

Case report

Contribution of swept-source OCT-angiography in analysis of choroidal osteoma and its quiescent neovascular complications: A case study

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A B S T R A C T

Purpose: Choroidal osteoma (CO) is a rare benign tumor of the choroid. Improvements in Optical Coherence Tomography (OCT) technologies, notably swept-source (SS), enables a better visualization of the choroid with deeper signal penetration in the tissues.

Observation: We describe SS-OCT and OCT-angiography findings in a 30-year-old patient with CO. The best visualization of the choroid allows even more precise analysis beyond the identification of classical structures of trabecular bone and denser cortical bone. OCT-Angiography show in this case a quiescent choroidal neovascularization without exudation on B-scan OCT.

Conclusions and importance: SS-OCT and OCT-angiography allow a nearly histological description of choroidal osteoma.

Patient consent: Written consent to publish this case has not been obtained. This report does not contain any personal identifying information.

1. Introduction

Choroidal osteoma (CO) is a rare benign tumor of the choroid in young adults, classically red-orange, peripapillary, unilateral in 75% of cases, and made up of mature ectopic bone.^{1,2}

The visual prognosis is altered by frequent choroidal neovascularization (CNV) (31–47%)³ as well as retina alteration above the tumor decalcification. Improvements in OCT technologies, notably swept-source (SS), enables a better visualization of the choroid with deeper signal penetration in the tissues. Moreover, OCT-angiography (OCT-A) is a noninvasive imaging technique, capable of screening quiescent neovessels and abnormal choroidal vascular flow signals (B-scan flow). This article reports the case of a patient presenting CO and in whom SS-OCT-A (PLEX® Elite 9000, Carl Zeiss Meditec Inc.) imaging provided a remarkable, nearly histological description of the tumor.

1.1. Case report

This was a 30-year-old patient, with a CO on the left eye, who had presented a neovascular complication treated with four intravitreal injections of bevacizumab 2 years ago and with no exudative recurrence since that time. The examination confirmed the presence of a peripapillary CO, 8 papillary diameters, reaching the macula (Fig. 1). Aspects of pigmented migrations were observed at the surface of the tumor; they were spiculated, osteoblastic-like, resembling those observed in

retinitis pigmentosa. Visual acuity (VA) was 20/25.

On the SS-OCT, B-scan demonstrated a 755- μ m-thick domed tumor (Fig. 1). The external retina had thinned, with alteration of the retinal pigmented epithelium (RPE). The heterogenous aspect within the tumor associated hyper- and hyporeflectivity similar to trabecular bone as

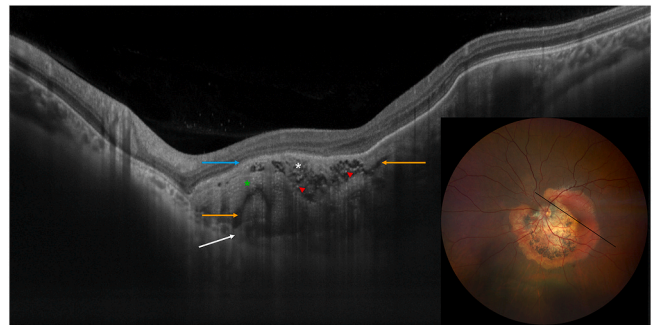


Fig. 1. 16 mm B-Scan: white star: trabecular bone; green star: denser and striated cortical bone; orange arrows: Heversian or Volkman vascular channels; red arrowheads: hyperreflective dots; blue arrow: alteration of external retinal layers and RPE above the tumor; white arrow: the external choroid seems pushed toward the outside and compressed. (For interpretation of the references to colour in this figure legend, the reader is referred to the Web version of this article.)

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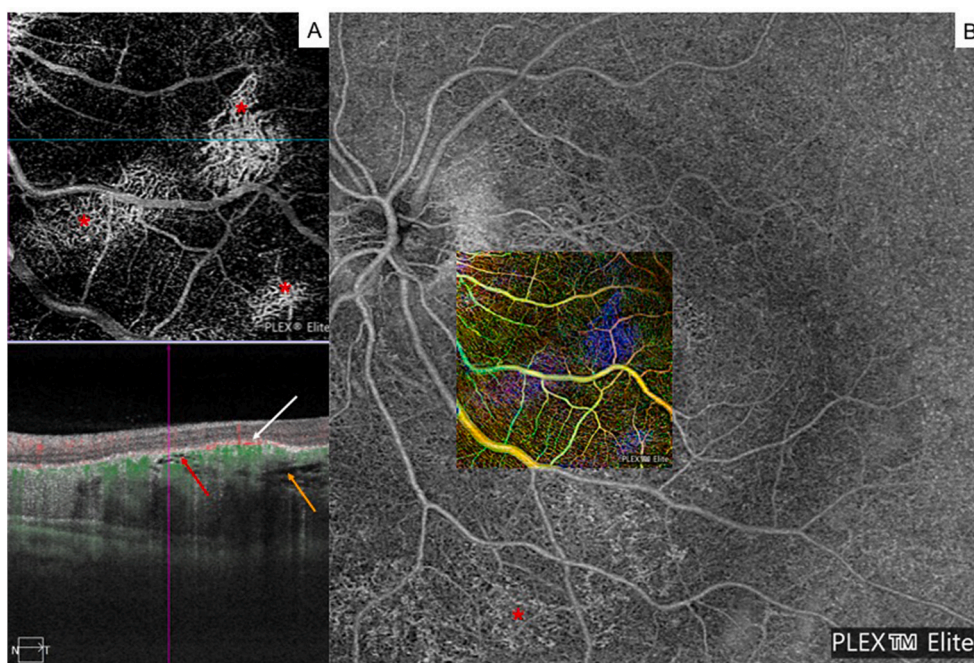


Fig. 2. A: En-face Retinal Depth Encoded of the 3×3 mm OCT-Angio cube scan, demonstration of three neovascular patches (red star); the flow area corresponding to the upper lesion (white arrow) is found in the periphery of the trabecular bone (red arrow), which presents no flow, and one of the vascular channels presents no flow (orange arrow); B: En-Face all eye slab of the 9×9 mm OCT-Angio cube scan (Slab: superficial capillary plexus), clustered microvascular abnormalities at the lower periphery of the lesion (red star). (For interpretation of the references to colour in this figure legend, the reader is referred to the Web version of this article.)

described by Williams et al. on histological sections⁽⁴⁾. The densest adjacent areas resembled cortical bone, within which was found a striated lamellar aspect, possibly cement lines.⁵ Hyperreflective dots were found within both types of bone. Moreover, hyporeflective tubular areas could correspond to bone vascular channels (Volkman or Heversian channels), as described by Shields et al.,³ even though in OCT-A no flow was detected in these canals (Fig. 2A). The En-face Retinal Depth Encoded of the 3×3 mm OCT-Angio cube scan (Fig. 2A) demonstrated three areas of quiescent neovascularization with no exudative sign found on the B-scan. The analysis of B-scan flow showed that these neovessels were at the edges of the trabecular bone in which no flow was found. Finally, the En-Face all eye slab of the 9×9 mm OCT-Angio cube scan analysis demonstrated microvascular abnormalities in clusters along the tumor edges in the superficial capillary plexus co-localized with the osteoblastic-like pigmented alterations of the fundus (Fig. 2B).

2. Discussion

The borders of a CO are easily discerned on SS-OCT, between the choroid capillary layer and the more external choroidal tissues, this is useful in monitoring tumor growth (51% of cases at 10 years).⁶ SS-OCT-A can be used to screen for CNV, here in a quiescent form, arguing in favor of more frequent OCT-A monitoring. The best visualization of the choroid allows even more precise analysis beyond the identification of classical structures of trabecular bone (heterogenous areas) and denser cortical bone (more homogenous areas), as described by Shields et al.⁵ with a spectral domain enhanced depth imaging OCT. SS-OCT technique therefore contributes data in coherence with the histological descriptions reported in the literature^{4,7}; however, the fine organization of the CO seems more anarchic than normal bone. OCT Angiography may contribute in CO to highlight the presence of multiple subclinical quiescent patches of neovascularization as reported by Arrigo et al.⁸

To our knowledge, this is the first report of three OCT signs:

- on B-scan hyperreflective dots that may indicate cell clumps: these

- cells may be immune cells as described in over retinal diseases⁹ or osteoblasts-osteoclasts in this ectopic bone,
- the absence of flow detected on flow B-scans within channels: this finding could be related to a high velocity or turbulence in the channels, so the flow is not detected by the OCT-A algorithm
- the vascular cluster aspect at the periphery of the tumor on OCT-A: co-localized with the osteoblastic-like pigmented alterations

These signs underscore the advantage of this technology in the diagnosis and follow-up of CO patients.

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Authorship

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Declaration of competing interest

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Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.ajoc.2020.100769>.

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