OPEN

# FUNDUS AUTOFLUORESCENCE PREDICTING GROWTH OF A CHOROIDAL OSTEOMA IN A 13–YEAR-OLD GIRL

Symmarana U. Desai, Uday R. Desai, MD

**Purpose:** To describe multimodal imaging findings, including fundus autofluorescence, in a patient with a growing choroidal osteoma.

**Methods:** Case report.

**Results:** A 13-year-old girl presented with an asymptomatic lesion in the superonasal macula of her left eye. Vision was correctable to 20/20 in both eyes, and the only significant finding on examination was the yellow flat lesion in the left macula. It measured 0.8-disk areas in size. Ocular coherence tomography showed a space occupying lesion in the choroid that had horizontal hyper-reflective lines consistent with cancellous bone. Re-examination in a year showed enlargement. Fundus autofluorescence showed no abnormalities in either eye. Ultrasonography showed a hyper-reflective lesion with associated shadowing that was consistent with a choroidal osteoma.

**Conclusion:** Normal fundus autofluorescence was seen in this young girl with a growing choroidal osteoma. Fundus autofluorescence is a proxy for the health of the retinal pigment epithelium. Normal retinal pigment epithelium is the only factor found to be predictive of future growth of a choroidal osteoma. This noninvasive test may prove useful as a guide to determine frequency of examinations especially in younger patients who might be prone to more rapid growth.

**RETINAL CASES & BRIEF REPORTS** 15:734–737, 2021

*From the Department of Ophthalmology, Henry Ford Health System, Detroit, Michigan.*

Choroidal osteoma is a rare, benign tumor that forms as mature bone replaces the choroid. When a choroidal osteoma is present, the fundus examination typically reveals a yellow-white macular lesion; ultrasound examination reveals a highly reflective choroidal mass with shadowing. The lesion is commonly found in the peripapillary or juxtapapillary region and frequently involves the macula. Although 79% of cases are unilateral, bilateral cases have also been reported. It is typically found in young women, and the median age of diagnosis is 26 years. Patients are usually asymptomatic unless they develop subfoveal retinal pigment epithelial damage or an associated choroidal neovascularization.[1–4] Lesions can grow over time, but they eventually stabilize, decalcify, and stop growing. Growth occurs in approximately 50% of cases over several months to years.[5,6] There is currently no proven method of halting the growth of a choroidal osteoma. We report a case of an enlarging choroidal osteoma in a 13-year-old girl with normal fundus autofluorescence (FAF). This imaging modality is a good proxy for determination of the health of the retinal pigment epithelium and may be useful in determining the likelihood of growth of a choroidal osteoma.

## Case Report

A 13-year-old African American girl was first evaluated because of a "raised retinal lesion" of the left eye. The patient was asymptomatic and was brought in solely for a retinal evaluation. Her ocular history was significant only for mild myopia of approximately −1.50 diopters.

None of the authors has any financial/conflicting interests to disclose.



Reprint requests: Uday R. Desai, MD, Department of Ophthalmology, Henry Ford Health System, K-10, 2799 West Grand Blvd, Detroit, MI 48202; e-mail: udesai1@hfhs.org

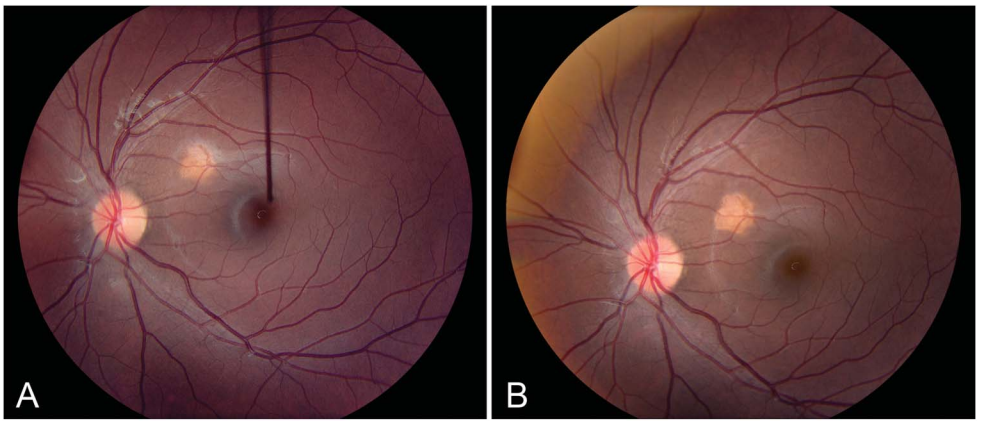


**Fig. 1. A.** The left eye shows a flat yellow lesion superonasal to the fovea that is deep to the retina. **B.** One year later, the edges of the lesion are larger. The overlying neurosensory retina is unaffected.

Her medical history was remarkable for frequent headaches, although she was on no medications. Her best-corrected visual acuity was 20/20 in the right eye and 20/20 in the left eye. The external structures and anterior segment appeared normal in both eyes. There was no evidence of inflammation. Fundus examination showed excellent foveal reflexes in both eyes; however, it also showed a lesion in the superonasal macula of the left eye (Figure 1A). This lesion was yellow in color, not elevated, and was approximately 0.8-disk areas. Ocular coherence tomography showed a space occupying lesion in the choroid (Figure 2). The patient was seen in follow-up 1 year later. She was still asymptomatic, but the lesion had noticeably grown in size (Figure 1B). Fundus autofluorescence (Figure 3) was normal in both eyes, but B-scan ultrasonography (Figure 4) revealed the lesion to be hyper-reflective with associated shadowing. The examination was consistent with a nondecalcified, growing choroidal osteoma. As she is currently asymptomatic without foveal involvement and without associated choroidal neovascularization, she is being closely observed every 3 months to 4 months.


**Fig. 2.** The vertical and horizontal cross-sections show the space occupying lesion in the choroid. Horizontal hyper-reflective lines in the lesion are consistent with cancellous bone. The overlying retina is unaffected.

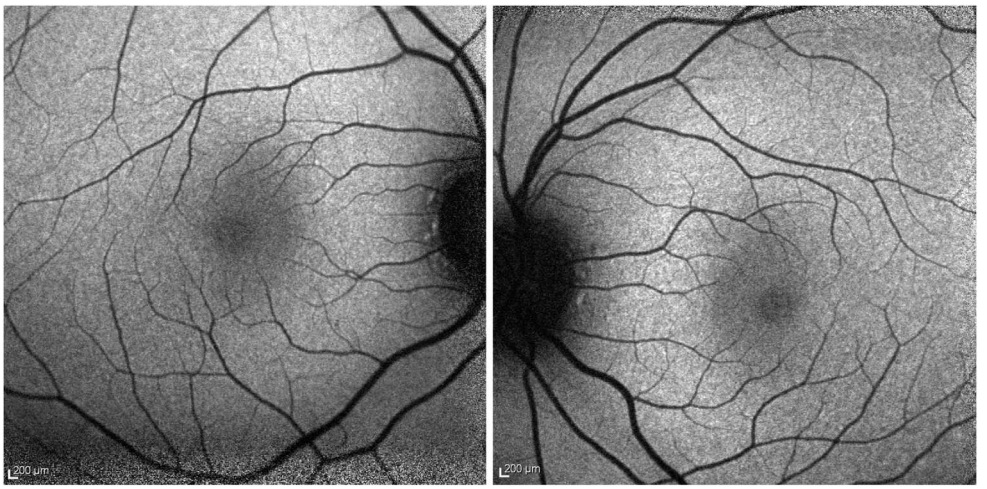

**Fig. 3.** Fundus autofluorescence is normal and symmetrical in both eyes.

## Discussion

The 10-year probability of tumor growth of a choroidal osteoma was reported to be 41% by Aylward et al[5] and 51% by Shields et al.[6] In their study, Shields found that the growth of the tumor was random with no predilection for any particular margin. For those tumors that grew, the rate was 0.37 mm of mean basal diameter per year. The only factor predictive of growth was the absence of overlying retinal pigment epithelial alteration. In addition, their study also showed that partial decalcification of the tumor was associated with an absence of growth.

Our patient showed growth over a 1-year time frame. The FAF was normal and is a quick noninvasive method to verify the health of the overlying retinal pigment epithelium. As such, the lack of overlying retinal pigment epithelium alteration is an indication that the patient is at risk for continued growth. Sisk et al[7] showed that patients with partial decalcification could have patterns of hyperautofluorescence and granular hypoautofluorescence. The varying patterns on FAF could potentially be used as a quick guide to the likelihood of growth. Mizota et al[8] has postulated that rapid growth may occur in younger patients. If this is true, these patients may be more at risk of visual loss with foveal involvement.

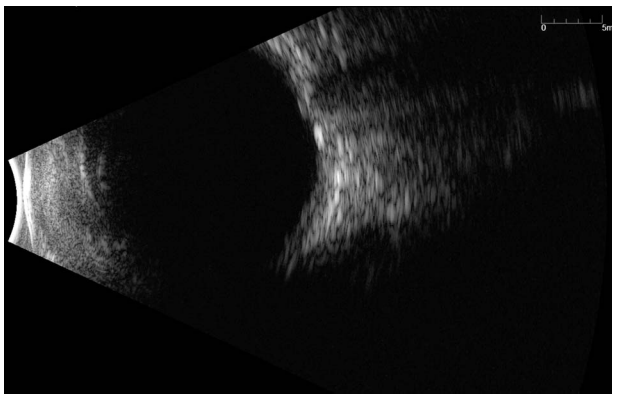

**Fig. 4.** B-scan ultrasonography shows a horizontal slice. The top of the image is nasal, and the bottom is temporal. The hyper-reflective lesion is seen with posterior shadowing. It lies in the macula temporal to the optic nerve.

We feel that frequent evaluations with FAF may be necessary with patients with a normal autofluorescence pattern because they may be at risk for growth. Conversely, if their FAF shows an alteration consistent with decalcification, the follow-ups may not need to be as frequent. Being a noninvasive test, FAF can be easily administered to younger patients. Closer follow-up may pick up a rapidly growing tumor before it threatens the fovea. Although there is no particular treatment that is recommended for a choroidal osteoma without an associated choroidal neovascularization, thermal laser or photodynamic laser could be considered as a means to induce decalcification and involution in a tumor that is rapidly progressing toward the fovea.

We understand that our observation on the potential utility of FAF in the management of choroidal osteoma is based on a single case, and studies with longer follow-up and larger case series will help validate this observation.

**Key words:** autofluorescence, choroid, choroidal osteoma, osteoma.

## References

1. Joffe L, Shields JA, Fitzgerald JR. Osseous choristoma of the choroid. Arch Ophthalmol 1978;96:1809–1812.
2. Gass JDM, Guerry RK, Jack RL, Harris G. Choroidal osteoma. Arch Opthalmol 1978;96:428–435.
3. Kadrmas EF, Weiter JJ. Choroidal osteoma. Int Ophthalmol Clin 1997;37:171–182.

4. Shields CL, Shields JA, Augsburger JJ. Choroidal osteoma. Surv Ophthalmol 1988;33:17–27.
5. Aylward GW, Chang TS, Pautler SE, Gass JD. A long-term follow-up of choroidal osteoma. Arch Ophthalmol 1998;116:1337–1341.
6. Shields CL, Sun H, Demirci H, Shields JA. Factors predictive of tumor growth, tumor decalcification, choroidal neovascularization, and visual outcome in 74 eyes with choroidal osteoma. Arch Ophthalmol 2005;123:1658–1666.
7. Sisk RA, Riemann CD, Petersen MR, et al. Fundus autofluorescence findings of choroidal osteoma. Retina 2013;33:97–104.
8. Mizota A, Tanabe R, Adachi-Usami E. Rapid enlargement of choroidal osteoma in a 3-year-old girl. Arch Ophthalmol 1998;116:1128–1129.