Optical coherence tomography angiography of a retinal astrocytic hamartoma

Retinal astrocytic hamartomas are rare, benign glial tumours that most commonly accompany tuberous sclerosis complex but may occur with neurofibromatosis type 1 or as isolated cases. We present a case of an isolated retinal astrocytic hamartoma, evaluated with multimodal imaging including spectral domain optical coherence tomography (SD-OCT), en face OCT, and OCT angiography. OCT angiography is a novel, noninvasive method for analyzing the retinal capillary system. This modality revealed a central feeder vessel with an associated abnormal vascular plexus, which correlated with the topographic location of the tumour on en face OCT. This is the first report on the use of OCT angiography to characterize an astrocytic hamartoma and its associated vasculature.

A 49-year-old female with a history of diabetic retinopathy was referred for an incidental retinal lesion in the right eye. The patient had no related history of tuberous sclerosis complex or neurofibromatosis type 1. Visual acuity with correction was 20/40 OD and 20/25 OS. Retinal examination revealed a flat, grey-white, opalescent lesion with ill-defined borders in the superotemporal macula of the right eye (Fig. 1A, B). Scattered retinal microaneurysms consistent with mild nonproliferative diabetic retinopathy were noted bilaterally.

Fluorescein angiography demonstrated minimal hyperfluorescence of the lesion during the filling phase and mild late staining (Fig. 1C, D). SD-OCT demonstrated marked nerve fibre layer thickening with preservation of the underlying layers (Fig. 2A, B). The lesion gradually transitioned to the surrounding tissue, without evidence of retinal traction or calcification.

OCT angiography was obtained using RTVue XR Avanti with Angiovue (Optovue, Inc, Fremont, California, USA.) and enhanced with split-spectrum amplitude decorrelation angiography and motion correction software. Segmentation parameters were adjusted to transect the deep capillary plexus with the upper offset at −82 μm and the

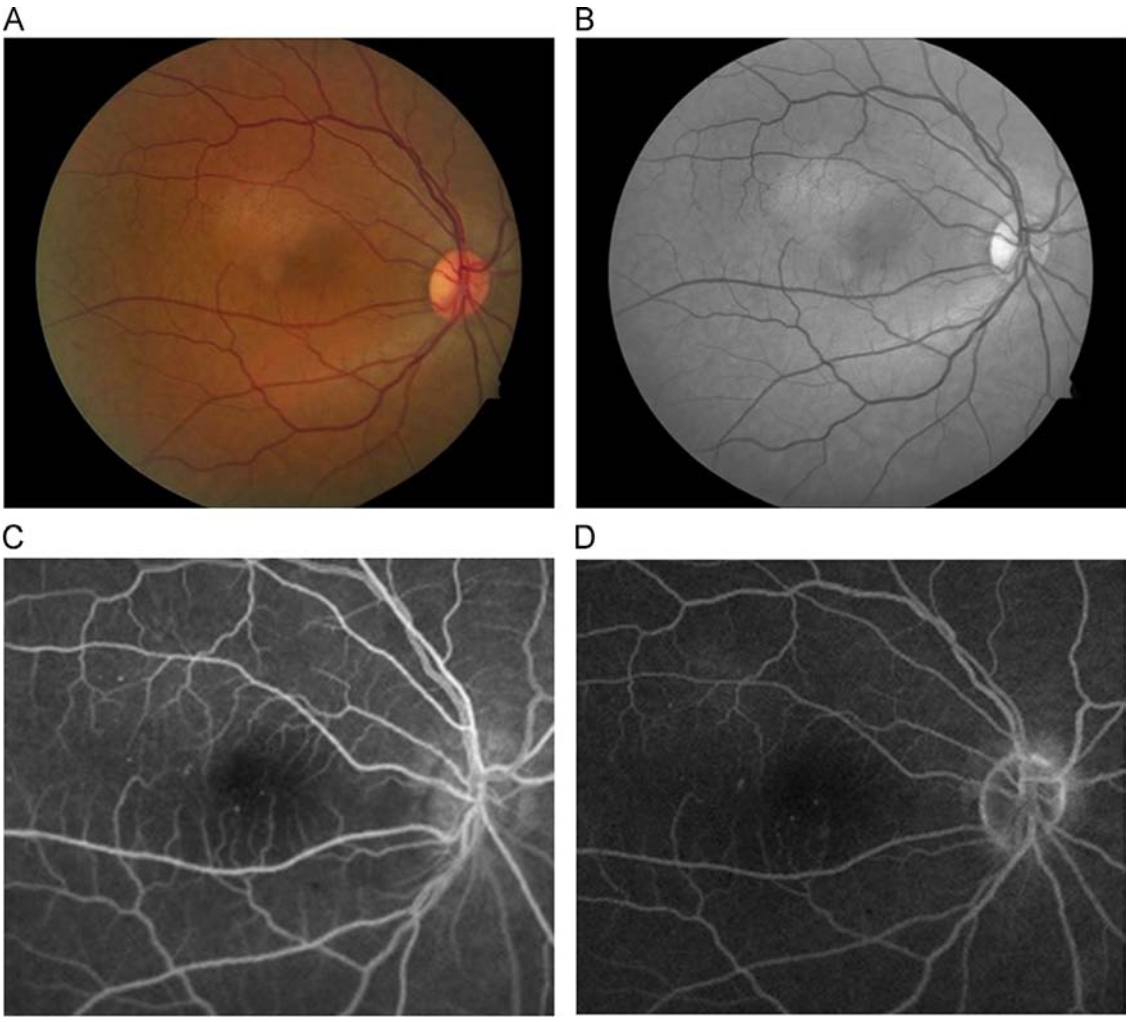

Fig. 1—Multimodal imaging findings of a retinal astrocytic hamartoma. (A) Colour fundus photography and (B) red-free fundus photography of the right eye show a grey-white lesion with ill-defined borders superotemporal to the fovea. (C) Fluorescein angiography shows minimal hyperfluorescence at 25 seconds and (D) minimal late staining at 5 minutes and 37 seconds.

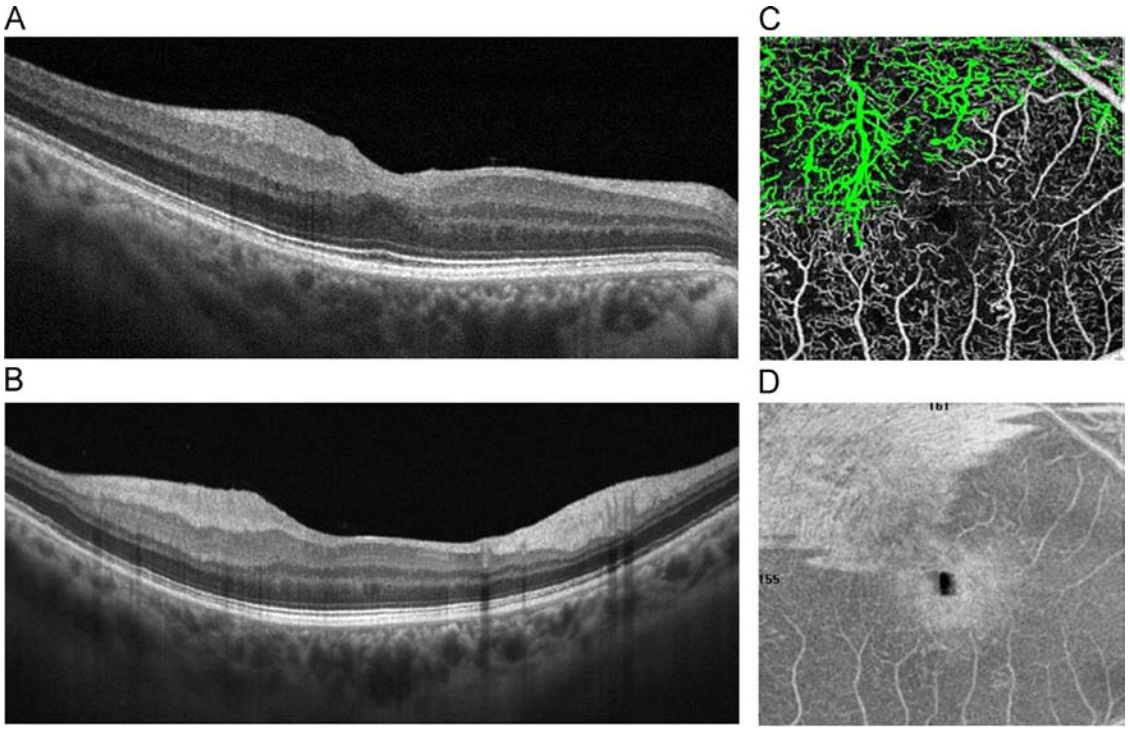

Fig. 2—SD-OCT, OCT angiography, and en face OCT of a retinal astrocytic hamartoma. SD-OCT transecting (A) the fovea and (B) the centre of the lesion demonstrates nerve fibre layer thickening. (C) OCT angiography reveals a feeder vessel with an abnormal capillary plexus, highlighted in green. (D) En face OCT maps the tumour to the nerve fibre layer. SD-OCT, spectral domain optical coherence tomography.

lower offset at −28 μm. The resultant image revealed a feeder vessel and an associated abnormal vascular plexus (Fig. 2C), which was highlighted using the publically available GNU Image Manipulation Program GIMP (www.gimp.org) 2.8.14. En face OCT isolated the lesion at the level of the nerve fibre layer and localized the feeder vessel within the central core of the tumour (Fig. 2D).

Retinal astrocytic hamartomas present an interesting diagnostic challenge because of the variable clinical presentation and lack of well-established guidelines for characterization by OCT. Recently, Serafino et al. described 4 classifications of astrocytic hamartomas on SD-OCT: flat and within the nerve fibre layer (type 1), slight elevation with retinal traction (type 2), associated "moth-eaten" areas caused by calcification (type 3), and associated optically empty intralesional cavities (type 4).[3] Our patient demonstrated a type 1 lesion, the clinical findings of which were consistent with previous reports,[4] although few SD-OCT descriptions exist in the literature.

The differential diagnosis for astrocytic hamartoma includes presumed solitary circumscribed retinal astrocytic proliferation (PSCRAP) and myelination of the nerve fibre layer. PSCRAP lesions show abrupt retinal elevation with posterior shadowing on OCT, whereas type 1 astrocytic hamartomas gradually transition to normal retina in the absence of posterior shadowing.[5] Myelination of the nerve fibre benign, idiopathic and presents as a chalk-white superficial retinal lesion with feathery borders.[6] SD-OCT shows a thickened nerve fibre layer with hyper-reflectivity likely due to myelin.

En face OCT and OCT angiography use high-density volume scanning to detect motion contrast and blood flow at depth-resolved levels of the retina, providing a novel method to delineate macular lesions.[2] In this case, OCT angiography demonstrated a central feeder vessel, spatially correlated to the lesion on en face OCT, that was not identified with clinical examination or fluorescein angiography. Astrocytic hamartomas have yet to be associated with feeder vessels, although reports of macular edema and neovascular glaucoma suggest a vasogenic association.[1]

OCT is an essential tool for analyzing retinal lesions. We describe the atypical appearance of a type 1 astrocytic hamartoma on SD-OCT. We also present the first report of an astrocytic hamartoma characterized by en face OCT and OCT angiography, demonstrating the value of detecting abnormal retinal vasculature.

Disclosure: The authors have no proprietary or commercial interest in any materials discussed in this article.

Acknowledgements: D.S. has received research grants from Genentech and Regeneron, and a research machine from Optovue, Inc.

Madeline Yung, [*] **Nicholas Iafe,** [*] **David Sarraf** [*,†]
[*]Stein Eye Institute, David Geffen School of Medicine at University of California, Los Angeles, Calif; [†]Greater Los Angeles VA Healthcare Center, Los Angeles, Calif.

Correspondence to:
David Sarraf, MD: dsarraf@ucla.edu

References

1. Shields JA, Shields CL. Glial tumors of the retina. The 2009 King Khaled Memorial Lecture. *Saudi J Ophthalmol.* 2009;23:197-201.
2. Nagiel A, Sadda SR, Sarraf D. A promising future for optical coherence tomography angiography. *JAMA Ophthalmol.* 2015;133:629-30.
3. Serafino M, Pichi F, Giuliari GP, Shields CL, Ciardella AP, Nucci P. Retinal astrocytic hamartoma: spectral-domain optical coherence tomography classification and correlation with tuberous sclerosis complex. *J Am Assoc Pediatr Ophthalmol Strabismus.* 17:e27.
4. Goel N, Pangtey B, Bhushan G, Raina UK, Ghosh B. Spectral-domain optical coherence tomography of astrocytic hamartomas in tuberous sclerosis. *Int Ophthalmol.* 2012;32:491-3.
5. Shields JA, Bianciotto CG, Kivela T, Shields CL. Presumed solitary circumscribed retinal astrocytic proliferation: the 2010 Jonathan W. Wirtschafter Lecture. *Arch Ophthalmol.* 2011;129:1189-94.
6. Shelton JB, Digre KB, Gilman J, Warner JE, Katz BJ. Characteristics of myelinated retinal nerve fiber layer in ophthalmic imaging: findings on autofluorescence, fluorescein angiographic, infrared, optical coherence tomographic, and red-free images. *JAMA Ophthalmol.* 2013;131:107-9.

Can J Ophthalmol 2016;51:e62–e64
0008-4182/16/$-see front matter Published by Elsevier Inc on behalf of the Canadian Ophthalmological Society.
http://dx.doi.org/10.1016/j.jcjo.2015.11.005

Use of a urinary catheter to prevent fogging of the BIOM lens during vitrectomy

The use of noncontact wide-angle viewing systems to perform vitrectomies has been widely adopted by vitreoretinal surgeons.[1] Fogging of the Binocular Indirect Ophthalmo Microscope (BIOM 4; Oculus Surgical, Port St. Lucie, Fla.) lens during vitrectomy can be a problem in patients with deep-set orbits and in patients with small pupils in whom the BIOM lens has to be placed in close proximity to the cornea.[2] Fogging is thought to be caused by humidity originating from the surface of the eye condensing on the cold BIOM lens. Antifogging agents applied to the BIOM lens have limited efficacy, and previously reported warming of the BIOM lens prevents buildup of condensation only when the procedure is short.[3] We describe an alternative simple method to avoid fogging of the BIOM lens.

The tip of a 14FR red latex urethral catheter is trimmed tangentially, leaving a rectangular opening on one side of the catheter. After proper draping of the surgical eye, and after placing the speculum, the trimmed tip is taped to the surgical drape as close to the medial canthus as possible using Steri-Strip™ skin adhesives (3M, Minneapolis, Minn.) (Fig. 1). The other end of the catheter is connected with tubing to a wall suction outlet. The vacuum generated at the tip of the catheter in the medial canthal area removes the moisture generated by the ocular surface, and prevents the buildup of condensation on the viewing lens.

We have used this technique during vitrectomy in around 400 cases. We have noted that the lens remains free of moisture for extended periods, even when it is in proximity to the cornea. When properly placed, the tube does not interfere with the movement of the BIOM lens or with instrument exchange in the nasal trocar. We also noted that the hissing sound generated by the vacuum at the tip of the catheter can be adjusted by decreasing the level of vacuum in the wall suction outlet without compromising the defogging ability of the catheter. The cost of a single sterile 14FR urinary catheter is around US $23.00, adding a minimal amount to the cost of surgery.

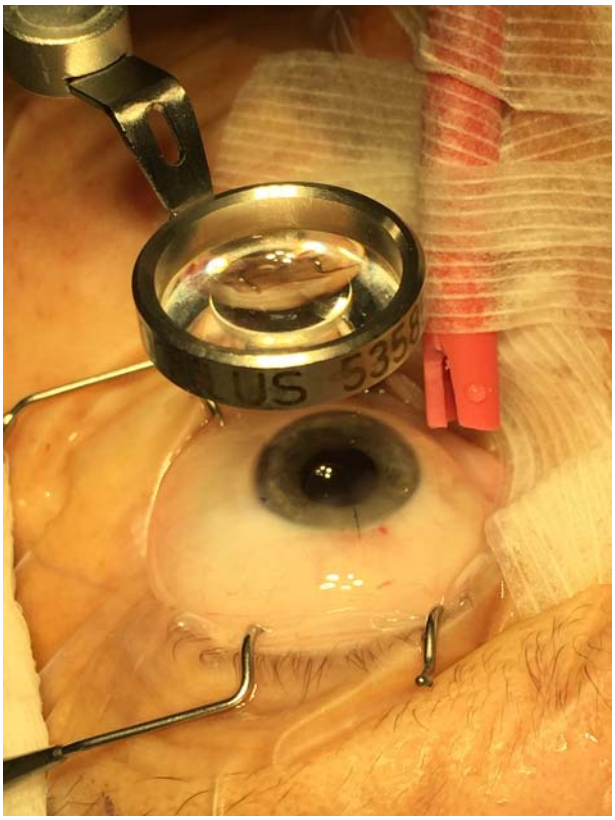

Fig. 1—Trimmed edge of the urinary catheter taped the medial canthus, with the BIOM lens in position.

The use of a 14FR urinary catheter connected to suction is a simple and affordable technique to prevent fogging of the BIOM lens during vitrectomy surgery.

Acknowledgements: Supported in part by Research to Prevent Blindness and the Pat & Willard Walker Eye Research Center.