choroidal hemangioma was established. Given the limited subretinal fluid and stable vision, conservative management with close follow-up was elected.

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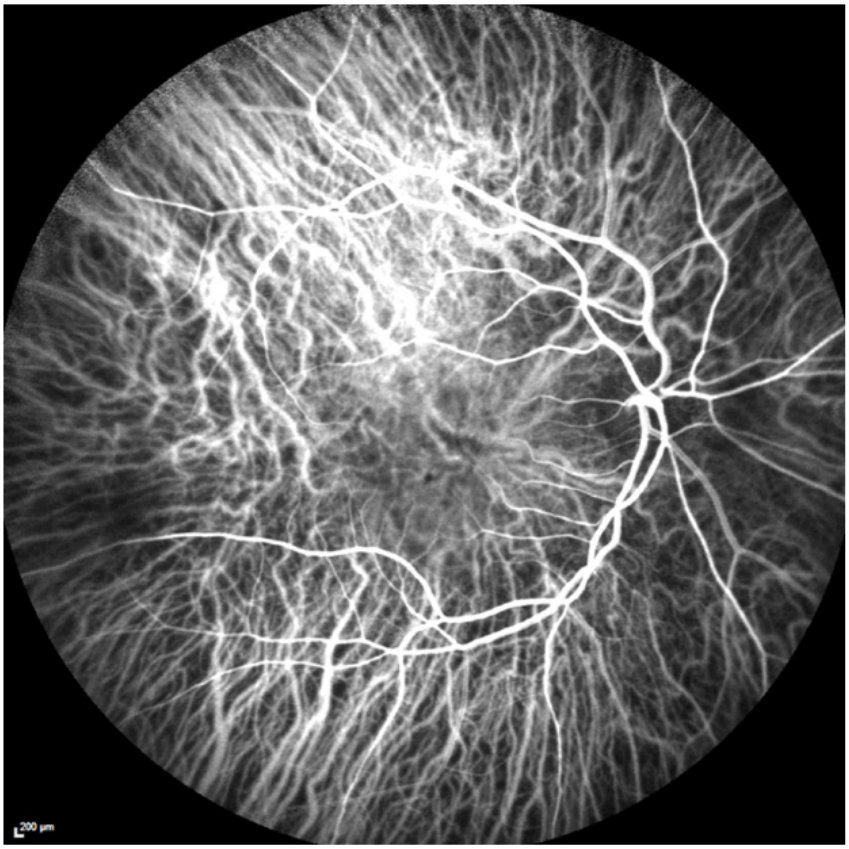

Figure 1: Early-phase ICGA demonstrating rapid homogeneous hypercyanescent filling of the posterior pole lesion.

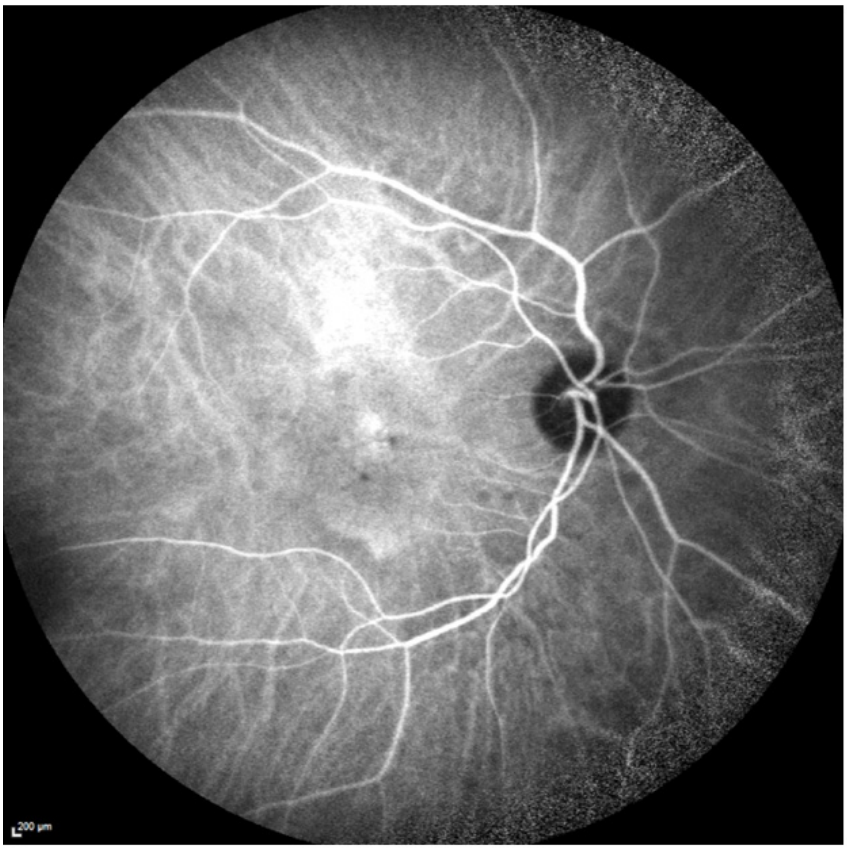

Figure 2: Intermediate-phase ICGA with maintained homogeneous hypercyanescence.

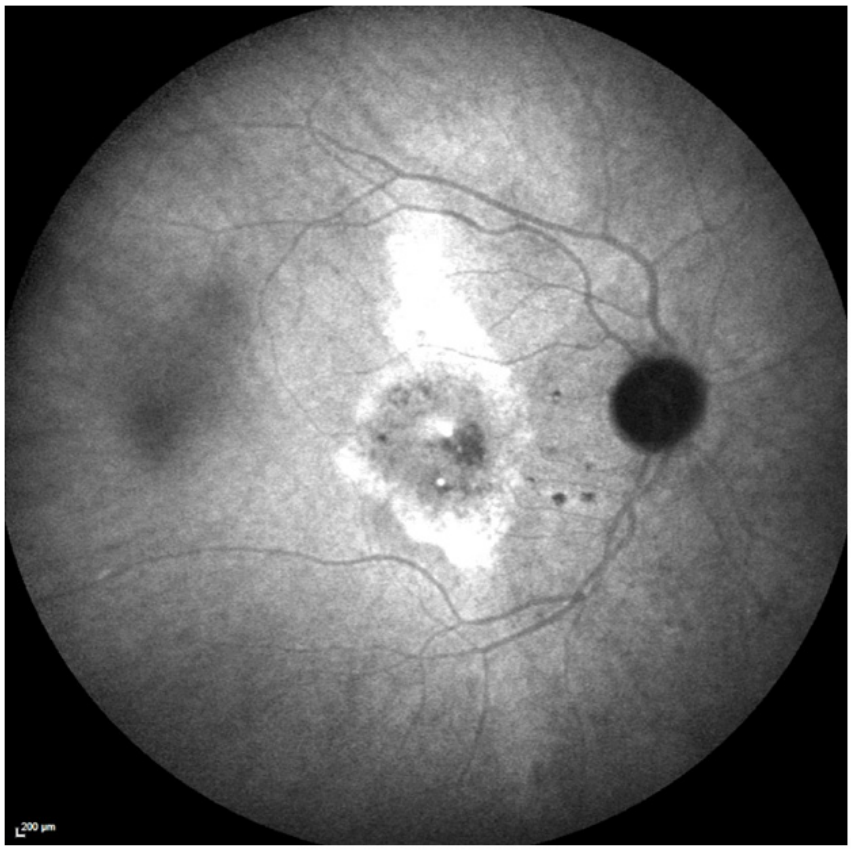

Figure 3: Late-phase ICGA illustrating relative washout compared to early phase, and gravitational subretinal fluid shift.

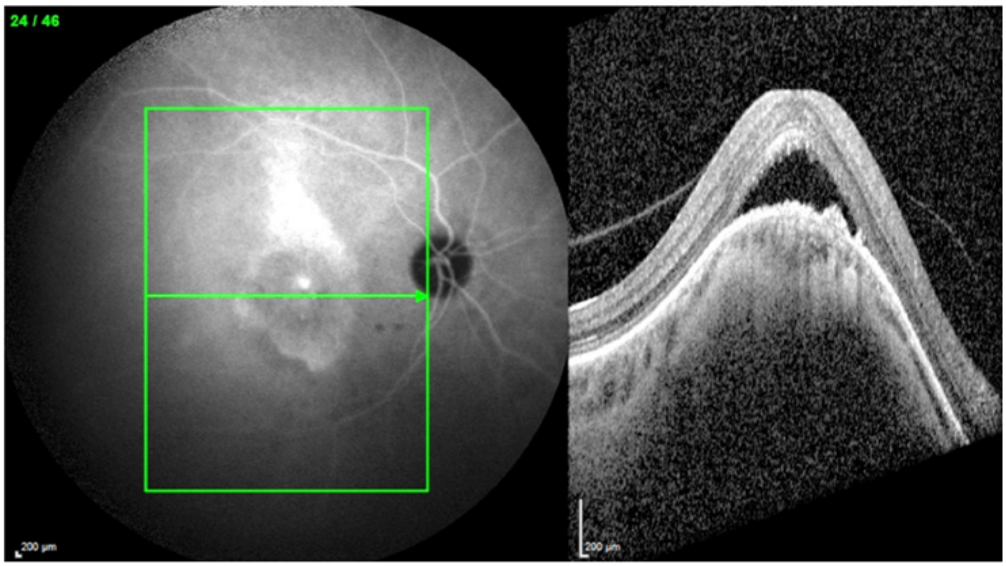

Figure 4: Spectral-domain OCT showing smooth dome-shaped choroidal elevation (red arrow) with overlying subretinal fluid.

5. Discussion

Circumscribed choroidal hemangioma typically presents as an orange-red, well-defined posterior pole mass, as described in large clinical series by Shields et al. [2] and Dalvin et al. [3]. The absence of lipofuscin and hemorrhage helps differentiate it from amelanotic melanoma according to Witschel et al. and Shields et al. [1,2].

ICGA is particularly valuable in diagnosis. It characteristically demonstrates early hypercyanescence due to high vascular flow, followed by persistent cyanescence in the intermediate phase and relative washout in the late phase, as shown in classic angiographic studies by Anand et al. and Arevalo et al. [6,7]. This angiographic pattern differs from melanoma, which often demonstrates intrinsic vascular loops different filling characteristics, as reported by Witschel et al. and Mashayekhi et al. [1,4].

OCT findings include smooth choroidal thickening and associated subretinal fluid, as reported in multiple OCT-based studies of choroidal tumors led by Shields et al., Say et al. and Torres et al. [8,9,10]. Multimodal imaging thus provides complementary structural and vascular information for accurate diagnosis, allowing reliable differentiation from malignant choroidal tumors and avoiding unnecessary invasive procedures.

Treatment is indicated in symptomatic cases or when subretinal fluid threatens the fovea. Photodynamic therapy remains the preferred first-line treatment in such cases due to favorable visual and anatomical outcomes, as reported by Schmidt-Erfurth et al. [11] and supported by clinical reviews by Singh et al. [12].

6. Conclusion

Multimodal imaging, particularly ICGA and OCT, is fundamental in diagnosing circumscribed choroidal hemangioma. Recognition of early hypercyanescence and late-phase washout on ICGA, combined with smooth dome-shaped choroidal elevation on OCT, allows accurate differentiation from malignant choroidal tumors and guides appropriate management.

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