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A White Retinal Lesion With Calcification in an 11-Year-Old Boy

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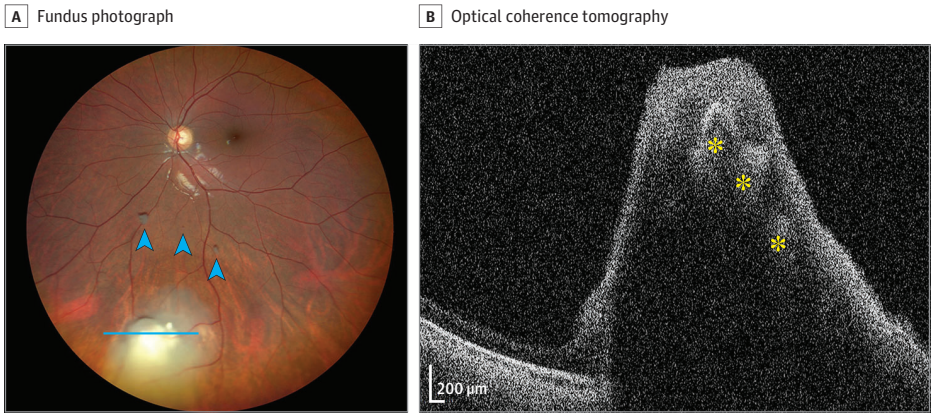

Figure. A, Left eye fundus photograph showing the white retinal lesion and vitreous seeds (arrowheads). B, Optical coherence tomography confirming an intraretinal tumor with calcification (asterisks). Scan noise due to the lesion's peripheral location.

An 11-year-old boy was referred to assess a retinal mass in the left eye found on his first routine ophthalmic evaluation. He reported no present or past ocular symptoms and had negative findings on a review of systems. His history included full-term birth by cesarean delivery from an uncomplicated pregnancy. He had healthy, nonconsanguineous parents.

The ocular examination showed a visual acuity of 20/20 OU with no anterior segment abnormalities. Findings of dilated fundus examination of the right eye were within normal limits. In the left eye, a white, translucent solid lesion with calcification was noticeable in the inferonasal quadrant (**Figure**, A). The lesion measured approximately 1.6 mm in height, exhibited mild underlying chorioretinal changes, and had associated 3 vitreous seeds (Figure, A). There were no signs of internal vascularization or vitritis. Optical coherence tomography confirmed an intraretinal location and calcified deposits within the lesion (Figure, B).

WHAT WOULD YOU DO NEXT?

- **A.** Order orbital magnetic resonance imaging
- **B.** Biopsy the lesion
- **C.** Request genetic testing and monitor
- **D.** Rule out infectious diseases

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Diagnosis

Retinoma

What to Do Next

C. Request genetic testing and monitor

Discussion

Retinoma is a white-gray gelatinous retinal tumor with chalky calcification that resembles retinoblastoma but lacks aggressive intraocular or systemic behavior.[1,2] Key features distinguishing retinoma from retinoblastoma include underlying chorioretinal changes, indicative of a chronic and quiescent state, and absence of vascularization or subretinal fluid.[1-4] Vitreous seeds may seldomly accompany retinomas as inactive spheres floating in the vitreous in front of the retina, carrying an uncertain clinical significance that contrasts to retinoblastoma seeds, known to represent worse disease staging and prognosis.[3,5]

While retinoblastoma is mainly diagnosed in the first months or years of life by the presence of leukocoria and strabismus, retinomas can be detected incidentally during fundoscopy at any age, being more commonly discovered in relatives of patients with retinoblastoma.[1-3] Indeed, molecular studies using samples from eyes with simultaneous retinoma and retinoblastoma demonstrated that the retinoma areas in these patients exhibit inactivation of both *RB1* alleles similar to the retinoblastoma areas, missing the additional variant events required for full-spectrum retinoblastoma.[6] For this reason, a new case of retinoma should be promptly screened for *RB1*

gene variation (choice C) to allow adequate patient counseling and guidance for testing of relatives.[2,6] The lifelong risk for retinoma transformation into retinoblastoma in the general population has been estimated at up to 15% in 20 years.[3]

The diagnosis of retinoma relies on clinical findings supported by ancillary imaging and genetic testing, differentiating this condition from other pediatric retinal neoplasms, particularly astrocytic hamartomas. In this sense, optical coherence tomography can be helpful to noninvasively outline the intraretinal origin of retinoma/retinoblastoma instead of the superficial retina, as seen in hamartomas.[7-9] B-scan ultrasonography, on the other hand, can highlight tumor calcification and provide consistent size documentation over time. Tumor biopsy (choice B) is not recommended for retinoma diagnostic confirmation owing to potential complications, including tumor seeding in case of masked retinoblastoma.

In the present case, infectious disease workup (choice D) would not be the first course of action, considering the highly suggestive clinical findings for a solid tumor and absence of signs of uveitis, such as vitreous cellularity. Despite being routinely performed for retinoblastoma diagnosis and staging,[2] magnetic resonance imaging would be formally required only to delineate retinomas that involve the optic nerve or in the context of associated retinoblastoma to elucidate high-risk features (choice A). No treatment has so far been demonstrated effective in retinoma unless changes occur indicating conversion into retinoblastoma, as revealed by increasing retinal exudation, growth in size, seeds enlargement, or evolving vascularization.[3,8]

Patient Outcome

The patient was referred for genetic testing and was not found to have the *RB1* variant, meaning he carries less than a 1% chance of hereditary retinoma.[2,6] The parents and siblings were examined and found to have normal retinas. He has been surveilled using ophthalmoscopy, photographic documentation, and tumor mensuration by ultrasonography and/or optical coherence tomography every 6 to 12 months.

ARTICLE INFORMATION

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REFERENCES

1. Gallie BL, Ellsworth RM, Abramson DH, Phillips RA. Retinoma: spontaneous regression of retinoblastoma or benign manifestation of the mutation? *Br J Cancer*. 1982;45(4):513-521. doi:10.1038/bjc.1982.87

2. Soliman SE, Racher H, Zhang C, MacDonald H, Gallie BL. Genetics and molecular diagnostics in retinoblastoma—an update. *Asia Pac J Ophthalmol (Phila)*. 2017;6(2):197-207.

3. Shields CL, Srinivasan A, Lucio-Alvarez JA, Shields JA. Retinocytoma/retinoma: comparative analysis of clinical features in 78 tumors and rate of transformation into retinoblastoma over 20 years. *J AAPOS*. 2021;25(3):147.e1-147.e8. doi:10.1016/j.jaapos.2020.11.024

4. Dimaras H, Khetan V, Halliday W, Héon E, Chan HS, Gallie BL. Retinoma underlying retinoblastoma revealed after tumor response to 1 cycle of chemotherapy. *Arch Ophthalmol*. 2009;127(8):1066-1068. doi:10.1001/archophthalmol.2009.178

5. Gallie BL, Soliman S. Retinoblastoma. In: Lambert B, Lyons C, eds. *Taylor and Hoyt's Paediatric Ophthalmology and Strabismus*. 5th ed. Elsevier; 2016.

6. Dimaras H, Khetan V, Halliday W, et al. Loss of RB1 induces non-proliferative retinoma: increasing genomic instability correlates with progression to retinoblastoma. *Hum Mol Genet*. 2008;17(10):1363-1372. doi:10.1093/hmg/ddn024

7. Soliman SE, VandenHoven C, MacKeen LD, Héon E, Gallie BL. Optical coherence tomography-guided decisions in retinoblastoma management. *Ophthalmology*. 2017;124(6):859-872. doi:10.1016/j.ophtha.2017.01.052

8. Nadiarnykh O, McNeill-Badalova NA, Gaillard MC, et al. Optical coherence tomography (OCT) to image active and inactive retinoblastomas as well as retinomas. *Acta Ophthalmol*. 2020;98(2):158-165. doi:10.1111/aos.14214

9. Shields CL, Say EAT, Fuller T, Arora S, Samara WA, Shields JA. Retinal astrocytic hamartoma arises in nerve fiber layer and shows "moth-eaten" optically empty spaces on optical coherence tomography. *Ophthalmology*. 2016;123(8):1809-1816. doi:10.1016/j.ophtha.2016.04.011