Optical coherence tomography (OCT) is commonly used in glaucoma diagnosis and management. Thinning of the retinal nerve fiber layer (RNFL), measured using OCT, is indicative of glaucoma progression. Progressive glaucomatous change is also seen as increased cupping of the optic nerve. Three patients with uveitic glaucoma made us question this paradigm, and we urge physicians to use caution when relying on these modalities to evaluate such patients. This study was approved by the Duke University Institutional Review Board. A waiver of consent was obtained from all patients.

Report of Cases

Case 1
A 27-year-old man with bilateral uveitis secondary to Behcet disease was first evaluated in the glaucoma clinic 6 months after a fluocinolone acetonide–sustained drug delivery implant had been placed in both eyes. Visual acuity was 20/20 OU, intraocular pressure (IOP) was 22 mm Hg OU with 2 glaucoma eyedrops, and the slitlamp examination revealed quiet anterior chambers. He was bilaterally pseudophakic with symmetric cup-disc ratios (CDRs) of 0.5. Initial RNFL OCT was interpreted as normal in both eyes (Figure 1A). Six months later, IOP was 32 mm Hg OU, and the ophthalmic examination was otherwise unchanged. In both eyes, follow-up RNFL OCT demonstrated early inferotemporal thinning with mild superotemporal thickening (Figure 1B), and automated perimeter revealed new superior arcuate changes. An Ahmed glaucoma tube was placed sequentially in both eyes. Two months postoperatively, he had an IOP of 12 mm Hg OU with 2 glaucoma eyedrops, no uveitis activity, but an increased CDR of 0.8 in both eyes. Optical coherence tomography documented further RNFL thinning both superotemporally and inferotemporally (Figure 1C). Increased frequency of IOP checks revealed a stable IOP in the low teens at all visits. Three months later, IOP and clinical examination were stable, but overall severe progressive RNFL OCT thinning was noted (Figure 1D). Subsequent visits for the next 2 years, however, were unchanged, with a stable visual field, IOP, and RNFL.

Case 2
A 73-year-old man with a visual acuity of 20/20 OS and an IOP of 24 mm Hg with no eyedrops in the left eye had been diagnosed with idiopathic unilateral uveitis. Slitlamp examination revealed low-grade anterior uveitis in the left eye with a CDR of 0.7 and an inferior notch. Baseline RNFL OCT demonstrated corresponding inferotemporal thinning (Figure 2A). The inflammation resolved with a several-month slow taper of topical corticosteroids while the IOP was treated with topical medications. One year later, he had an IOP of 35 mm Hg OS with 3 glaucoma eyedrops, an active low-grade anterior uveitis, and early posterior synechiae formation. The CDR was unchanged, and RNFL OCT demonstrated slight thickening compared with the previous year (Figure 2B). The patient’s inflammation and IOP responded to topical corticosteroids, and he...
A year later, the patient sought treatment for headaches. She had an IOP of 60 mm Hg OD. Slitlamp examination revealed pericentral visual field loss consistent with secondary open-angle glaucoma. A baseline RNFL OCT was interpreted as normal (Figure 2A). Optical coherence tomography in the unaffected eye remained stable.

Overall, the patient achieved stability on a once-every-other-day corticosteroid regimen. At last follow-up 6 months later, he had an IOP of 11 mm Hg OS with 3 glaucoma eyedrops, with no uveitic activity detected.

**Case 3**

A 61-year-old woman with early open-angle glaucoma had a visual acuity of 20/20 OD and an IOP of 19 mm Hg OD with 1 glaucoma eyedrop. The CDR was 0.5, visual fields were full, and a baseline RNFL OCT was interpreted as normal (Figure 3A). A year later, the patient sought treatment for headaches. She had an IOP of 60 mm Hg OD. Slitlamp examination revealed low-grade anterior uveitis (diagnosed as idiopathic, with no significant inflammation, and a CDR of 0.7 with inferior thinning. She started to receive topical corticosteroids, and the following day, her IOP was 19 mm Hg OD. On OCT, the RNFL was thinned and CDR was 0.9 with inferior thinning (Figure 3B). A month later, she had decreased inflammation with topical corticosteroids, but an IOP of 35 mm Hg OD with 3 glaucoma eyedrops. On OCT, the RNFL had mild inferior thinning (Figure 3C). A trabeculectomy with mitomycin C was performed. Her postoperative course was uncomplicated, and at a follow-up 2 months later, she had an IOP of 18 mm Hg OD with 1 once-daily topical corticosteroid, no uveitic activity, and a CDR of 0.8 with an inferior notch. On OCT, there was progressive superotemporal and inferotemporal RNFL thinning (Figure 3D) with further severe global RNFL thinning 5 months later (Figure 3E). Optical coherence tomography in the unaffected eye remained stable.
Changes of RNFL Thickness in Uveitic Glaucoma

Figure 2. Sequential RNFL OCT Scans in Unilateral Anterior Uveitis

A, Baseline retinal nerve fiber layer (RNFL) scan demonstrating inferotemporal thinning. B, Follow-up 1 year later during mild uveitis flare-up with slight RNFL thickening compared with previously. C, Subsequent scan 6 months later after quiescence of uveitis with significant global thinning compared with previous scans.

Figure 3. Thicking Followed by Thinning of RNFL Measurements Associated With Flare-up and Control of Uveitis

A, Baseline retinal nerve fiber layer (RNFL) scan interpreted as normal. B, Follow-up 1 year later during mild uveitis flare-up demonstrating overall thickening of the RNFL. C, Repeat scan 1 month following resolution of uveitic activity with mild inferior thinning of the RNFL. D, Scan 2 months after trabeculectomy showing progressive RNFL thinning superotemporally and inferotemporally. E, Scan 5 months after trabeculectomy showing severe progressive RNFL thinning globally.
Discussion

These cases highlight a previously unreported phenomenon in patients with uveitic glaucoma: “normal” RNFL measurements obtained during uncontrolled periods of uveitic activity with subsequent thinning following control of uveitis. These cases also demonstrate that despite apparent control of IOP and continued uveitis quiescence, the RNFL continued to thin and the optic nerve had increased cupping.

When glaucoma is superimposed in an eye with uveitis, a normal-appearing RNFL thickness\textsuperscript{1-4} could lead a physician to be less aggressive in the management of IOP. Conversely, if a uveitis-associated normal-appearing RNFL becomes thinner due to uveitis control, it may appear as glaucoma progression. This finding may lead the physician to inappropriately conclude there has been an abrupt worsening of the glaucoma. When interpreting these measurements, physicians should recognize that normal values are for eyes without disease such as uveitis, thickness may vary with uveitic activity, and clinical judgment should be used to determine appropriate treatment.

Furthermore, on ophthalmoscopic evaluation, the optic nerve head may erroneously appear normal. We hypothesize that this normal-appearing optic nerve is likely due to subclinical RNFL edema,\textsuperscript{5} and after appropriate uveitis control, the edema resolves, the cupping increases and the RNFL thickness decreases, occasionally to the dramatic degree demonstrated earlier. Two patients showed an increase in RNFL thickness with increased inflammation, indicating that some of the thickness was secondary to edema. Furthermore, increased thickness of the RNFL noted after cataract or glaucoma surgery\textsuperscript{6-8} could be due to mild uveitis that accompanies the postoperative course. Since none of the eyes demonstrated clinical edema, fluorescein angiograms were not obtained. It is possible that such testing may help determine if the normal-appearing nerve actually has some edema by revealing leakage. Although such a phenomenon could be due to resolution of RNFL edema, confirmation that a normal and stable IOP has been achieved is necessary in patients with uveitic glaucoma due to the labile nature of IOP control in such eyes.

REFERENCES